LABLINES

OFFICIAL PUBLICATION OF THE LABORATORY TECHNICIANS' ASSOCIATION OF VICTORIA
VOLUME 45 I 2025 I ISSUE 4

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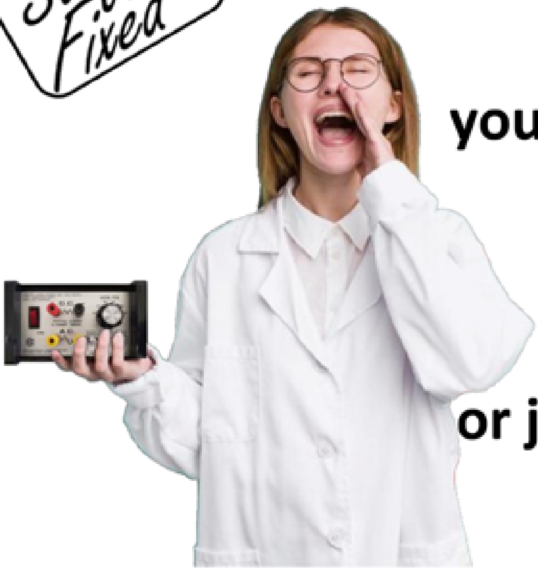

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PRESIDENT'S REPORT

By Mary Jones

The year has flown by, with the arrival of this edition of Lablines being in the new year. Many have retired and moved on the next exciting phase of their journey be it travel, hobbies or simply a change of pace to do things more important to them. Some of the retirees that are known to me are Sheree Baker, Andrea Skinner, Christine Giarusso, Denise Athanasopoulos, Brema Samuel, Evelyn Colvin, Michele Warren, Helen Fernandez and Donna Lavery (after a few training sessions at beginning of 2026). I wish you all the best.

It would be remiss to not congratulate everyone on their hard work for the year and wish that you have all had a restful break. Looking forward to 2026, it will be a new year, and we will face whatever challenges are thrown at us. LTAV is strong because of its members and their dedication to our profession. I look forward to the new posts to the list with insights, discoveries, and questions.

In addition, I would like to thank the entire committee for their hard work over the year. Everyone has been working hard behind the scenes, thank you. I would also like to say an extra thank you to Sally, our editor for Lablines in 2025. Sadly, she will be leaving us in 2026. Thank you for your wonderful Labline editions.

I would also like to thank everyone that was able to attend Labcon. It was a wonderful conference. Our Distinguished Service Award was given to Christine Nolan, while Glenda Merrilees received our Susannah Larrat Award. Thank you to both ladies for their contributions to our profession. Work has already begun for LABCON 2026, where I will hope to see you.

FROM THE EDITOR

By Sally Dupleix

Welcome to my final issue as editor. It is hard to put into words what a privilege it has been to curate these pages. Thank you for the trust, encouragement and generosity you have shown me during my time in this role.

You will notice that this issue has taken a little longer than usual to reach print. For that delay, I sincerely apologise and thank you for your patience. Producing a publication that does justice to the quality of work within our community is always worth the extra care.

This edition brings together an extraordinary collection of stories. In *A Continent in Bloom*, we explore the evolution of Australian plants and the ingenious adaptations that have allowed them to thrive on one of Earth's oldest and driest landmasses. *Friend or Foe?* challenges our assumptions about Australian wasps, revealing their surprising and often overlooked role as pollinators.

We also delve into the life-saving science behind *Passive Immunity and the Power of Antivenoms*, and uncover the geological wonder of *Geodes* and the secrets hidden within stone. In *Survival Under Stress: The Epigenetics of It All*, we examine how plants respond to environmental pressures in ways that can echo across generations. Highlights from the *South Yarra and Moorabbin Region PD,* along with a closer look at the remarkable *Spiny Leaf Insects*, round out this diverse issue.

Thank you for reading, contributing and supporting the magazine. It has been an honour.

A CONTINENT IN BLOOM

The Evolutionary Story of Australia's Native Plants

Submitted by Sally Dupleix
Warrnambool College

Australia's plants are some of the most unique and resilient in the world, shaped by tens of millions of years of isolation, climatic change, and nutrient-poor soils. When the continent separated from Antarctica around forty-five million years ago, it carried with it lush Gondwanan forests dominated by ferns, conifers, and early angiosperms. As Australia drifted northward, the climate gradually dried, rainforests retreated to sheltered pockets along the east coast and Tasmania, and open forests, woodlands, and shrublands expanded across the continent. Over this vast span of time, plants evolved in isolation, developing remarkable strategies to survive intense heat, prolonged drought, frequent fire, and infertile soils. These adaptations shaped not only individual species but entire families of plants, resulting in the distinctive flora that defines Australia today.

