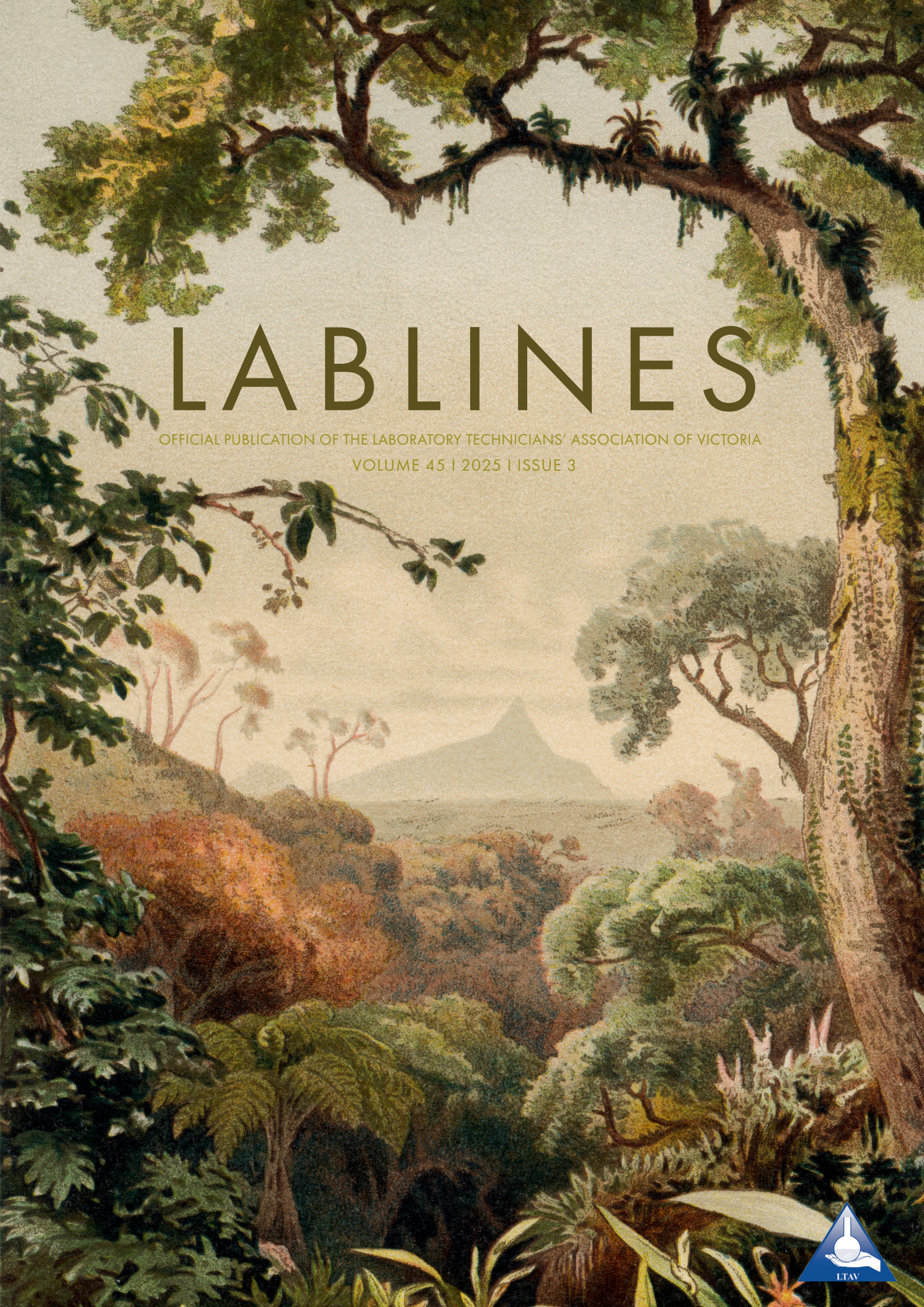
