



STANSW  
*young*

# Scientist Awards

The STANSW Young Scientist Awards is a major project of the Science Teachers' Association of New South Wales

STANSW acknowledges the assistance of the following organisations for their contributions to the Young Scientist Awards in 2015

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## Presentation Ceremony

McKinnon Building  
University of Wollongong  
Main Campus

4th November, 2015

Hosted and Sponsored by:

UNIVERSITY OF  
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## PROGRAM

### Introduction

Stuart Garth, STANSW Young Scientist Awards Coordinator

### Master of Ceremonies

Philippa Miller, STANSW Councillor and STANSW Young Scientist Awards Committee Member

### Welcome Address

Professor Chris Cook, Executive Dean, Engineering and Information Sciences, University of Wollongong

### Presentation of Models and Inventions Awards

### Video Presentation of the Young Scientist Paper Plane Challenge

### Presentation of Scientific Investigations Awards

### Announcement of BHP Billiton Science and Engineering Awards' Teacher Finalist Representative from NSW

Margaret Shepherd, Treasurer, Science Teachers' Association of NSW

### Presentation of STANSW Most Promising Awards

### Keynote Address

Dr Chris Read, Australian Museum

### Presentation of Sponsored Awards Part I

### Message from a Sponsor

Peter Bowditch, Australian Skeptics

### Presentation of Sponsored Awards Part II

### Message from 2014 Young Scientist of the Year

Chanum Torres, Year 11 Student

### Presentation of Grand Awards

Dagmar Arthur McCloughan, ISEF Panel Chair and Education Consultant, ACARA

### Closing address

Margaret Shepherd, Treasurer, Science Teachers' Association of NSW

## MESSAGE FROM THE PRESIDENT



As President of the Science Teachers' Association of NSW, I would like to congratulate all the students receiving an award tonight. According to the judges, the standard of entries this year have been extremely high, so it is an honour for yourselves and your school to have your project selected as one of the best in NSW. As a prize-winner your project will now progress to the national BHP Billiton Science and Engineering Awards and we hope that the valuable life skills that you have developed in this STEM-based enterprise will inspire you to pursue a Science-related career.

Behind every great project is an exceptional teacher and I would like to express my gratitude to the passionate teachers from all corners of NSW who have contributed to the success of the 2015 STANSW Young Scientist Awards. Many of these teachers have been inspiring student research projects for years while a refreshing number of teachers submitted entries for the first time.

In 2015, we had an impressive 42 new schools enter and I have the pleasure of announcing that 29 of the 79 student prize-winners are from these new schools. Also 40% of these new schools are regional and I would like to personally thank our STANSW Young Scientist Professional Officer, Ann Hanna, who gave up her own holiday time to deliver free scientific investigation workshops to NSW regional schools. Ann has been selected as our NSW representative in the 2016 BHP Billiton Science and Engineering Teacher Award and she is definitely a worthy recipient.

Maree Woods  
President, Science Teachers' Association of New South Wales



## STANSW Young Scientist Awards Committee

Stuart Garth (*Coordinator*)

Brian Barter

Catherine Beehag

Anjali Chandrasekar-Rao

James Cleaver

Lauren DiMarco

Ian Fairhurst

Firth Garth

Ann Hanna

Edwina Hine

Michele Mawer

Philippa Miller

Elizabeth O'Connor

The STANSW Young Scientist Committee is a group of dedicated volunteers who meet monthly to plan Young Scientist activities and develop fresh strategies for supporting NSW teachers; fostering innovation, creativity and a love of Science and Technology.

### ISEF Judging Panel

Dagmar Arthur McCloughan (*Chair*)

Vatche Ansourian

Dr Kerry Hitos

The ISEF Panel is an independent judging panel, made up of leading educators and a biomedical scientist. They review the top 10-12 projects against the ISEF and Young Scientist rules and select the STANSW Young Scientist of the Year and the finalists for the Intel International Science and Engineering Fair.

## MESSAGE FROM THE COORDINATOR



2015 – What a Year! Young Scientist commitments started in the January holidays with the production of the Young Scientist Booklet, ready for distribution to all NSW schools in early February. Then the first day of the school year involved frantic decision-making in relation to a small paper plane competition that would run alongside and complement our Models and Inventions Exhibition at the University of Sydney Open Day.

Little did we know that the Young Scientist Paper Plane Challenge would literally involve tens of thousands of NSW school students taking part in school events with 800 students qualifying for the state finals, held at the University of Sydney. To run such a competition, required a commitment to design a specific website and respond to the 30+ daily email enquiries.

Simultaneously, Young Scientist Committee members were spending countless voluntary hours constructing our new STANSW Young Scientist website, providing a platform for the uploading of valuable resource material for teachers, parents and students. We also delivered free Young Scientist workshops in 4 Sydney Metropolitan and 5 Regional centres. On top of all this, Committee members developed, from scratch, a state-of-the-art online registration and judging system that's been a huge success.

Therefore, I would like to express my deepest gratitude to each Young Scientist Committee member. 2015 has been an exciting transitional year, a year that has laid a solid foundation for the years to come.

Stuart Garth

STANSW Young Scientist Awards Coordinator



## Models and Inventions K-2

**Sasha Mackenzie, St John Bosco Catholic Primary School, *Possum Fox***

Sasha made a cute fabric fox, complete with movement sensors, designed to protect her Grammie's plants from getting eaten by possums. Possum Fox sits in the garden and sensor lights and sounds activate when it detects movement.