Much of Australia's soil is ancient, highly weathered, and extremely poor in nutrients such as phosphorus and nitrogen. Many native plants have evolved ingenious methods to cope with this scarcity. Members of the Proteaceae family, including banksias, grevilleas, and waratahs, produce dense clusters of fine roots called proteoid roots that exude organic acids. These acids release nutrients from the soil that would otherwise be unavailable, allowing these plants to thrive where most others would struggle. Similarly, the Fabaceae family, which includes wattles and other peas, forms symbiotic relationships with nitrogen-fixing bacteria, effectively producing their own fertiliser. This gives them a crucial advantage in regions where nitrogen is limiting, supporting growth and reproduction in conditions that would severely limit less specialised species.

Fire has played an equally transformative role in shaping Australian flora. Many ecosystems are not just adapted to fire, they depend upon it for regeneration. Eucalypts, perhaps the most iconic of Australian plants, have thick insulating bark that protects living tissue from flames, while dormant buds hidden beneath the bark allow trees to resprout quickly after a burn. The leaves of eucalypts are rich in volatile oils, which, paradoxically, may encourage fire. Frequent fires reduce competition, recycle nutrients, and trigger reproductive events, creating conditions that favour species adapted to these cycles. Banksias and hakeas, for example, produce woody seed cones that remain closed until exposed to the intense heat of fire. This strategy, known as serotiny, ensures seeds are released when the post-fire environment is cleared, nutrient-rich, and ideal for germination. In grasslands and heathlands, many species survive repeated burning through underground structures such as lignotubers and rhizomes, which protect the plant's regenerative tissues and allow it to reshoot even after severe fires.

Water scarcity and high sunlight exposure have driven the evolution of distinctive leaf forms. Many eucalypt species have narrow, vertical leaves that hang rather than spread horizontally, reducing exposure to the harsh midday sun and minimizing water loss. Thick cuticles, leathery textures, and aromatic oils further conserve moisture and deter herbivores, a vital adaptation in landscapes where replacing lost leaves is energetically costly. The Myrtaceae family, which includes eucalypts, paperbarks, and bottlebrushes, exemplifies this strategy, combining chemical defences with water-efficient leaf structures. The Fabaceae family also demonstrates leaf modifications, with many acacias developing phyllodes, flattened leaf stems that perform photosynthesis while reducing water loss compared to traditional leaves.

Australian plants have also evolved in tandem with animals, leading to intricate coevolutionary relationships that are evident in flowers, fruit, and seed dispersal strategies. Flower colour provides a

fascinating example. Birds, especially honeyeaters, are sensitive to bright colours in the red, orange, and yellow range, as well as ultraviolet light, which humans cannot see. These colours attract birds to flowers, guiding them to nectar while simultaneously ensuring pollen transfer. Mammals, by contrast, generally perceive the world differently. Many marsupial and small mammal pollinators are dichromatic, meaning they can distinguish blues and greens but have limited ability to see red. Flowers pollinated by mammals often produce strong scents, are less visually striking in red or yellow, and tend to be open at night when mammals are active. This contrast in sensory perception has led to the evolution of flower traits tailored to specific pollinators, revealing an intricate dialogue between flora and fauna over evolutionary time. The presence of vividly coloured flowers, therefore, often indicates coevolution with birds, whereas flowers that rely on scent or night-time presentation suggest adaptation to mammalian pollinators.

Several major plant families dominate the Australian landscape due to the combined effectiveness of these adaptations. Eucalypts, with their fire-resistant bark, vertical leaves, and volatile oils, dominate forests and woodlands. Acacias spread across arid and semi-arid regions, their nitrogen-fixing roots and water-conserving phyllodes supporting growth in harsh conditions. Proteaceae thrive in infertile soils with specialised root systems and fire-dependent reproduction, while Casuarinaceae succeed in dry, sandy, or coastal environments with needle-like leaves and nitrogen-fixing root nodules. Even native grasses, members of the Poaceae family, play a crucial ecological role, with deep root systems, rapid regrowth, and tolerance of fire and grazing, helping stabilize soils and shape open habitats.

