

STANSW YOUNG SCIENTIST AWARDS

Virtual Presentation Ceremony Awards Booklet

Monday 16th - Thursday 19th November 2020



Connecting school and society through the active promotion of Science, Technology and Mathematics

STANSW Young Scientist Awards:

**A major project of the
Science Teachers Association of New
South Wales**



Program

Monday 16th November - 7pm

Welcome message

Anjali Rao, STANSW Young Scientist Awards Coordinator

Presentation of Awards

STANSW Scientific Investigations - Primary

STANSW Scientific Investigations - Secondary - Biology

Australian Society for Biochemistry and Molecular Biology (ASBMB)
Award

STANSW Scientific Investigations - Secondary - Chemistry

Royal Australian Chemical Institute (RACI) Chemistry

Encouragement Award

National Measurement Institute (NMI) Awards - Science

Tuesday 17th November - 7pm

Welcome message

Ann Hanna, STANSW Young Scientist Awards Committee

Presentation of Awards

STANSW Scientific Investigations - Secondary - Earth &
Environmental Science

Primary Environment Award

STEP Environment Award

STANSW Scientific Investigations - Secondary - Physics

AARNet (Australia's Academic and Research Network)

Communications Awards - Science

Australian Institute of Physics (AIP) Most Outstanding Physics
Award

Rowe Scientific Depth Study Awards

Wednesday 18th November - 7pm

Welcome message

Firth Garth, STANSW Young Scientist Awards Committee

Presentation of Awards

OSHClub (Primary) Inventions and Innovation Awards

Secondary Innovations and Engineering Design Awards

AARNet (Australia's Academic and Research Network)

Communications Awards - Technology

National Measurement Institute (NMI) Awards - Technology

Sebel Testing Awards

STANSW Most Promising Awards

Thursday 19th November - 6pm

Welcome message

Daisy Kong, STANSW Young Scientist Awards Committee

Presentation of Awards

MANSW Working Mathematically Awards
AARNet (Australia's Academic and Research Network)
Communications Awards - Mathematics
National Measurement Institute (NMI) Awards - Mathematics

Thursday 19th November - 7pm

Message from the President

Margaret Shepherd, Science Teachers Association of NSW

Presentation of Awards

Australian Water Award
NSW Student Nominees for the 2021 BHP Foundation Science and
Engineering Awards - Primary and Secondary
NSW Nominee for the 2021 BHP Foundation Science and
Engineering Teacher Award
Budding Young Scientist (K-2)
Primary Young Scientist (3-6)

Keynote Address

Dr. Cathy Foley, Chief Scientist, CSIRO and
Chief Scientist, Australia (January 2021)

Announcement of Grand Awards

Broadcom Honourable Mention
Broadcom Representative to 2021 (virtual) Broadcom Masters
Program
ISEF Finalists
Young Scientist of the Year

Acknowledgement of Country

We at the Young Scientist Awards would like to pay our respects to the Traditional Custodians of this land on which we work, learn and live. We recognise Country includes but transcends land and borders, being both belongingness and a way of being.

Recognising this, we pay our respects to Aboriginal peoples past, present and to those of the future who are our knowledge holders and teachers. As we share information, teaching, and learning, we remember to appreciate and value the knowledge embedded forever within the Aboriginal custodianship of Country.

Message from the President



This year COVID-19 cannot stop us. Whilst we will miss attending our amazing awards ceremony in person, we still continue to acknowledge and celebrate the very talented young scientists who are the best of 855 entries into the Science Teachers' Association Young Scientist Awards Program for 2020. All students in NSW have access to this competition and we

are very happy to see entries from all school sectors and both girls and boys. We commend all the teachers of these schools for their commitment to their students and passion for scientific research.

The Science Teachers' Association of New South Wales is very proud to have this amazing state program that truly incorporates all STEM subjects and brings together the professional teaching associations. As President of the Association, I would like to acknowledge and thank our Young Scientist committee and its hard working convenor, Anjali Rao. This is the third year Anjali has committed to being convenor of this project for the Association. There are also a large number of sponsors of our YS program that support this STEM initiative and I would like to thank them for their commitment to the future scientists of Australia. There are also hundreds of teacher and non-teacher volunteers that are required for this ongoing initiative to succeed so well and the program could not occur without their support.