**Harrison Taylor, St John Bosco Catholic Primary School, *Battery Powered Water Feature***

Harrison has had such a fascination with fountains and outdoor garden features that he decided to build his own, complete with a water pump and a lion's head made from clay from which the water comes out, with lights around the top.

## Models and Inventions 3-6

**Sam Katz, Bondi Public School, *How the Height of the Curvature of a Plane Wing affects the Lift***

Sam's model was designed for use in an experiment investigating if the height of the curvature of the top of a plane wing affects lift. The experiment showed that increasing the curvature of the wing increased the lift up to a point where the curvature gets too high and instead of creating lift it forces the wing down.

**Tom Robbins, Saint Ignatius' College, *Flash Flood Proof House***

Tom designed a house with multiple engineering solutions to help it survive a rapid-onset flood (flash flood). Turbulence barriers on the uphill side break the initial impact from the water surge. The second line of defense is a diversion system, triggered by the force of the water flow. A barrier rotates to protect the house structure, diverting the water under the dwelling into a drainage channel.



## Models and Inventions 3-6

**Grattan Rutherford, Saint Ignatius' College, *Tsunami Proof Building***

Grattan's project focused on designing a solution to the difficulties faced by residents and community members in the case of a tsunami natural disaster scenario. Grattan created a building designed to withstand the initial impact of a tsunami wave, and then allow the house to rise up a support structure to prevent the residence from being submerged.

**Isabel Sanderson, Abigail Last & Sophie Martland, Queenwood School for Girls, *SecondMind***

The problem Isabel, Abigail and Sophie identified was that of children dying of heatstroke after being left in a car. Their research showed this is a worldwide issue, with most deaths being children under 2 years of age. Their idea was to create an alarm system that alerts the parent when the child is left in the car.

**Joshua Wren & Roman Upton, Saint Ignatius' College, *Elgen Ramp Stairs***

Joshua and Roman looked to address a social justice issue in trying to create greater equity in lifestyle for people with a disability. They created a multi-purpose staircase which is engineered to convert into a ramp with the aim of improving access in a variety of settings for people who are wheelchair bound.

**Emma Yap, Abbotsleigh, *Emma's Wagon - A Mobile Phone App Coordinating School Carpools***

Emma's project was to create a phone app to encourage carpooling habits and patterns in her school and potentially other school communities. The surveys and wireframe model she created showed this was a viable project but required financial backing. She also concluded that the app should collect data on saved mileage, allowing for carbon dioxide emission reductions to be calculated.



## Models and Inventions 7-9

**1<sup>st</sup> – Macinley Butson, The Illawarra Grammar School, *The "SOLAR SYSTEM": A green power and water cleaning invention for improved life quality in disadvantaged third world communities***

This device could be the key to a sunny future for people in third world communities. Utilising a number of techniques, Macinley invented the "Solar System", a device that is able to increase the efficiency of the solar panels in the device by up to 70%. Some of these techniques included reflectors, Peltier devices and a system to track the sun's movement throughout the day. The water used to power the tracking system is then filtered, producing a clean water source.

**2<sup>nd</sup> – Kate Carey, Meriden School, *Bin cleaning system***

The school cleaners can rest easy with this invention! The Bin Cleaning System is here! Kate's system uses microjet water sprayers that can be installed on the inside of a bin lid. This connects to a hose attachment outside the lid, into which disinfectant can be added. Kate tested the invention with baby food splattered in a bin – and the results were spotless! The final design is a cleaning system that is simple and effective, and can easily be installed into any bin.

**3<sup>rd</sup> – Lawson Stead, MET Wagga Wagga, *Handball Lines Monitor***

Playground arguments may have just ended forever – well, at least those during handball! Lawson saw just how many arguments were had during a handball game at school, and he decided to invent an automatic line judge to solve them. After trialling a number of different designs, Lawson settled upon using an infrared detector placed along the line during the game. He found it to be very effective at solving the very arguments that inspired him in the first place.



## Models and Inventions 10-12

**1<sup>st</sup> – James Poyitt, Redeemer Baptist School, *Leg-e-vator***

As anyone who has suffered from leg injury would know, it is often difficult to follow the doctor's orders and keep it elevated. James saw this struggle when his brother had an injured foot, and decided to do something about it. His device would allow for the correct elevation of an injured leg when a person is seated. James put a lot of work into the final design: a portable, comfortably fitted device that does a simple job well.

**2<sup>nd</sup> – Samuel Kantor, Moriah College, *Eye Connect***

For individuals with upper body paralysis, assistive software is often necessary to access digital technology. Samuel saw just how expensive this software could be, and created "Eye Connect", the first free cross-platform assistive software for upper body paralysis. The software may be controlled by small movements of the head or the blink of an eye, using a computer's built-in webcam. It is an affordable alternative to conventional methods to assist the severely disabled from impoverished backgrounds.

**3<sup>rd</sup> – Sudesh Tunga & Ed Kudaya-more, Redeemer Baptist School, *V.A.D-R***

When watching a video online, bandwidth gets used up quite quickly. Sudesh and Ed have devised V.A.D-R (Visual Audio Distance-Rangefinder) to solve this issue. This software solution measures the distance of the user from the screen using an external arduino sensor and software. V.A.D-R then changes the resolution and volume of a video so that they both appear constant, even though the viewer may move towards or away from the sensor.