The story of Australia's plants is one of resilience and innovation, shaped by fire, drought, infertile soils, and long-term isolation. Their success lies in their ability to endure and adapt, whether by modifying leaves to conserve water, developing roots to extract scarce nutrients, or evolving intricate relationships with animals for pollination and seed dispersal. Far from being fragile, these plants demonstrate the power of evolution over deep time, producing ecosystems that are both highly productive and finely tuned to their environment. As climate change intensifies droughts, shifts fire regimes, and alters habitats, understanding the evolutionary history of these plants is not only fascinating but essential. Australia's flora offers a remarkable lesson in adaptability, showing that survival often comes not from avoiding adversity but from learning to thrive within it.

FRIEND OR FOE?

The surprising ecological role of one of Australia's most misunderstood insects

Submitted by Sally Dupleix
Warrnambool College

When most people think of pollinators, bees, butterflies, and birds usually come to mind, while wasps are often overlooked or even feared. Yet in Australia, wasps play a critical and often underappreciated role in sustaining native ecosystems.

Many Australian plants evolved long before the introduction of European honeybees in the 19th century, developing specialized relationships with native insects, including a wide variety of wasp species. Some plants, such as native figs, rely exclusively on fig wasps like *Pleistodontes froggatti* to transfer pollen between flowers, forming co-evolved partnerships that have existed for millions of years. Other plants, including many orchids and native shrubs, have evolved strategies to attract wasps, through nectar, scent, or mimicry of potential mates or prey, which ensures that wasps visit their flowers and effectively transfer pollen.

Unlike much of Europe and North America, where bees dominate pollination and wasps primarily act as predators, Australia's native flora evolved in isolation with a pollinator community that included wasps, flies, beetles, and a smaller diversity of native bees. Many Australian flowers are adapted to the size, behavior, and foraging patterns of wasps rather than the long-tongued social bees that dominate other continents. For example, orchid species such as the hammer orchid (*Drakaea spp.*) are pollinated by thynnine wasps, which are attracted by the flower's scent that mimics the pheromones of female wasps. Native figs, banksias, and eucalyptus species also rely on various wasp species for pollination, highlighting the essential ecological role these insects play in maintaining plant diversity across the continent.

The arrival of European honeybees introduced a highly efficient and generalist pollinator that has had both positive and negative effects. Honeybees have become important for agriculture and urban gardens, yet they can compete with native insects for floral resources, potentially reducing the pollination of plants that rely on specialized native wasps. Some plants are less effectively pollinated by honeybees because their flowers evolved with specific native wasps or small insects in mind, and this can have subtle impacts on seed production and plant diversity.

Despite their reputation for aggression, wasps are essential to maintaining ecological balance. They not only provide pollination services for a wide range of native plants, but they also help control pest populations, making them doubly valuable in natural ecosystems. Recognizing the importance of wasps and other native pollinators is critical, especially in the face of habitat loss, urbanization, and pesticide use. By protecting native vegetation and supporting diverse insect communities, we can ensure that these small but vital insects continue to perform the ecological work that sustains Australia's unique flora. Wasps may sting, but they are indispensable to the survival of the plants that define Australia's landscapes, quietly maintaining the rhythm of life that has evolved over millions of years.

PASSIVE IMMUNITY AND THE POWER OF ANTIVENOMS

Submitted by Sally Dupleix
Warrnambool College

Antivenoms are life-saving treatments that have transformed the prognosis for people bitten or stung by venomous creatures, from snakes and spiders to scorpions. At their core, antivenoms are antibodies, specialised proteins that bind to and neutralise the toxic components of venom, preventing them from disrupting nerves, destroying tissue, or shutting down vital organs. While the science behind antivenoms is sophisticated, the idea itself has a surprisingly long history rooted in careful observation and experimentation.

The first effective antivenoms were developed in the late nineteenth century by French physician Albert Calmette at the Pasteur Institute. Working in what is now Vietnam, Calmette was confronted with frequent and often fatal cobra bites. Drawing inspiration from emerging vaccine research, he proposed that an animal exposed to small, controlled doses of venom might produce substances in its blood capable of counteracting the toxin. By injecting horses with gradually increasing amounts of cobra venom and later harvesting antibodies from their blood, Calmette demonstrated that venom toxicity could be neutralised in humans. This marked the birth of antivenom therapy and introduced the concept of passive immunity into toxicology.

Despite advances in molecular biology, modern antivenom production still follows this same basic principle. Venom is first collected from the target species under tightly controlled conditions. It is then diluted and injected into a host animal, most commonly horses, but also sheep, rabbits, or camelids, over weeks or months. The animal's immune system responds by producing antibodies that specifically recognise venom proteins. These antibodies are later extracted from blood plasma, purified, and processed into antivenom suitable for clinical use. In many cases, the antibodies are broken down into smaller fragments to reduce the risk of severe immune reactions in patients.