Can I request all schools consider sending a teacher along to gain experience judging the student projects? It is a wonderful accredited professional learning opportunity, through which teachers can read for themselves some of the amazing research projects being developed by high calibre students across the state. So next year when the judging notice is sent out, think about coming along. You will be impressed.

So congratulations to all students who reached this level of the YS Awards. That is an achievement itself. Congratulations also to the winners. Well done.

Best wishes from STANSW
Margaret Shepherd President 2020

STANSW Young Scientist Committee

The STANSW Young Scientist Committee is a group of dedicated volunteers who work to develop innovative STEM strategies for supporting NSW teachers.

Anjali Chandrasekar-Rao (Coordinator)

Leonard Cheung

James Cleaver

Firth Garth

Stuart Garth

Ann Hanna

Edwina Hine

Daisy Kong

Matt McKenzie

Philippa Miller

Elizabeth O'Connor

Sian Ware

ISEF Judging Panel

The ISEF Panel is a highly experienced judging panel, who review the top 20+ projects and select the STANSW Young Scientist of the Year and the finalists for the International Science and Engineering Fair.

Dagmar Arthur McCloughan (Judging Chair)

Dr Melissa Thompson (Science Education Expert)

Associate Professor Kerry Hitos (Biomedical Scientist)

Sandra Woodward (Science Educator-Physics)

James Cleaver (IBM)

Stuart Garth (SRC Chair)

Message from the Coordinator

What an incredible year 2020 has been for our country and for the whole world. The challenges of the global pandemic to the way we live, work and learn meant we had to adapt at every stage to a new normal this year.

After months of supporting our ISEF 2020 finalists to refine and finalise their projects, we switched to helping them prepare for a virtual experience online. Our wonderfully talented students continued to make their mark in this format as well (See Stuart Garth's description below). ISEF 2021 has already been announced as a virtual (competitive) fair and we look forward to working with our team over the next six months.

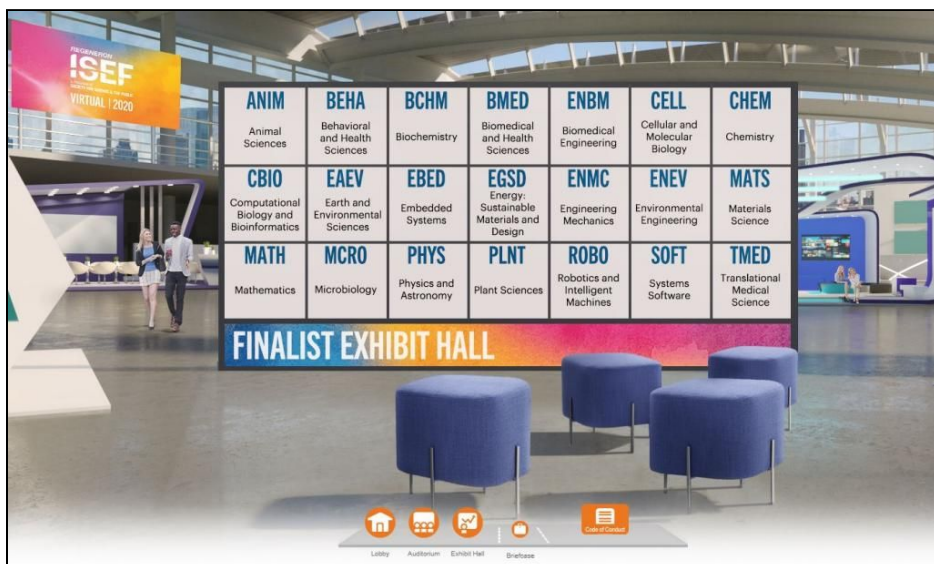


We were also overwhelmed by the number of entries we received this year despite the very real challenges all students would have faced because of the lockdown earlier in the year and COVID-19 restrictions. In a year when the role of science and the advice and counsel of well informed scientists has been so significant in our lives, the commitment that the students have shown in persevering with their investigations, design projects or inventions has been so heartwarming to see. The Young Scientist Committee would like to congratulate and commend each and every one of our participants. It is also a mark of the times that so many projects had an environmental concern at their core.