## Young Scientist Paper Plane Challenge



*Around 800 qualifiers competed in the finals at the University of Sydney Open Day*

### K-6 Furthest Distance Event

1 <sup>st</sup>	Terry Sotiropoulos	Oatley West Public School	27.8 m
2 <sup>nd</sup>	Jett Fendall	Leura Public School	25.7 m
3 <sup>rd</sup>	Sam Harrop	Castle Cove Public School	23.2 m

### 7-12 Furthest Distance Event

1 <sup>st</sup>	Mitchell Irvine	Menai High School	35.5 m
2 <sup>nd</sup>	Cameron Gordon	Menai High School	32.3 m
3 <sup>rd</sup>	Lachlan Bolton	Redeemer Baptist School	32.0 m

### K-12 Longest Airtime Event

1 <sup>st</sup>	Vraj Patel	Parramatta West Public	11.9 s
2 <sup>nd</sup>	Oskar Wolfram	St Martins Catholic Primary	7.1 s
3 <sup>rd</sup>	Taj Witherow Scott	Pacific Palms Public School	4.6 s



## Scientific Investigations K-2

### Jared Arnold, Redeemer Baptist School, *Heart rate frenzy*

Jared investigated the effects of exercise on heart rate and blood pressure. Each subject's heart rate increased most dramatically with running and star jumps, while walking had little difference. Blood pressure only changed slightly during each type of exercise. Jared's report was full of colourful tables and graphs.

### Eddi Budrodeen, St John Bosco Catholic Primary School, *Which liquid freezes fastest?*

Eddi used two test methods to investigate the effects of sugar on the melting rate of different liquids. Orange juice, milk and water were the liquids tested in his investigation. Eddi concluded from test results that the presence of sugar in liquids does affect melting rate.

### Ethan Humphrey, Carlingford Public School, *Colour and light perception in children and adults*

People see colours differently and so Ethan decided to investigate the link between age and gender and colour perception. Ethan's testing of child and adult subjects revealed that the difference in how people see colour is possibly linked to age, not gender, because the young brain gradually learns to perceive colour the way an adult does.

### Jarod Macarthur, Homeschool, *Wash Your Hands!*

Jarod investigated the need to wash your hands and use soap to prevent infection and stay healthy. He found that soap does not actually kill bacteria but washing the hands with soap flushes them away when you wash. Unwashed hands spread germs and can make you sick.



## Scientific Investigations K-2

### **Shelby McIlvaney, St John Bosco Catholic Primary School, *Which liquid freezes the fastest?***

Shelby investigated the freezing points of a variety of liquids to find out which freezes the fastest. She tested soft drink, fruit juice, methylated spirits and milk. Shelby found that liquids with alcohol and sugar content took longer to freeze.

### **Nate Ryan, St John Bosco Catholic Primary School, *The Rusty Apple***

Nate investigated different types of wrapping to determine which was best in keeping cut apple from going brown. The wrappings tested included cling wrap, greaseproof paper and aluminium foil. He found that the wrapping that keeps moist air out is the most effective in stopping cut apple from going brown.

## Scientific Investigations 3-6

### **Zane Assen, Holy Family Primary School Menai, *Does the weather and surface type effect the total rolling distance and acceleration of a certified soccer ball?***

After exploring the mechanisms and principles of friction, air resistance and other forces, Zane investigated how weather affects the forces on size 3, 4 and 5 certified soccer balls on both grass and synthetic fields. His results suggest that weather not only effects acceleration but also rolling distance.

### **Ankitha Avvari & Zoe Moutsopoulos, Gib Gate, *Soggy socks***

Ankitha and Zoe used cotton, polyester, nylon and wool socks to test which type of sock material dried the quickest. They found that cotton dried the fastest and recommended cotton socks for students embarking on a school camping trip so that they could enjoy their trip and not have 'Soggy Socks'.



## Scientific Investigations 3-6

### **Maya Basson & Emma Hasset, Gib Gate, *Protective polystyrene***

Maya and Emma investigated the effect of polystyrene in preventing or slowing down heat loss in water. They found that hot water contained in a polystyrene container maintained a more constant and higher temperature for longer than did water that was not kept in a polystyrene container.

### **Elio Forte, Bondi Public School, *Can I move salt using sound waves?***

Elio placed salt on a bowl and placed it in front of an amplified speaker. He then played various notes on his electric guitar through the speaker to investigate how the different notes affected the movement of the salt. He found that higher notes made the salt move more because they vibrated the salt more.

### **Timothy Hanna, Caringbah North Public School, *Can 'resting' resistant bacteria from exposure to an antibiotic induce susceptibility once more?***

Timothy investigated if antibiotic resistant bacteria can become susceptible, once again, to an antibiotic if given a 'resting period' in which generations of bacteria are allowed to grow from resistant bacteria without further exposure to the antibiotic. His results indicated that, after 'a resting period', the bacteria *Escherichia Coli* was susceptible to antibiotics.

### **Kyle Hubbard, Castle Cove Public School, *Inhibition of enzyme browning in apple slices***

Kyle investigated different ways and methods to stop or slow enzymatic browning in apple slices using household products. He found that a combination of an effervescent Vitamin C/Calcium tablet plus two teaspoons of lemon juice in water worked the best as a browning inhibitor.



## Scientific Investigations 3-6

### **Sam Katz, Bondi Public School, *How the height of the curvature of a plane wing affects the lift***

The aim of Sam's investigation was to find out if the height of the curvature of the top of a plane wing affects the lift. He concluded that increasing the curvature of the wing increased the lift only up to a point. The best lift was achieved when the wing's depth was about 25% of the width of the wing.

### **Kira Macarthur, Homeschool, *Antibiotics – Is it effective?***

Kira investigated the use of antibiotic ointment on the growth of bacteria. Once she had established that the ointment was effective at killing bacteria she performing further research to show that re-applying the ointment is necessary to ensure that the bacteria does not regrow.