For people unfamiliar with the field, the idea that snake venom and horse blood might intersect can seem strange. That disconnect is part of what makes antivenom science so compelling. It's also why a casual conversation can linger. The idea for this article grew out of an unexpected late-night Uber ride, during which the driver casually mentioned that his primary job was in medical science, producing antivenoms. As traffic lights flicked past, he described the intricate biological logic behind the process, how one animal's immune response could be used to counteract another's venom, and how deeply researchers must understand both to make the treatment work. It was a reminder that behind every vial of antivenom is not just a bite victim, but an entire chain of biological relationships and human expertise.

Different animals are used in antivenom production for practical and biological reasons. Horses are particularly well suited because of their size, longevity, and ability to generate large volumes of antibodies without becoming ill. In recent years, researchers have also turned to camelids such as llamas and camels. These animals produce unusually small antibodies, known as nanobodies, which are more stable and can access venom targets that conventional antibodies sometimes miss. Peer-reviewed studies suggest nanobodies may form the basis of next-generation antivenoms that are safer, more effective, and easier to store in remote regions.

Antivenoms also reveal just how complex venoms themselves are. A single snake species may produce dozens of different toxins, each affecting the body in a different way. This complexity explains why antivenoms are often species-specific, and why polyvalent antivenoms, designed to neutralise venoms from multiple related species, require detailed knowledge of venom composition and regional variation. In Australia, the development of funnel-web spider antivenom in the 1980s, using antibodies raised in rabbits, reduced fatalities from one of the world's most dangerous spiders to virtually zero, an achievement frequently cited in medical literature.

Behind every dose of antivenom is a long process of refinement, testing, and restraint. It is a field where progress depends not on dramatic breakthroughs alone, but on patience, precision, and a deep understanding of biology. From Calmette's early experiments to modern molecular approaches, antivenom research continues to evolve, driven by the same goal it has always had: to turn some of nature's most dangerous substances into tools that save lives.

GEODES

It's what's on the inside that counts

Submitted by Sally Dupleix
Warrnambool College

At first glance, a geode is unremarkable. Rough, dusty, and often grey or brown, it blends easily into its surroundings and is readily mistaken for other rocks. There is little to suggest what lies beneath its surface. Yet when a geode is split open, an interior of glittering crystals is revealed, with sharp points and glassy faces catching the light. What appears ordinary from the outside conceals a record of geological processes that have unfolded slowly over immense spans of time.

A geode is a hollow, spherical or ellipsoidal rock lined with crystals. The outer shell is typically composed of microcrystalline quartz such as chalcedony and encloses an internal cavity filled with well formed crystals of quartz, amethyst, calcite, or celestite. This hollow space is essential. Without room to grow, crystals cannot develop their characteristic shapes. It is this open interior that distinguishes a geode from other rounded rocks that may appear similar before they are broken open.

Many geodes form in volcanic environments, particularly within basaltic lava flows. As lava cools, gas bubbles can become trapped inside the solidifying rock, leaving behind rounded cavities. These voids may persist long after the lava has hardened. Over time, groundwater carrying dissolved silica and other minerals moves through microscopic fractures in the rock and enters these spaces. As conditions change, minerals begin to precipitate from solution and attach to the cavity walls. Crystals grow slowly inward, layer by layer, guided by the chemistry of the fluid and the stability of the surrounding rock.

Quartz is the most common mineral found lining volcanic geodes, reflecting the abundance of silica and its chemical resilience. Variations in trace elements can influence crystal colour. Amethyst, for example, forms when small amounts of iron are incorporated into quartz and later modified by natural radiation. Other geodes may remain colourless or pale, depending on the composition of the mineral rich fluids from which the crystals grew.

Geodes also form in sedimentary rocks. In contrast to volcanic geodes, those formed in sedimentary environments are typically associated with limestone, shale, or dolomite deposited in ancient marine environments, floodplains, or shallow inland seas. These settings are characterised by layered sediments rather than solid lava flows. Sedimentary geodes often begin as nodules, which are compact masses of mineral material that form within sedimentary rock and are usually solid throughout. In some cases, nodules develop around organic material, shells, or other debris within soft sediments. As this material dissolves or decays, a cavity is left behind. Groundwater moving slowly through the rock then deposits minerals into the space. Calcite and celestite are particularly common in these geodes, reflecting the calcium rich chemistry of sedimentary rocks.