Our hard working committee has also demonstrated creativity and adaptability in meeting the challenges of an entirely online program. Along with the rest of the education system, we have moved relatively seamlessly to a virtual world which has brought some wonderful benefits with it. We have been so pleased to welcome many more of our rural and regional colleagues to the judging teams now that distance from Sydney is no longer a barrier. My thanks to all of the members of the committee as well as the executive committee of the STA NSW for their support and encouragement. Lastly, I would like to acknowledge the work of Lachlan Bolton - multiple YS award winner and ISEF Finalist 2018, in putting together our online awards presentation.

Anjali Rao
STANSW Young Scientist Awards Coordinator 2020

NSW Young Scientists make Virtual Impression! ISEF 2020



ISEF 2020 ended up being a virtual event. Our 9 Young Scientist ISEF finalists took part in a week-long virtual event which included an Opening Ceremony and a Finalist Exhibit Hall, where all of our projects were on display for a few weeks. All of their official abstracts can be found on the [ISEF Archives](#) webpage by clicking on Australia, "2020 Virtual ISEF" and "All Abstracts Matching Criteria" to see our 9 Young Scientist and 5 BHPFSEA ISEF finalists.

The highlight of the week was a number of panel discussions where panellists answered three to eight video-recorded questions that were chosen from the 1200 finalists. Our Young Scientist team was very well represented with Eleanor Clifton-Bligh, Emma Leggett-Budden having a question selected and Molly Dixon had two separate questions selected for different panels. Eleanor's question which related to the COVID-19 virus highlighting the challenges of globalisation was discussed for 13 minutes by Nobel Prize Laureates on the Excellence in Science & Technology Panel.

Presentation Night 2: Tuesday 17th November

Category Awards - Scientific Investigations

STANSW Investigations Earth & Environmental Science 7-8

Ellie Cole, PLC Sydney, *Do P2 face masks protect children from bushfire smoke*

Ellie aimed to determine if a P2 face mask could fit well enough to actually provide protection from bushfire smoke to a child. She performed a series of tests using a quantitative fit-testing machine called a PortaCount which measures particles both inside and outside of the P2 face mask while they were fitted to children's faces. The data she collected suggested P2 face masks do not provide an adequate fit on children's faces and therefore do not provide protection from airborne contaminants such as bushfire smoke.

Angus Edmundson, Newington College, *An investigation into microplastic quantities in Sydney Harbour seawater at different tides*

This investigation explores the quantities and concentrations of microplastics in the water of Sydney Harbour and whether concentrations are affected by tide. The investigation showed that the tides are linked directly to the level of microplastics, and a significantly higher number of microplastics were counted in samples collected from lower tides.

Beatrix Farley, Loreto Kirribilli, *Fungi in Harold Reid Reserve*

Beatrix carried out into the effects of different vegetation communities in Harold Reid Reserve, Middle Cove on the abundance and diversity of fungi fruiting bodies. She determined that the plateau section showed most abundance in observed species and that the north facing slopes and south facing slopes had equal diversity and were more diverse than the plateau section of the reserve.

STANSW Investigations Earth & Environmental Science 9-10

Molly He, PLC Sydney, *Rethink Your Zinc Solution*

Eggshells have the capability to adsorb heavy metals due to their calcium carbonate content. Molly investigated an environmentally friendly solution to zinc contamination in soil, using eggshells from chicken, duck and quail. Molly used an Atomic Absorption Spectrometer to measure zinc levels and she found quail eggshells were the most effective in absorbing zinc from the soil samples with an average of 1075.48 mg/kg zinc adsorbed.

Olivia Low, PLC Sydney, *Double, double, oil and trouble*

Olivia explored potential environmentally-friendly clean-up solutions to remediate Arctic oil spills. This was achieved by determining which organic sorbent (coconut coir, walnut shells or sugar bagasse) would be the most effective in removing oil from an oil-water mixture of 3°C. Her investigation determined coconut coir was the most effective sorbent from the materials she tested.

Marina Ruan, PLC Sydney, *Eggcellent Solutions: An Investigation Into The Effectiveness of Different Adsorbents In Removing Food Colouring From Water*

Dyes found in wastewater produced from the textile, printing and paper industries are a major polluter in waterways globally. Marina's investigation aimed to determine which adsorbent, from Bioglan Activated Charcoal Powder, raw eggshell powder and calcined eggshell powder, would be most effective at removing blue food colouring from an aqueous solution. She used a spectrophotometer to determine the reduction in blue dye in aqueous samples after they had been incubated with amounts of the adsorbents, and she determined calcined eggshell powder to be most effective of the adsorbents she tested.