### **Trisha Prahbu, MLC School, *Does temperature affect conductivity and resistance?***

Using copper wire, Trisha's investigation analysed if the flow of an electric current through the wire was affected by varying the temperature of the wire. She found that an increase in temperature of the wire caused an increase in the resistance, and thereby reducing the flow of electrical current.

### **Eshwari Surendran, MLC School, *How does water temperature affect how clean your hands are?***

Eshwari investigated the effect of water temperature on the cleanliness of hands. By cultivating the separate bacteria on petri dishes over a 7 day period, she concluded that washing hands in hot water makes the hands cleaner than when washed in warm or cold water.



## Scientific Investigations 3-6

### **Sophie Walsh, Katherine Cannon & Eliza Lo Russo, Balgowlah Heights Public School, *At what age do kids start thinking a certain gender is better at a subject?***

Sophie, Katherine and Eliza investigated whether age and gender affected how primary school children perceived ability in particular school subjects. They found strong perceptions of girls being better in the subjects of Art, Singing and Dancing, and strong perceptions of boys being better were found in Computer Science. In STEM subjects, no difference in perception of ability was found.

### **Harry Wood, Castle Cove Public School, *Wipes vs paper – Are flushable wipes what they say they are?***

Harry investigated the biodegradability of flushable wipes compared to toilet paper. He concluded that environmentally flushable wipes are flushable but they do take a much longer time to biodegrade than toilet paper, and that they have serious consequences for the sewage system and the environment.



*Students from St Francis Xavier Catholic Primary School, Arncliffe, made a giant 7.77 m<sup>2</sup> paper plane for the Young Scientist Paper Plane Challenge and it was also entered into the Models and Inventions category of the STANSW Young Scientist Awards.*



## Biology 7-9

### 1<sup>st</sup> – Benjamin Hamill, Holy Spirit College Bellambi, *ContIEminated*

Ties help doctors present a professional image but can they also pose an infection risk as carriers of pathogenic organisms? Benjamin tested the ties worn by health professionals and compared them to ties worn by teachers and police detectives. He found that ties worn by health professionals had a much higher load of pathogenic bacteria than ties worn by non-health professionals. His research makes a strong case for male doctors to change their dress code since their ties play no role in patient health.

### 2<sup>nd</sup> – James Drielsma, Cranbrook School, *A study on the effects of nitrogen fertiliser versus rhizobia bacteria inoculation on the growth of the Fava Bean plant*

The use of synthetic nitrogen fertiliser to deliver nitrogen to plant crops has serious resource and environmental costs. James investigated the effect of rhizobia bacteria inoculation on the growth of fava bean plants. He found that plants produced from seeds inoculated with rhizobia bacteria were taller and had greater biomass than plants that received liquid nitrogen fertiliser, demonstrating that inoculation was a more efficient method of delivering nitrogen to plants.

### 3<sup>rd</sup> – Katelyn Biggart, Macarthur Anglican School, *An experiment to investigate the effect of ageing on reaction time. Bop it.*

Changes in reaction times in humans can be used in medical diagnosis of medical conditions such as dementia. Katelyn investigated whether there is a correlation between reaction times and age. She used the children's toy Bop It to measure reaction times in subjects ranging in age from 5 to 79, and found that reaction times decreased as children got older but increased after the age of 19 and through adulthood.



## Biology 10-12

### 1<sup>st</sup> – Madeleine Maloof, PLC Sydney, *Dental whitening and enamel loss*

The purpose of Madeleine's experiment was to determine whether whitening toothpastes have lower pH than non-whitening toothpastes, whether whitening toothpastes whiten teeth more than non-whitening toothpastes and whether whitening toothpastes cause a greater loss of dental enamel than non-whitening toothpastes. In total 10 molar teeth, 3 whitening and 2 non-whitening toothpastes were used. The results showed that all the whitening toothpastes caused the more loss of dental enamel than the non-whitening toothpastes.

### 2<sup>nd</sup> – Jason Ren, Newington College, *Antimicrobial Copper*

Jason designed and tested an investigation that used a metallic solution to fight against the invading armies of antibiotic resistant bacteria sweeping our health system. He measured bacterial growth on the surface of copper tubing as well as stainless steel and PVC to determine the surface that prohibited the most bacterial growth. From his results, Jason concluded that copper can be used as an antimicrobial agent to limit bacterial growth.

### 3<sup>rd</sup> – Vanessa Li, PLC Sydney, *The complete guide to solving an itty zitty problem*

Vanessa investigated an itty zitty problem that many teenagers face daily – acne. She examined three commercially available acne treatments (tea tree, benzoyl peroxide or salicylic acid) and determined their ability to kill bacteria on the skin over a 7 day period. Her investigation showed products which had a consistent rate of minimising the growth of the *B. subtilis* bacteria were best. Tea tree oil was the most effective ingredient in killing bacteria whilst products containing benzoyl peroxide proved to be the most consistent of the three.



## Chemistry 7-9

### **1<sup>st</sup> – Aniruddh Chennapragada, James Ruse Agricultural High School, *Synthesis and analysis of composite biodegradable plastics***

Aniruddh's project focused on the improvement of bioplastics through the addition of natural additives. Some general trends were observed: natural additives did increase the tensile strength of all the plastics produced, gelatine plastics were stronger than starch plastics, a batch of the gelatine plastic with egg shell additive was the strongest plastic produced, and the jute used as an additive to the plastic produced the most consistently strong plastic.