In Victoria, geodes are most closely associated with the Western Volcanic Plains. Extensive basalt lava flows shaped this landscape, and gas bubbles trapped during cooling provided the initial cavities for later crystal growth. Over time, silica rich fluids moved through fractures in the cooling rock, depositing minerals within these spaces. Victorian geodes are generally smaller and less abundant than those from major international deposits, but they are significant for what they reveal about local geology. They preserve evidence of fluid movement, volcanic activity, and the conditions that existed as the landscape we recognise today was taking shape.

Seen in this context, geodes are more than visually striking objects. Their layered shells, mineral compositions, and crystal forms act as records of the environments in which they formed. Each one represents a sealed system in which natural laws have operated slowly and consistently over millions of years. What they share, whether formed in volcanic basalt or sedimentary rock, is a reliance on time, stability, and space. Geodes remind us that some of the most intricate structures on Earth are created not through rapid change, but through the quiet repetition of simple physical processes, unfolding far beyond a human timescale.

SURVIVAL UNDER STRESS, THE EPIGENETICS OF IT ALL

Submitted by Sally Dupleix
Warrnambool College

In a world where climate extremes are becoming increasingly common, plants face unprecedented challenges. Unlike animals, they cannot flee from drought, heat, or other environmental stresses. Yet recent research reveals that some plants possess a remarkable survival strategy: they can "remember" stressful conditions and pass that memory on to their offspring. This phenomenon, known as epigenetic inheritance, is changing the way scientists think about adaptation and evolution.

Epigenetics refers to chemical modifications to DNA or its associated proteins that regulate gene activity without altering the underlying genetic code. In plants, these modifications can turn specific genes on or off in response to environmental cues. For example, when a plant experiences drought, genes controlling water retention, root growth, or stress-protective proteins may be activated. Amazingly, these changes can persist in seeds, preparing the next generation to better cope with water scarcity.

Several peer-reviewed studies illustrate this process. Research on Arabidopsis thaliana, a model plant species, found that plants exposed to repeated drought conditions produced offspring with enhanced drought tolerance, even when the seeds were germinated under normal conditions. These offspring germinated more quickly, developed deeper root systems, and maintained higher water-use efficiency than controls. Similar effects have been observed in important crops such as rice and wheat, suggesting that epigenetic memory is widespread across plant species.

The mechanism is subtle but powerful. Modifications such as DNA methylation or histone modification can silence or activate genes in a heritable manner. Unlike traditional genetic mutations, which permanently change the DNA sequence, epigenetic marks can be reversible, providing flexibility. This allows plants to "tune" their responses to environmental conditions across generations without committing to a permanent genetic change. In essence, it is a biological form of learning, the plant's environment leaves a chemical signature on its genome that the next generation can use to survive.

This discovery has profound implications. For agriculture, epigenetic inheritance offers a potential tool to enhance crop resilience naturally. Instead of relying solely on breeding or genetic modification, farmers could use pre-stressed parent plants to produce seeds better equipped for drought, heat, or salinity. In ecological terms, it shows that adaptation is not exclusively a slow process driven by mutations; plants have a way of preparing their offspring for a harsh world, giving them a survival advantage when environmental conditions fluctuate.

Scientists are still exploring the limits of this phenomenon. How long can epigenetic memory persist across generations? Are there trade-offs, such as reduced growth under optimal conditions? Early studies suggest that while there may be costs, the benefits under stressful conditions are significant. Moreover, epigenetic memory could help explain rapid adaptation in wild plant populations facing climate change, an ability that classical evolutionary theory alone struggles to account for.

Plants may not have nervous systems or consciousness, yet through epigenetic inheritance, they demonstrate a remarkable capacity for foresight. Each seed carries not just genetic material, but a chemical memory of its parent's experiences, quietly guiding the next generation toward survival. In a warming, drying world, this hidden memory could be one of nature's most elegant and powerful survival tools.

SOUTH YARRA AND MOORABBIN REGION PD

Submitted by Rosalind Romeo-Meeuw
Wesley College

Professional Development Overview

On 24 October 2025, I organised and coordinated a regional Professional Development day in my role as LTAV Representative for the South Yarra / Moorabbin Region, in collaboration with Amanda Brick (LTAV) and Jason Moore from MTA (Modern Teaching Aids).

The event was hosted at Wesley College, Elsternwick and was attended by 23 science laboratory technicians from schools across metropolitan and regional Victoria.

Schools represented included (but were not limited to):

Caulfield Grammar School, Carey Baptist Grammar School, Brentwood Secondary College, Glen Waverley Secondary College, Presbyterian Ladies' College, Melbourne High School, Warrnambool College, Bemin Secondary College, Balcombe Grammar School, and Kilbreda College.