Rowe Scientific Investigations

Earth & Environmental Science 11-12

Caleb Cheung, Covenant Christian School, *Microplastics in the gastrointestinal tracts of commercial Australian Trachurus novaezelandiae*

Caleb investigated the levels of microplastic within the gastrointestinal tract of wild-caught commercial *Trachurus novaezelandiae* in Australia. The gastrointestinal tract of the *T. novaezelandiae* was extracted and observed under a stereomicroscope where microplastic amount and type was recorded. The most common microplastic observed in the *T. novaezelandiae* were fibrous microplastics, while beads were the least prevalent microplastic.

Jake Talakovski, Menai High School, *An investigation into the correlation of marine heatwaves on *Chaetodontoplus duboulayi* abundance in both northern and southern regions as evidence for tropicalisation on the west coast of Australia*

Marine heatwaves are extreme climatic events that involve sea temperatures rising and have a serious impact on the marine environment. Jake's study focused on whether heat waves correlate with the count of scribbled angelfish. After the data was extracted through the programming software Python, the study revealed the distribution of the scribbled angelfish along the west coast of Australia is adversely affected by these weather events.

Megan Ussher, Bishop Druitt College, *Investigating the Impacts of Rainfall, Water flow velocity, and Turbidity on the Health of Local Waterways*

Megan studied rainfall, flow velocity and turbidity, and determined whether the population of the macroinvertebrate community is an accurate measure of waterway health. Results showed a strong relationship between rainfall, flow velocity and turbidity levels, but the possibility of utilising a macroinvertebrate population to accurately measure the effects of turbidity and the overall health of the waterway was not supported by the results.

Sponsored Awards



Primary Environment Award

Awarded for the best primary school environmental project

Hannah Chalmers, PLC Sydney, *Stormwater - It Bugs me!*

Hannah wanted to find out if water quality and water flow, and waterbug biodiversity was better in naturalised stormwater canals than non naturalised stormwater canals. She found that waterbug biodiversity is better in naturalised stormwater canals than non naturalised stormwater canals and that water flow was significantly slower in naturalised canals.



STEP Environmental Award

Awarded for the best environmental entry

Maja Dalby-Ball Olson, Barrenjoey High School, *Variation in Flammability of Flora in the Sydney Sandstone Vegetation Community*

Maja conducted a flammability study of twenty two native plant species common to the Sydney sandstone bushland. This information is vital to inform selecting bushland retention or landscaping. The plants were tested for various aspects of flammability: including temperature of ignition, time of ignition, duration of visible flame, and time to return to pre burn temperature. Her results showed that there is a significant difference between species and that the higher the moisture content the higher the temperature required to ignite the plant. Species identified by her research can be used to augment existing Rural Fire Service (RFS) recommendations for plantings in urban areas as well as to retain biodiversity in bushland close to human habitation.

Category Awards - Scientific Investigations

STANSW Investigations Physics 7-8

Hamish Magill, Caringbah High School, *How Do Different Surfaces Affect the Braking Distance of A Vehicle?*

Realising that car crashes are a significant issue, Hamish carried out an investigation to determine the effect of different surfaces on stopping distance. In his experiment, he compared asphalt, carpet, grass, tiles and wood, finding that a toy car travelled furthest on wood, and stopped most quickly on grass, with variables including the initial kinetic energy kept constant.

Alexandra Prokhorov, PLC Sydney, *The Perfect Shot Put: The Optimal Conditions for A Throw*

Shot put is a field event that requires a great deal of skill and precision for success. Alexandra wanted to determine the best angle, environmental temperature and the best muscle warm-up routine for a strong performance. Through use of video tracking to measure the trajectory, she showed that an angle of 37° and an air temperature of 20°C were the best combination, with five pushups immediately beforehand to get the arm muscles ready.

Anviti Sinha, PLC Armidale, *Which type of water has the highest conductivity?*

Water purity is an important issue, both to determine the safety of the water, but also for aesthetics, both positive and negative. Anviti explored the relationship between the electrical conductivity and the concentration of salts in the water. Her measurements showed that, while seawater had the highest conductivity and distilled water the lowest, the sparkling waters had fairly high conductivities, whether or not they were listed as 'mineral water'.