### **2<sup>nd</sup> – Lauren Lancaster, Hornsby Girls High School, *How does temperature affect bovine waste decomposition and the subsequent production of methane gas?***

Lauren investigated how temperature affects bovine waste decomposition and the subsequent production of methane gas. She found temperature does indeed effect the production of methane, but there was not the expected linear correlation between the temperature and gas formation. 25°C was shown to be the temperature at which the samples tested produced the most methane, with the other samples of 5°C, 15°C and 35°C producing considerably less methane.

### **3<sup>rd</sup> – Esther Wong, Meriden, *How much Vitamin C is lost in different drinks over time***

Esther investigated through titration the amount of Vitamin C contained in different drinks and observed their degradation over time. She found that Berocca® Performance Vitamin Drink contained the highest quantity of Vitamin C and that Vitamin C content degraded gradually over time at similar rates for all the four drinks analysed.



## Chemistry 10-12

### **1<sup>st</sup> – Jade Lin, PLC Sydney, *Plastic: A Pesky Problem***

The ongoing use of petroleum based plastics is problematic, however the product is very useful so stopping plastic use is impractical. The development of durable bioplastics is therefore significant. Jade synthesised three simple bioplastics (agar, corn starch and an agar/ corn starch blend) and utilised a simple home test to measure the tensile strength and water resistance of these bioplastics. The investigation concluded the Agar Plastic was the strongest plastic produced whilst the Corn Starch plastic was the most water resistant.

### **2<sup>nd</sup> – Grace Carmichael, St Paul's College Walla Walla, *Irrigation – Water quality analysis***

Irrigation water quality is affected by a number of factors including pH, water hardness, and salinity. Grace investigated the water quality around her locality (the Murrumbidgee River at Wagga Wagga and two water bores on a property). She concluded that the Murrumbidgee River water was the best source of irrigation water in her locality, with the lowest salinity and optimum pH and water hardness when compared to collected samples from the water bores.

### **3<sup>rd</sup> – Adarsha Parajuli, Redeemer Baptist School, *Whether caffeine escalates athletic ability or not***

Posing the question “could coffee affect an athlete’s athletic ability?”, Adarsha had 65 volunteers of varying ages undergo a series of exercises that included “step ups”, and “throwing a ball”. The test subjects were observed before and after coffee was consumed. The general trend observed was that the exercises were performed better by test subjects after they consumed coffee, indicating that caffeine consumption may improve athletic ability.



## Earth & Environmental Science 7-9

### **1<sup>st</sup> – Nga Nguyen, Sydney Girls High School, *Effect of macrophytes on eutrophic Centennial Park water nutrients***

Eutrophication of waterways from acquired chemical nutrients, such as nitrates and phosphates, is a major problem worldwide. In this project Nga investigated the use of Duckweed to remove nutrients from the 'Lily Pond' in Centennial Park in Sydney. The Duckweed proved to be extremely efficient at removing excess nutrients with no detrimental effects occurring. As well as improving the quality of the water, the Duckweed is also a good source of food for many animals.

### **2<sup>nd</sup> – Macinley Butson, The Illawarra Grammar School, *The "Solar System"***

Macinley devised 'A Green Power and Water Cleaning Invention' for improved life quality in disadvantaged third world communities. The "Solar System" was made from readily available materials and each system was independently and rigorously evaluated. Collectively each System works together to make a solar-powered device that both generates electricity and produces clean water. It has potential for use in many underprivileged communities.

### **3<sup>rd</sup> – Ellen Rowley, Anastasiya Potapenko & Emma von Thomann, Riverside Girls High School, *Composting Investigation***

Working as a team, Ellen, Anastasiya and Emma investigated the properties of compost for potential use at their school. They independently measured and analysed moisture levels, aeration levels and composition of compost, combining their results to demonstrate that it is important to have the right mix of the three components for the best growth of plants. The girls used beans for their experiments but the results could be extrapolated to other plants.



## Earth & Environmental Science 10-12

### **1<sup>st</sup> – Jade Moxey, Sapphire Coast Anglican College, *The spread of seeds through cattle***

This is a project dear to any farmer's heart! Jade has investigated what seeds are ingested by cattle in her local area and then germinate through their manure. The significance is that plants are then transferred to other areas. Jade showed that a limited number of species beneficial to a farming operation germinated, such as Ryegrass, Kikuyu and Clover. She also found that noxious weeds, such as Fireweed, can easily spread via the rudiments of livestock.

### **2<sup>nd</sup> – Sunera Samaratunga, Macquarie Anglican Grammar School Dubbo, *Efficiency of Solar Panels***

Do you have solar panels on your house, and if so have you ever considered cleaning off dust build-up? If you haven't, you might want to reconsider due to Sunera's investigative findings. She discovered that small amounts of dust reduce the power output by half and as the dust level increases, the power continues to decline, with the largest reduction being 84%. This, of course, is particularly relevant to Sunera who lives in the dusty area of Western NSW.

### **3<sup>rd</sup> – Georgina Garth, Redeemer Baptist School, *Revealing Sydney's Ice Age***

Georgina's survey takes you on a journey back in time to explore colder periods in Sydney Basin's geological past. She surveyed the distribution of Glendonites (a type of calcium carbonate crystals that are only formed at very low water temperatures) in the South Coast and Hunter areas. Her initial hypothesis was they were formed in mini 'ice ages', but eventually she established that they were caused by brief periods of cold water upwelling in the Sydney basin area.



## Physics 7-9

### **1<sup>st</sup> – Steven Zhang, Shore School, *Experimental Study on the Effect of Size Ratio and Number Percentage on Packing Density of Random Binary Packing of Particles***

Not sure whether it will all fit into the box? Did you know that there are mathematical equations that can help you solve this problem, maths that goes right back to Kepler? Steven gets the bravery award for tackling this complex mathematical problem verifying that random mixing of different sized particles greatly affects the packing density and found a size ratio for optimum packing density.