The strong attendance from a wide range of regions highlighted the high level of interest in practical, skills-based professional learning for laboratory technicians. The day provided valuable opportunities for networking, sharing best practice, and exploring innovative solutions that can be applied directly within school science laboratories. Feedback from attendees was overwhelmingly positive, with participants valuing the hands-on nature of the sessions and the practical relevance to their day-to-day roles.

Overall, the PD was a highly successful outcome, strengthening professional connections across schools and supporting lab technicians to build confidence with emerging technologies.

Workshop Highlight

Get Hands-On with 3D Printing for Your Lab!

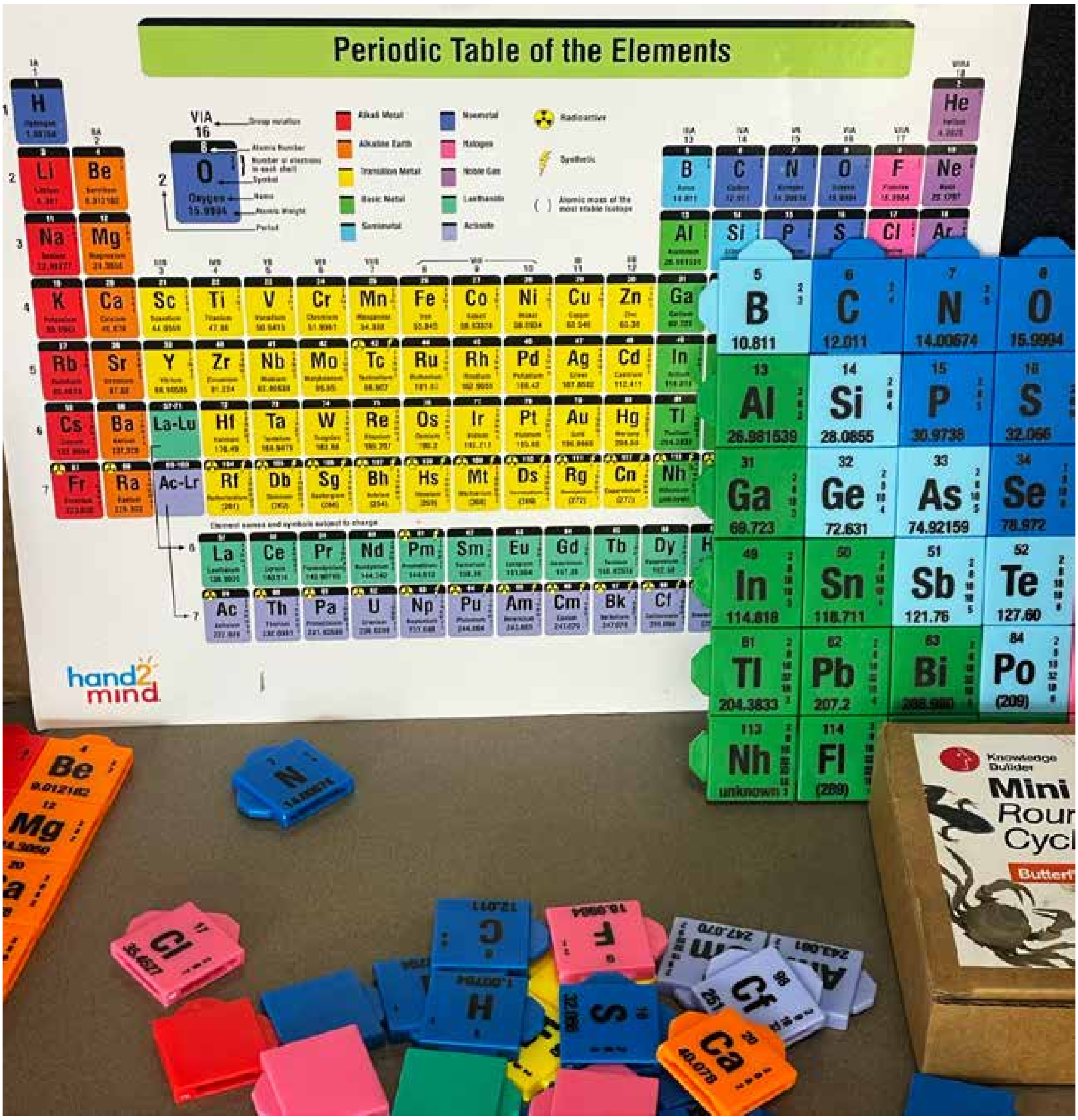
This workshop introduced science laboratory technicians to 3D printing as a practical, accessible, and cost-effective tool for use in school laboratories. The session focused on real-world applications rather than theory, ensuring participants could immediately see how 3D printing could support their work.