STANSW Investigations Physics 9-10

Ella Fleming, St Andrew's Cathedral School, *An Investigation into the effect of dust buildup of the power output of solar cells*

Solar panels have great potential in rural areas across the globe, as they offer the possibility of electricity production without access to the grid. However, it is critical that the panels are maintained to ensure their continued efficiency. Ella studied the effect of different amounts of sand on the power output of a solar panel, and found that the performance was degraded. She emphasised how important it is that users of solar panels are educated about this issue.

Jupiter Grant, Cranbrook School, *The Impact Changing the Number of Blades on a Pelton Turbine has on Rotations Per Minute*

Hydroelectricity is a sustainable energy source with the potential to take over an increasing proportion of the electricity generated from fossil fuels. Jupiter set out to explore the use of the Pelton turbine, which is often used in smaller private dams. He used 3D printing to create the blades and tested the effect of the number of blades on the spin velocity, finding that it resulted in a faster rotation, but with each additional blade having a smaller effect.

Zoe Hayes, St Andrew's Cathedral School, *Determining if Water Cooling Solar Panels enhances their performance*

Solar panels are part of the global strategy to reduce the use of fossil fuels and transition to a more sustainable way of generating electricity. Zoe investigated the impact of using water to cool solar panels. Her results showed that having a container with more water on top of the car powered by the solar panel resulted in a greater distance travelled. This indicated that reducing overheating was an important way of increasing the output for solar power.

Rowe Scientific Investigations Physics 11-12

Matthew Cooper, Broughton Anglican College, *Investigating the impact of temperature on solar cells*

With renewable energy being so important to our sustainable use of the planet, this study explored factors that may impact the efficiency of solar panels. Matthew combined an extensive review of secondary data from the Bureau of Meteorology with his own testing to analyse relationships between temperature and efficiency of solar panels. Matthew's research was thorough, his analysis of his first-hand data and error analysis was outstanding and his findings significant for our understanding of this renewable energy resource.

Alex Gray, Barker College, *A General Vector Theory of the Dynamics of a Rapidly Rotating Top*

Even the simplest of toys can have astonishing physics behind them. Alex explored the physics of the spinning top. He researched all the different elements that contribute to the top's motion and used this to build a computer simulation. Predictions were made based on the simulation data which were tested in his investigation that used a unique contraption that sought to limit the variables involved with getting the top to spin. A fascinating project.

Conrad Petrovic, Broughton Anglican College, *Investigating the relationship between carburising time and case depth in steel case hardened by pack carburising, gas carbonitriding and cyaniding techniques*

Conrad's project may seem abstract but maintaining steel quality and how it can be improved is vitally important for so many industries. Conrad undertook extensive research into the processes used to harden steel and then conducted his own first-hand research into how one of these processes impacted the final quality of the steel. His analysis of complex data and ability to synthesis this into a meaningful conclusion was well worth reading.

Sponsored Awards



AARNet Communications Award

*For best use of electronic communications in
Working Scientifically*

Primary: Maximilian Tietz, St John Bosco Catholic Primary School, *How are solar panels working most efficiently?*

Using dual multimeters to measure voltage and current levels, Maximilian investigated the power output of a 12V/5W solar cell at hourly intervals over seven weekends. At each hour he measured the power output of 9 different set angles and found that 45 degrees generated the most power.

Primary: Lillian Xue, Arden Anglican School, *Internet Fast or Slow*

Like all students and parents globally who have spent loads of time in 2020 working from home, internet speed has been a major issue. Lillian conducted an intriguing study looking at internet speeds for different devices, time of day, day of the week and even distance from a cell tower. She found time of day was a factor and internet speed markedly increased for mobiles closer to towers.

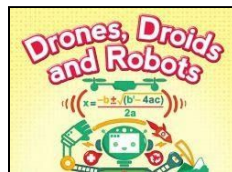
Secondary: Akhil Akku & Zohaib Khan, Redeemer Baptist School, *Drowsy Detector*

In order to reduce road deaths caused by fatigue, Akhil and Zohaib designed and constructed a Raspberry Pi device attached to a wide-angle camera that automatically measured the blinking rate of 40 subjects. They found a weak correlation between hours of sleep and blinking rate.