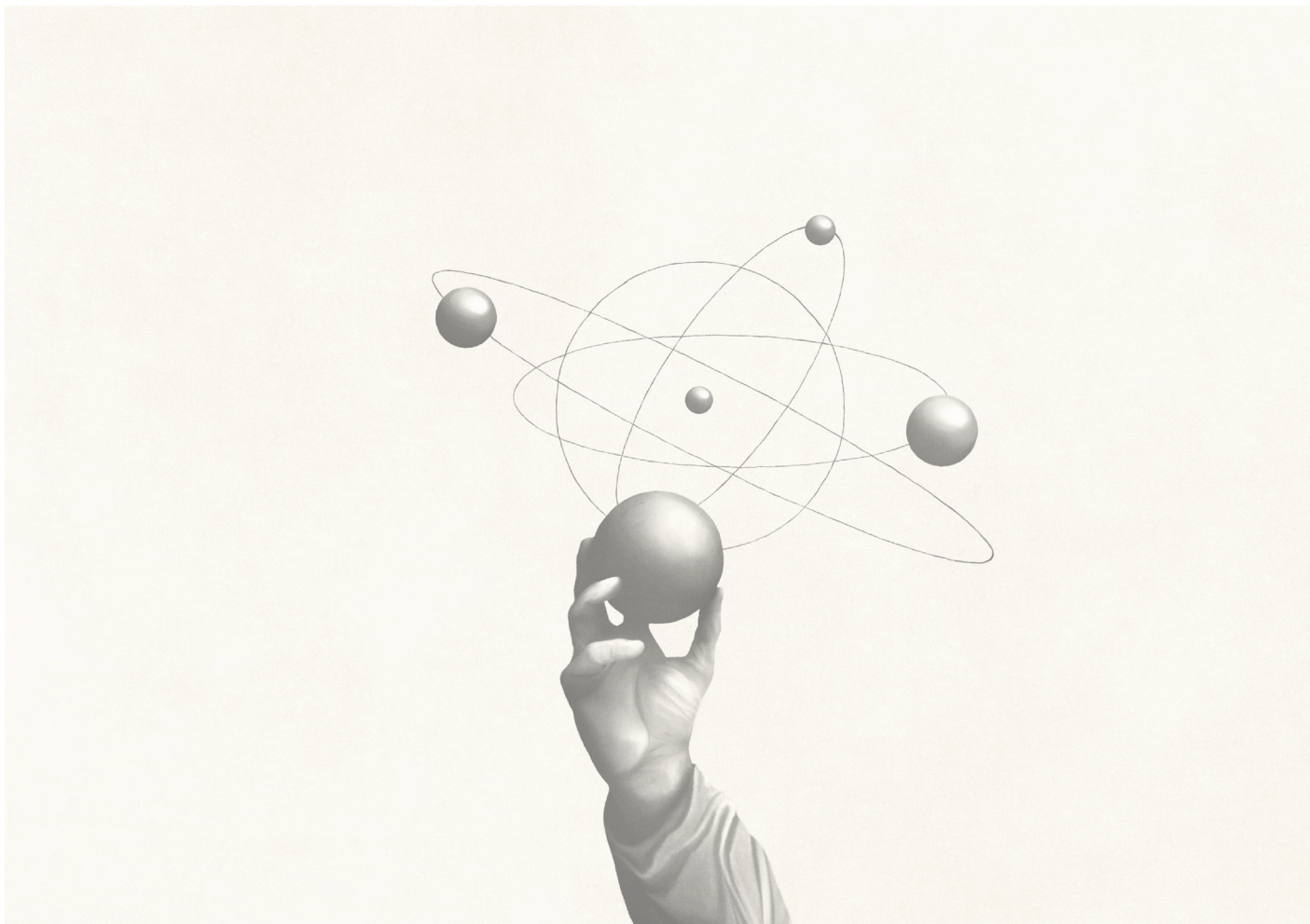