### **2<sup>nd</sup> – Paddy Heaton, Shore School, *Water surface tension for different temperatures***

One of the marvels of the world we live in ... the surface tension of water. Paddy wanted to know if the temperature of the water would affect its surface tension. She constructed a unique apparatus to control variables and her results were interesting. She discovered a clear relationship that as the temperature increased, surface tension decreased.

### **3<sup>rd</sup> – Sophie Howard, Loreto Kirribilli, *Blu-tack and its adhesive abilities at different temperatures***

Sophie's research examined a very common household item, Blu-tack, and found some astonishing results. Does the temperature of Blu-tack affect its sticky-ness. Her results ... astonishing. The Blu-tack put into the microwave was much more adhesive than when left in the oven (at 150°C), the fridge, the freezer or even room temperature. A world first research and an intriguing result!



## Physics 10-12

### **1<sup>st</sup> – Emma Tanevska, PLC Sydney, *25 Billion Gone to Waste***

Concerned about the amount of polystyrene foam going to landfill, Emma explored the possibility of re-using it as sound insulation for rooms. After lining a small room with foam Emma measured the sound that was conducted through to the next room. She showed that polystyrene has potential in the area of sound insulation, particularly at a frequency of 1000 Hz.

### **2<sup>nd</sup> – Timothy Hill, Hills Adventist College, *Is a dropped carabiner a dangerous carabiner?***

Timothy set out to investigate whether a carabiner, used in rock climbing, can be used safely after being dropped, to test a common recommendation that a device dropped from waist height be retired from use. Using industrial testing equipment Timothy was able to show that carabiners dropped from as much as 15 metres maintained all or most of their strength, and therefore satisfied standard minimum safety requirements.

### **3<sup>rd</sup> – Meredith Hinds, Roseville College, *It is Rocket Science!***

Meredith conducted an investigation to determine the optimal filling level for a water rocket. She found that a bottle containing 40% water, with the rest pressurised air, was able to maintain the longest flight time. Meredith explained this result in terms of the balance between the thrust and the weight of the rocket.



## NSW Nominee – Ann Hanna 2016 BHP Billiton Science and Engineering Teacher Award



*Ann Hanna (left) after delivering a Young Scientist Workshop with some of the participants at All Saints College, Bathurst*

The BHP Billiton Science Teacher Awards recognise outstanding contributions made by classroom teachers to science education especially in the area of open ended investigations.

Our NSW nominee is Ann Hanna, Menai High School. Ann is a staunch advocate for first-hand investigations setting up programs in her school and running a gifted and talented program for students in neighbouring primary schools. Just last month she took 45 students to the US for a week of authentic science learning and first-hand investigations at Space Camp, Huntsville, Alabama.

Professionally, Ann is a leader of scientific investigative education in NSW. As the STANSW Young Scientist Professional Development Officer she voluntarily delivered workshops throughout regional NSW, during her own holiday time.



*At the 2015 Teacher Awards, our MC for tonight, Philippa Miller, won this prestigious prize. She won a trip to chaperone the BHPBSEA team to the Intel International Science and Engineering Fair, which was held in Pittsburgh, in May.*

## STANSW Most Promising Awards K-6

*Awarded to highly commended students who show particular promise and are encouraged to pursue further development*

### **Thomas Kirkpatrick, Glenbrook Public School, *The power of bows***

A bow and arrow is not just a simple weapon – it is wrapped in high level Science. Thomas wanted to find how the length of the draw (the distance you pull the arrow back) is related to the distance of flight. He fired 5 arrows at each of 5 different draw lengths and found that the distance travelled is directly proportional to the draw length

### **Zac Petersen, Carlingford Public School, *Investigation on Alzheimer's disease***

After losing his maternal Grandpa to Alzheimer's disease, Zac conducted an exhaustive series of experiments with lamb brains to see how they are structurally damaged by high levels of sugar, alcohol and then salts. In each case there was a definite shrinkage and sugars caused greatest tissue damage.

## STANSW Most Promising Awards 7-12

### **David Clark, Wollondilly Anglican College, *Technology - friend or foe? Investigating bacteria on keyboards***

David wanted to find out if computer keyboards harbour bacteria. He found that every keyboard he tested had traces of bacteria, even the ones wiped with a strong antibacterial agent. There was, however, a definite reduction in the level of bacteria where antibacterial wipes are used. Be warned! There was an instant where 101 bacterial colonies were found on a keyboard where no wipes were used.



## STANSW Most Promising Awards 7-12

**Chaltu Etana, St Benedict's Catholic College, *Effect of salt on the rate of respiration in yeast***

It is well-known that adding sugars to yeast increases the rate of respiration and accelerates the growth of the yeast. This practice has been utilised in bread making and alcohol fermentation for thousands of years. Chaltu investigated whether the addition of salt to yeast would have the reverse effect. She determined the rate of the reaction by measuring carbon dioxide gas formation and found that increasing salt concentration reduces the growth of yeast.

**Abbey Kumar, PLC Sydney, *An investigation into the relative gluten content of wheat flours***

Responding to her younger cousin being diagnosed with coeliac disease, Abbey wanted to find out which foods contain the most gluten. She discovered that many of the foods at her family functions contain flour, so she decided to use a kneading process to separate and measure the gluten content of three types of flour. Bread & pizza flour contained the most gluten of the 3 flours tested (bread & pizza, plain and wholemeal) while the plain flour contained the least gluten.