Secondary: Emilia Rice, O'Connor Catholic College, *Pedal Powered Generator*

Emilia designed and constructed a Pedal Powered Generator that was used to investigate the output of volts, amps and watts at 5 varying rates of speed. As the speed of the Pedal Powered Generator increased, in pedals per minute, the dependent variables of watts, voltage and current increased.

AIP Most Outstanding Physics Award



*For the students who best represent the theme,
“Drones, Droids and Robots”*

Max Hanley & Ryan Moon, Barker College, *Fence Post Robot*

Fencing a farming property can be a costly, hazardous and arduous task. To reduce the risks to farmers and to increase speed and efficiency of fencing a property, Max & Ryan designed and constructed a Fence Post Robot prototype. Using CAD and animation techniques to demonstrate the final design, it automatically inserts straws (representing posts) at regular intervals.

Hannah Jones, St Columba Anglican School, *RoboBall*

Elite soccer players from regional areas have a huge disadvantage in that they often don't have training facilities or even training partners to do basic skills as passing a ball. In response, Hannah, who hails from Port Macquarie, designed a robotic soccer trainer that has the ability to retrieve balls, deliver balls to different heights and can provide simulated passing practice.

Nicholas White, Toronto High School, *Remote Controlled Electric Robot*

For his Industrial Technology: Electronics Major Project, Nicholas designed and built a remote controlled, tank-style electric robot, with accompanying controller and first-person view (FPV) capabilities enabling manipulation of a foam dart blaster that can be remotely aimed and fired. Nicholas selected this project as he is passionate about robots and regularly competes in foam dart challenges.



Rowe Scientific Depth Study Awards

For Year 11 or 12 investigations that most effectively communicate deep knowledge of one or more concepts from the syllabus.

Lindsay Bath, Wyndham College, *Helicopter Rotor Speed and Lift Force*

Lindsay investigated the relationship between the rotor speed of a helicopter-style coaxial drone and the amount of lift force generated. The experiment involved taking accurate measurements of the drone's lift force with the aid of electronic scales and a strobe tachometer. It was determined that the lift force does increase with increasing rotor speed.

Alfie Broekhuizen, Cranbrook School, *A study into how increasing global temperatures, as a result of climate change, impact the number of low oxygen oceanic dead zones*

Alfie set out to determine whether increasing water temperatures will result in less dissolved oxygen thus supporting the possibility that increasing global temperatures could increase the size and number of low oxygen oceanic dead zones. In this investigation freshwater was used instead of saltwater. A clear trend was found which Alfie hopes would draw attention to the disastrous impacts of climate change on species living in our future oceans.

Emily Burns, Redeemer Baptist School, *In or Out: Heat or Fan - Drying a Towel Needs a Plan*

No-one wants to use damp towels! Emily decided to extend a previous investigation on evaporation to a common real-world problem by looking at the effects of using an exhaust fan, a heat lamp and the humidity of the room on the rate of drying. She found that increased air movement is the most critical factor in drying towels quickly.

Rowe Scientific Depth Study Awards

Abdelaziz Dahshan, Denison College Bathurst High Campus, *Is the observable colour of a star dependent on its chemical composition?*

Abdelaziz used data from the Sloan Digital Sky Survey to explore the relationship between the overall colour of stars and particular absorption lines due to chemical composition. The data showed that there was a correlation between the two.

Lucy Davis, Gilgandra High School, *Bonding*

Lucy conducted a review of the various types of intermolecular and intramolecular bonding. She explored the relationships between atoms and molecules in greater depth by constructing a range of models.

Michael Eksteen, Northern Beaches Christian School, *How do Radiators Remove Heat?*

Michael was tasked with designing the perfect automobile radiator so he carried a series of experiments investigating thermodynamics. At the conclusion of his experiments he determined that aluminium should be used as it has a high conductivity and his radiator would have a large surface area so that heat would be transferred more efficiently.

Jordyn Faraj, Menai High School, *An Investigation into Enzymatic Action in the Browning of Apples*

Jordyn predicted that juice with low pH would denature the main enzyme responsible for browning in apples. The results showed that little browning occurred when the apples were treated with orange juice with a pH of 3.