LAB LINES

OFFICIAL PUBLICATION OF THE LABORATORY TECHNICIANS' ASSOCIATION OF VICTORIA
VOLUME 45 | 2025 | ISSUE 3





PRESIDENT'S REPORT

By Mary Jones

I would like to openly acknowledge the hard work each laboratory technician puts into their role, even when we are not always recognised within our individual schools. Furthermore, I would like to remind everyone that the 3rd–7th of November is STAR Week, School Technicians Appreciation and Recognition Week, developed by SETA. I hope you all have a wonderful time this week.

We are fast approaching LABCON on 13th–14th November, with fewer sleeps than I care to count. The time has flown by, and I look forward to seeing as many of you there as possible. I am aware that some have been denied approval to attend LABCON. If you work in a school that requires a PDP knowledge component, you may list LABCON as a conference held by school laboratory technicians for school laboratory technicians.

It provides valuable information on legislative changes, builds practical skills, and fosters new ideas that can be taken back to improve learning in your own school. This may help some who were previously denied the opportunity to attend.

Please continue the wonderful work you do. With your support, science education will continue to grow and enrich the future.

FROM THE EDITOR

By Sally Dupleix

Welcome to this issue of Lablines, celebrating curiosity, skill, and innovation in school laboratories. Inside, explore plant evolution, practical guidance on preparing stem cross-section slides, highlights from recent professional development days, and the final installment of Generative AI for Laboratory Operations. I hope these articles inform, inspire, and support your vital work.

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EXPLORING PLANT EVOLUTION

Submitted by Sally Dupleix
Warrnambool College

This week in the lab, I've been getting a little obsessed with plant evolution. What started as setting up a few simple Year 8 biology pracs quickly turned into a deep dive down the phylogenetic rabbit hole and an exploration of the school's slide collection. Once you start thinking about how the plants we see every day came to be it's hard not to be amazed by the evolutionary ingenuity that has shaped the green world around us, and I couldn't resist taking a closer look at some of this under the microscope.

Plants began their journey in the water. The earliest ancestors were green algae that, over millions of years, developed the ability to survive on land. By evolving waxy cuticles to prevent drying out and vascular tissues to transport water and nutrients, they transformed from small, simple forms into the towering trees and complex flowering plants we know today.

The bryophytes, mosses, liverworts, and hornworts, still echo that early stage of life, relying on water for reproduction. The next evolutionary leap came with vascular plants, which evolved lignified xylem and phloem to move water and nutrients efficiently, allowing them to grow taller and spread further.

The evolution of seeds changed everything. Gymnosperms like conifers and cycads produced seeds that could survive harsh

conditions, while angiosperms (flowering plants) refined the process even further. With the advent of flowers and fruits, plants recruited animals and insects to help with pollination and seed dispersal, an ingenious bit of evolutionary teamwork that led to an explosion of diversity. Today, angiosperms dominate the planet, making up over 90% of all plant species.

Once flowering plants (angiosperms) appeared, they diversified rapidly, an evolutionary explosion that led to the enormous variety of species we see today. Genetic and fossil evidence suggests that early angiosperms split into several major lineages, each experimenting with different forms, habitats, and pollination strategies.

At the base of the family tree are the basal angiosperms, small groups such as water lilies (Nymphaeales) and star anise (Austrobaileyales), which retain many ancestral traits like simple flower structures and aromatic oils. These are followed by the magnoliids, plants like magnolias, laurels, and peppers, that bridge the gap between early flowering plants and the two dominant modern groups: monocots and eudicots.

The monocot–eudicot divergence represents one of the most significant evolutionary splits in plant history. It's thought to have occurred around 140–125 million years ago, giving rise to two



distinct approaches to plant growth and development.

The term cotyledon refers to the embryonic leaf or leaves within a seed, the first structures to emerge when the seed germinates and begin photosynthesis. Monocots possess a single cotyledon, while eudicots have two. Though it might sound like a small difference, it reflects deeper developmental patterns that shape the plant's entire structure.

Monocots, such as grasses, orchids, and lilies, typically have long, narrow leaves with parallel veins and a fibrous root system that spreads close to the soil surface, an advantage in quickly absorbing rainfall and resisting erosion. Eudicots, including plants like beans, eucalypts, and daisies, tend to have broader leaves with branching veins and a central taproot, allowing them to reach deeper water sources and support woody growth.

These two lineages have evolved distinct structural and physiological traits that influence everything from water transport and leaf architecture to growth habits and reproductive strategies. For example, the efficient vascular bundles of grasses enable rapid water movement and resilience under grazing or moving, while the woody stems and branching networks of many eudicots allow for long-term growth and complex canopy formation.

You can actually see this evolutionary divergence under the microscope. In a cross-section of a monocot stem, the vascular bundles appear scattered throughout the ground tissue, a flexible arrangement that supports even growth in plants with soft, non-woody stems. In contrast, eudicot stems show their vascular bundles arranged neatly in a ring, a pattern that allows for the development of secondary growth (wood and bark) and stronger, more upright stems.

These differences aren't just anatomical curiosities they represent two evolutionary solutions to the same challenge: how to transport water and nutrients efficiently while supporting the plant's structure. The monocot strategy favours speed and flexibility, the eudicot approach favours strength and longevity. Both have proven remarkably successful.