What Happened on the Day

- Participants watched a 3D printer in action, seeing the full process from setup to finished print.
- Explored a range of 3D printed lab-related items, including learning aids, storage solutions, and custom-made lab tools.
- Learned the entire workflow, from sourcing ready-made designs online to preparing files and starting a print.
- Discussed how 3D printing can save time and money by producing replacement parts and customised storage that fits their own lab spaces.
- Shared ideas and experiences, with technicians already using 3D printing contributing practical tips and examples.

The session was designed to be approachable and inclusive, with no prior experience required. Participants left with increased confidence and a clearer understanding of how easily 3D printing can be integrated into laboratory practice.

Thank you to everyone who attended and supported the PD Day.


Periodic Table of the Elements
hand2mind
Knowledge Builder
Mini

SPINY LEAF INSECTS

An insight into Extatosoma tiaratum

Submitted bySally Dupleix
Warrnambool College

In classrooms across Australia, a spiny stick insect clings quietly to a eucalyptus branch while students lean in for a closer look. At first glance it appears almost lifeless, more plant than animal. Yet this calm, armoured creature represents more than 200 million years of evolutionary history and a remarkable suite of biological adaptations that have allowed stick insects to survive alongside dinosaurs, birds and mammals.

The species most commonly kept in Australian schools is *Extatosoma tiaratum*, often called the spiny leaf insect or giant prickly stick insect. It belongs to the order Phasmatodea, a group whose name comes from the Greek word phasma, meaning apparition or phantom. Fossil evidence shows that early stick insect relatives existed during the Jurassic period, and molecular studies suggest their lineage may be even older. Over time, natural selection favoured individuals that most closely resembled leaves or twigs, improving their chances of avoiding visually hunting predators such as birds.

Extatosoma tiaratum is native to eastern Australia, particularly Queensland and New South Wales. In the wild it inhabits eucalyptus forests and woodlands, where it feeds primarily on gum leaves, though it can also consume other broadleaf plants. It is a nocturnal herbivore. During the day it remains motionless, relying on camouflage and defensive spines to deter predators. At night it becomes active, climbing and feeding.

Its physiology reflects this lifestyle. Like all insects, it has an exoskeleton made of chitin, a tough structural polysaccharide. The body is divided into head, thorax and abdomen. Six jointed legs extend from the thorax, each equipped with claws and adhesive pads that allow it to grip bark and leaves. Along the body are sharp spines that provide both physical protection and disruptive camouflage, breaking up the insect's outline. Respiration occurs through spiracles along the body, which connect to a branching network of tracheae that deliver oxygen directly to tissues. Circulation is open rather than closed, with haemolymph bathing the organs rather than travelling through sealed blood vessels.

One of the most striking features of this species is sexual dimorphism. Adult females are large, heavy bodied and typically wingless or with very reduced wings. They can reach around 20 centimetres in length. Males are smaller and more slender, with fully developed wings that allow them to fly. Their body shape is less bulky and more streamlined. These differences reflect their reproductive roles. Females invest heavily in producing large, nutrient rich eggs and benefit from remaining camouflaged and stationary. Males are more mobile, using flight to locate females.

Reproduction in Extatosoma tiaratum is particularly interesting because females are capable of both sexual reproduction and parthenogenesis. In parthenogenesis, females produce viable offspring from unfertilised eggs. Offspring produced this way are female and genetically very similar to the mother. When males are present and mating occurs, eggs are fertilised and can produce both male and female offspring. This dual strategy allows populations to persist even when mates are scarce, while still maintaining genetic diversity when sexual reproduction occurs.

Females flick their eggs to the forest floor rather than attaching them to leaves. Each egg resembles a small seed and includes a structure called a capitulum, a fleshy knob rich in lipids. Ants are attracted to the capitulum and carry the eggs into their nests. After consuming the capitulum, the ants discard the intact egg in their underground refuse chambers. This behaviour benefits the insect because the egg is protected from fire and predators, and the soil provides stable temperature and humidity conditions. This interaction is a documented example of myrmecochory, a strategy more commonly associated with plants but also observed in some stick insects.