**Lily Yang, Meriden School, *The effects of taste on memory***

Lily investigated the effects of taste on memory. Three groups of 10 subjects were either given no drink, a drink they liked or a drink they disliked before viewing some visual material. They were then given 10 questions on a piece of paper 20 minutes after viewing this material and the data collected from this investigation concluded that the effects of taste on memories of facts and information were not beneficial, but rather negative.

## KEYNOTE SPEAKER



*Dr Chris Reid  
Australian Museum*



Dr Chris Reid is a Principal Research Scientist at the Australian Museum, Sydney. His main area of interest is the systematics (the study of the diversification of living forms), taxonomy (classifying into ordered categories) & evolution of leaf-beetles, which include major crop pests.

Currently, as well as his main research area, Chris is involved in teaching entomology (the study of insects) in Papua New Guinea, the identification of sweet potato weevils in the Pacific, and identification guides to Australian Xmas and stag beetles.



2015 STANSW Young Scientist Awards Presentation Ceremony



**Young Marine Scientist Award**

*For a primary school entry that explores the marine world*

**Harry Wood, Castle Cove Public School, *Wipes vs paper – Are flushable wipes what they say they are?***

Every year, countless litres of waste water are treated and released into Australia's marine ecosystems. It is essential that this process is operating efficiently and correctly to ensure the continuing health of our coastal waters. Harry compared the biodegradability of flushable wipes and toilet paper in a range of environmental conditions. He found that flushable wipes do not biodegrade easily and so can cause greater damage to sewer systems and the environment.



**STEP Environmental Award**

*Awarded for the best environmental entry*

**Jade Moxey, Sapphire Coast Anglican College, *The spread of seeds through cattle***

Weeds are common problem for both agriculture and the environment and preventing the spread of seeds is a critical component of weed control. Jade investigated the ability of seeds to survive in the digestive system of cattle by identifying germinating plants in livestock manure. She identified over 15 different plant species that could do so, including fireweed (*Senecio madagascariensis*) – a weed of national significance. Jade concluded that, instead of controlling weeds, livestock could spread them in their manure.



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**NMI Measurement Award**



Australian Government  
Department of Industry and Science

**National  
Measurement  
Institute**

*Entries that best demonstrate an understanding of good measurement*

**1<sup>st</sup> – Emma Liu, PLC Sydney, *For fans of fans***

The aim of Emma's experiment was to determine the most powerful rotating arrangement and shape for blades in a mechanical fan. Measurements carried out in the report were comprehensive and covered a significant range of 'blade angle' and various blade designs. It was concluded that a fan with 2 curved shaped blades at an angle of 60 degrees was the most powerful.

**2<sup>nd</sup> – Alicia Lieng, Meriden, *Spatter pattern analysis***

The purpose of Alicia's investigation was to measure the width to length ratio of blood drops in order to estimate the angle at which they fell, therefore the direction of the source as in a crime scene analysis. In this experiment, angles of 10, 20, 30, up to 90 degrees were used and the accuracy allowed the resolution of ratios (width over length) from the different angles to be measured.

**3<sup>rd</sup> – Msgana Akele & Chelsey Karvon, Redeemer Baptist School, *Investigation into road signs in NSW***

Msgana and Chelsey explored the combination of colours which is best for the readability of road signs. They determined the colour which was the best contrast to the Australian environment by averaging the background of pictures of road signs taken in rural and urban environments. They developed eye charts based on this analysis and scored subjects on their ability to read the signs.



2015 STANSW Young Scientist Awards Presentation Ceremony



**ACPSEM**

Australasian College  
of Physical Scientists &  
Engineers in Medicine

### ACPSEM Medical Physics Award

*Awarded to the student who demonstrates good scientific analysis in the field of Physics*

**Emma Tanevska, PLC Sydney, *25 Billion Gone to Waste***

Every year, the United States alone disposes of 25 billion polystyrene cups. These polystyrene cups are non-biodegradable, non-recyclable, non-renewable and unsustainable. Emma investigated whether this wasted polystyrene could be reused as sound-proofing in buildings. By analysing recorded sound waves and accumulated data readings, Emma was able to demonstrate that polystyrene could block high frequencies of sound and absorb considerable levels of sound reverberations.



### ASBMB Award

*Awarded for excellence in Biochemistry and Molecular Biology*

**Abdulla Kakkat, Al Amanah College, *The effect of the plant hormone 1-triacontanol on the phenotype of genetically identical Allium cepa***

People have selectively bred organisms with favourable characteristics for generations to try and produce desirable genetics. But can these genetics be favourably altered by changing some environmental factor? Abdulla investigated the effect of artificially adding triacontanol, a plant hormone that regulates plant photosynthesis and cell division, to the growth rate of shallots (*Allium cepa*). His investigation showed that using triacontanol did alter plant phenotype by producing increased rates of growth.



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### RACI Chemistry Encouragement Award

Royal Australian Chemical Institute



*For primary and secondary students demonstrating ability, skill and promise for Chemistry*

**Primary: Kyle Hubbard, Castle Cove Public School, *Inhibition of enzyme browning in apple slices***

Kyle investigated a variety of methods for slowing enzymatic browning of apple slices. Through a thorough range of tests, he determined that a combination "powerhouse" method was most effective – combining low pH and antioxidants as preservative techniques.

**1<sup>st</sup> – Secondary: Grace Carmichael, St Paul's College, Walla Walla, *Irrigation – Water quality analysis***

Irrigation water for agriculture is affected by a range of factors, including pH, hardness and salinity. In her investigation, Grace studied a variety of available water sources to determine the best source for irrigation water. She found that the sampled river water was the best for irrigation, since it had a low salinity and appropriate levels of pH and hardness.