Rowe Scientific Depth Study Awards

Sabrina Fu, James Ruse Agricultural High School, *Statistical comparison of the effectiveness of potential universal influenza mRNA-LNP vaccine approaches in a mouse model: Literature Review*

Influenza is a global respiratory virus that presents itself via a plethora of different strains. Some strains are targeted with specific vaccines which often result in antigens providing immune resistance. Sabrina performed a literature review comparing these specific vaccines to universal influenza vaccines.

William Graham, Batemans Bay High School, *Repurposing waste rubber - Thermal properties of rubberised concrete*

Waste vehicle tyres are a global issue so William was keen to see whether repurposing this rubber could be used in the manufacture of concrete and affect concrete's thermal properties. He determined that there was a positive correlation; increasing the amount of rubber aggregate did increase the amount of heat absorbed by the concrete.

Charlotte Hart, St John Paul College Coffs Harbour, *Potassium Polyacrylate Fire Retardant*

Annabelle Instrell, St Joseph's Regional College, *Endophytic Fungi Species' Ability to Biodegrade Plastics*

Annabelle incubated three different plastics with mycelium from the fungus *Pleurotus ostreatus* for 5 weeks. She found that there was some degradation of the plastic, offering hope of a method of bioremediation using fungi.

Rowe Scientific Depth Study Awards

Emerson Jolliffe, Karabar High School, *Incidence and prevention of Varicella*

Chickenpox is a common infectious illness. Emerson's literature review of qualitative data showed that there was a significant decline in the number of incidences and hospitalisations since a vaccine was introduced in South Australia in 2005.

Riki Leamon, Fort Street High School, *The Effects of Land Clearing and Fragmentation in Eastern Australia*

Riki carried out an investigation into the impacts of land clearing and how this has led to the degradation of native habitats and ecosystems. Additionally Riki conducted an analysis of how this topic is portrayed in the media.

Alexander MacMahon, O'Connor Catholic College, *The effect of weight on time and distance needed for takeoff in plane*

Alexander investigated the impact of the weight carried on the takeoff of a remote-controlled plane, in order to explore the effects of the forces involved in flying. He found that more time and distance was needed as weight was added.

Iyad Mohammad, Al Amanah College, *Factors affecting the effectivity of crumple zones in the safety of a car at different speeds*

Iyad investigated factors that affected the effectiveness of crumple zones in a car. He determined that the most pertinent factor in crumple zone safety was the length of the zone, as this increases the time to stop and thus saves lives.

Catherine Shaw, Wollondilly Anglican College, *The effect of varying potassium nitrate amounts on the effectiveness of a Fitzroy storm glass*

A Fitzroy storm glass was an 1800's weather predicting instrument that when clear indicated fine weather and when cloudy indicated cloudy weather. Catherine tested different concentrations of potassium nitrate solution and found that lower and higher concentrations were less effective.

Rowe Scientific Depth Study Awards

Riley Tonna, John Therry Catholic College, *Death risks for Campbelltown koalas*

Riley researched the effect that the disease chlamydia had on koala populations. Comparing local government statistics from the chlamydia-free population of Campbelltown with the chlamydia-infected population at Port Stephens, Riley concluded chlamydia has a negative effect on koala behaviour due to higher road kill rates.

Jasmine Webb, Wenona School, *Determining the Distance of Open Star Cluster NGC 4755 from Earth Using Photometric Analysis*

Using images from the 'Our Solar Siblings' project, Jasmine constructed colour magnitude diagrams to determine the distance of the famous 'Jewel Box' cluster in the Southern Cross constellation. She found the distance to be consistent with the lower end of the published range.

Lina Zaioor, Sydney Girls High School, *A Retrospective Study on the Most Effective Antibiotic Regimens used in Lebanon to treat Low Severity Community-Acquired Pneumonia (CAP) in Adults*

Lina spent two weeks of her Lebanon summer holiday going through medical records of 200 patients at Mount Lebanon Hospital with the purpose of finding the most effective antibiotic regimens for low severity community acquired pneumonia. With patient names and details suppressed, Lina found patients taking a combination of beta-lactam and macrolide antibiotics had higher success rates.

Anna Zhou, Meriden School, *Trebuchet*

For her Depth Study, Anna built a trebuchet and wanted to find the ideal pivot point for firing a payload at the greatest velocity. Using a bag of rocks as a counterweight, she found the optimum position for this pivot and in doing so increased her understanding of torque, moments of inertia and kinetic energy.