Egg development is slow and variable. At typical room temperatures of around 20 to 25 degrees Celsius, eggs often take five to nine months to hatch, though some may take longer. Temperature and humidity influence development rate, with warmer conditions generally shortening incubation time within viable limits. Even eggs laid on the same day can hatch weeks or months apart. This variation functions as a form of bet hedging. By spreading hatching over time, the species reduces the risk that all offspring will emerge during an unfavourable period such as drought, fire or food shortage. Staggered emergence increases the probability that at least some individuals survive.

When they hatch, nymphs look very different from the spiny adults. Newly emerged nymphs are often dark brown or black with pale markings and may resemble ants. This resemblance is thought to reduce predation during their most vulnerable stage. As they grow, they undergo incomplete metamorphosis, moulting several times and gradually developing the spines and leaf like body form of adults.

Even individuals that hatch on the same day do not necessarily grow in the same way. Growth in insects occurs in stages through moulting, and small differences early in life can become amplified over time. Temperature strongly influences metabolic rate and development speed. Slightly warmer conditions within the normal range can accelerate growth and increase moulting frequency, while cooler environments slow development. Food quality also matters. Fresh young eucalyptus leaves generally provide better nutrition than older foliage, and differences in leaf water content or chemistry can affect growth rate.

There is also natural genetic and developmental variation. When reproduction is sexual, offspring differ genetically. Even in parthenogenetic reproduction, where daughters are genetically very similar to their mother, variation still arises through normal developmental processes. Body size and the degree of spine development are influenced by both genes and environmental conditions. As a result, one female may become noticeably larger and more heavily ornamented than her sisters, while another raised in slightly cooler or less optimal conditions may remain smaller for longer. This phenomenon reflects developmental plasticity, the capacity of an organism to produce different physical outcomes in response to environmental conditions.

In the wild, spiny stick insects are generally solitary. They do not form structured social groups, defend territories cooperatively or communicate in complex ways. Individuals may occur in the same tree if food is abundant, but this is a result of shared habitat rather than social bonding. Their primary defence strategy is stillness and camouflage rather than group vigilance.

In captivity, however, they are commonly housed together without obvious aggression. This is largely because they are not territorial and have relatively low levels of direct competition when food is

plentiful. Nevertheless, subtle effects can occur. Individuals that occupy the best feeding positions may gain slightly better nutrition. Crowding can increase the risk of accidental disturbance during moulting, which requires the insect to hang freely and expand its new exoskeleton. For this reason, enclosures should be spacious, well ventilated and stocked with ample fresh foliage so that individuals can spread out and moult safely. While they tolerate group housing well, this should not be mistaken for true social behaviour.

Ecologically, the spiny stick insect occupies the role of a specialist herbivore within eucalyptus dominated ecosystems. By feeding on leaves, it participates in energy transfer from primary producers to higher trophic levels. It is also prey for birds, reptiles and mammals. Its reliance on camouflage highlights the evolutionary arms race between herbivores and visually hunting predators.

Because of their calm nature and relatively simple care requirements, spiny stick insects are well suited to classroom environments. They require a tall, well ventilated enclosure with fresh eucalyptus branches placed in water to maintain leaf quality. The container must allow individuals to hang freely during moulting. Excrement should be removed regularly to maintain hygiene. Eggs can be collected from the enclosure floor and kept in a separate container with slightly moist substrate and good airflow. Excess moisture should be avoided, as fungal growth can damage eggs. Stable indoor temperatures typical of Australian classrooms are generally suitable, though extremes should be avoided.

The spiny stick insect may appear passive and unremarkable at first glance, but its biology tells a deeper story. It embodies ancient evolutionary history, intricate ecological interactions, flexible reproductive strategies and subtle developmental variation. In a classroom, it offers more than a curiosity. It provides a living example of natural selection, adaptation and the quiet complexity of life in Australia's forests.

QUIZ

Test your knowlage with these fun scientific facts

1. On which planet is a day longer than a year?
2. Which species of bird can fly backwards?
3. Which fruit is slightly radioactive?
4. What animal can sleep for up to three years?
5. Apple pips contain what poisonous chemical?
6. What part of the body does not have a blood supply?
7. Which metal explodes in water?
8. Which part of the human body is slightly bioluminescent?
9. Which animal has fingerprints almost identical to humans?
10. On what planet does it rain diamonds?
11. Which animal can survive being frozen solid?
12. Which animal can go up to 30 years without food or water?

1. Venus
2. Hummingbird
3. Banana
4. Snail
5. Cyanide
6. Cornia
7. Potassium
8. Skin
9. Koala
10. Neptune
11. Wood Frog
12. Tardigrade

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