**Highly Commended – Secondary: Lauren Lancaster, Hornsby Girls High School, *How does temperature affect bovine waste decomposition and the subsequent production of methane gas?***

One of the major contributors to global warming is methane produced by cows. In her scientific investigation, Lauren tested the effect of temperature on the decomposition of bovine waste and subsequent production of methane gas, finding that 25°C was optimal. This may suggest the most likely geographic locations in which methane production from bovine waste may occur.



### Western Sydney University Science Award

*Greater Western Sydney entry that demonstrates particular scientific accomplishment*

**Callum Avery, The Hills Grammar School, *Investigating Colour Spectra***

Callum used a homemade spectrophotometer to investigate the colour spectra of different sources of light. A light source was shone through a collimator, hitting a diffraction grating and projecting onto a sheet of ground glass. The colour spectra produced was then photographed. It was observed that warm lights had lots of yellow, orange and red spectra and cooler lights had more blues and purples. This spectrophotometer was found to work effectively in capturing photographs of the colour spectra of different light sources.



### AARNet Communications Award

*For the best use of electronic communications*

**Primary: Elio Forte, Bondi Public School, *Can I move salt using sound waves?***

Music is a traditional form of communication that relies on vibrational dynamics to produce sound waves. In our electronic age, it is now possible to visualise these invisible sound waves that are generated by an instrument. Elio placed salt on a bowl and placed it in front of an amplified speaker. He then played various notes on his electric guitar through the speaker to investigate how the different notes affected the movement of the salt. He found that higher pitched notes made the salt move further because they vibrated the salt more.

### AARNet Communications Award

**Primary: Emma Yap, Abbotsleigh, *Emma's Wagon - A Mobile Phone App Coordinating School Carpools***

Getting the kids to school, sports training, music lessons, all the concerns of parents. Sonny has soccer training and Mary has netball training. How can you get to all these places in the same afternoon? Emma Yap has developed the app to save parents, Emma's Wagon. Working in conjunction with local schools the app makes car-pooling with other parents easy and safe saving parents time, petrol and most of all, worry.

**Secondary: Lachlan Bolton, Redeemer Baptist School, *Self-adjusting microphone stand***

Ever sat in meeting where you couldn't hear the speaker as the microphone was too far away from them. That awkward moment where no one wants to make a scene and go and fix it. Well, Lachlan has worked on a solution to this problem: SAM, the Self-Adjusting Microphone stand. Lachlan's prototype conquered the mechanics of the adjustment system and has made some initial forays into voice processing mechanisms.

**Secondary: Sebastian Hodge, Newington College, *CPU Clock Speed and Performance***

With all the big computer companies racing to create the fastest computers with the best processors, Sebastian decided to investigate the relationship between CPU clock speed (the rate at which a computer carries out instructions) and the performance of the computer. His highly technical research discovered a clear linear relationship between the CPU clock speed and computer performance.



2015 STANSW Young Scientist Awards Presentation Ceremony



## AIP Most Outstanding Physics Award



*For the students who best represent the 2015 National Science Week theme, "Making Waves – the Science of Light"*

**Ethan Humphrey, Carlingford Public School, *Colour and light perception in children and adults***

The photo that went viral. Was the dress white and gold or blue and black? Ethan became intrigued with this issue that went right around the world. He wanted to learn more about colour perception and whether age had anything to do with how we perceive colour. Starting with an initial survey on the famous picture and then an innovative use of cardboard boxes, LED's and lego blocks, Ethan was able to establish some links between the age of a person and how they perceive colour.

**Hannah Ma, Meriden, *How do primary colours of light combine to make new colours?***

Making colour from other colours has been the job of artist for decades. But in our digital world of light shows and special effects the challenge for the digital artist is how to mix coloured light. Hannah used tri-colour LED's and mixed the colours to varying intensities to successfully create the secondary colours (cyan, magenta and yellow) from the primary colours (red, green and blue).



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## Grand Award Winners

**2015 Young Scientist of the Year Award – Jade Moxey, Sapphire Coast Anglican College, *The spread of seeds through cattle* (Overall best K-12 project)**

Weeds are common problem for both agriculture and the environment and preventing the spread of seeds is a critical component of weed control. Jade investigated the ability of seeds to survive in the digestive system of cattle by identifying germinating plants in livestock manure. She identified over 15 different plant species that could do so, including fireweed (*Senecio madagascariensis*) – a weed of national significance. Jade concluded that, instead of controlling weeds, livestock could spread them in their manure.

**2015 Primary Young Scientist Award – Timothy Hanna, Caringbah North Public School, *Can 'resting' resistant bacteria from exposure to an antibiotic induce susceptibility once more?* (Overall best 3-6 project)**

Timothy investigated if antibiotic resistant bacteria can become susceptible, once again, to an antibiotic if given a 'resting period' in which generations of bacteria are allowed to grow from resistant bacteria without further exposure to the antibiotic. His results indicated that, after 'a resting period', the bacteria *Escherichia Coli* was susceptible to antibiotics.

**2015 Budding Young Scientist Award – Ethan Humphrey, Carlingford Public School, *Colour and light perception in children and adults* (Overall best K-2 project)**

People see colours differently and so Ethan decided to investigate the link between age and gender and colour perception. Ethan's testing of child and adult subjects revealed that the difference in how people see colour is possibly linked to age, not gender, because the young brain gradually learns to perceive colour the way an adult does.