STEM CROSS SECTION

Submitted by Sally Dupleix
Warrnambool College

SEEING EVOLUTION IN CROSS SECTION

Microscopic examination of plant stems provides a window into evolution in action. By preparing and staining monocot and dicot stem cross sections, we can observe how their vascular arrangements reflect distinct evolutionary strategies, the scattered bundles of monocots offering flexibility, while the ringed pattern of dicots enables strength and secondary growth.

Working with stains

Stains can have a number of hazards associated with them, particularly when diluting them from a concentrated stock. For this reason, it is always important to be aware of the risks associated with each chemical. After assessing the hazards of the stains available in our lab, I chose to work with a combination of 0.1% Neutral Red and 0.05% Toluidine Blue. This combination provides complementary contrast: Neutral Red highlights living cytoplasm and vacuoles, while Toluidine Blue stains cell walls and lignified tissues, making it easier to distinguish different tissues and vascular structures under the microscope.

Materials

- Fresh monocot and dicot stems
- Sharp razor blade
- Forceps and dissecting needle
- Petri dish with water
- Stains: Neutral Red 0.1% and Toluidine Blue 0.05%
- Microscope slides and cover slips
- Droppers and paper towel
- Gloves and safety glasses

Hazards and Safety

- Neutral Red (0.1%) is an irritant; avoid contact with skin or eyes and do not ingest.
- Toluidine Blue (0.05%) is an irritant and suspected of causing long-term health effects if mishandled. Avoid inhalation, skin contact, or ingestion.
- Always wear gloves, safety glasses, and work in a well-ventilated area. Dispose of stains according to your institution's chemical safety protocols.

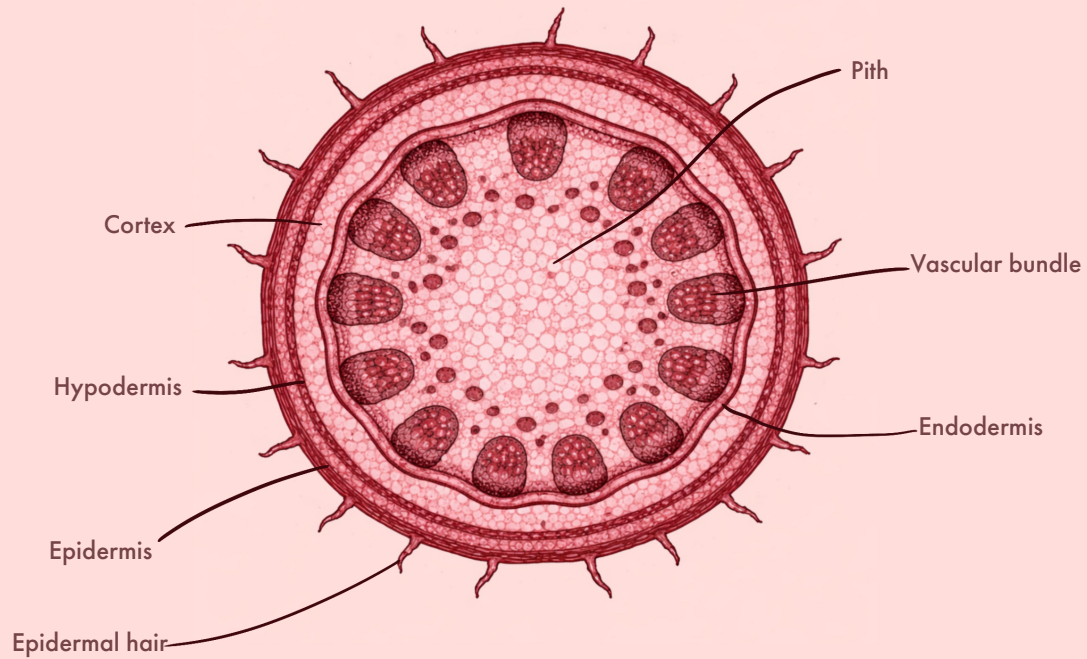
Method

- Slice a thin cross section of the stem using a razor blade.
- Float the section in water to prevent it from drying.
- Apply Neutral Red 0.1% for 30–60 seconds.
- Rinse gently with water.
- Apply Toluidine Blue 0.05% for 30–60 seconds.
- Rinse gently with water and mount in a drop of water or glycerine on a clean microscope slide.
- Cover with a cover slip and observe under the microscope, starting at low power.

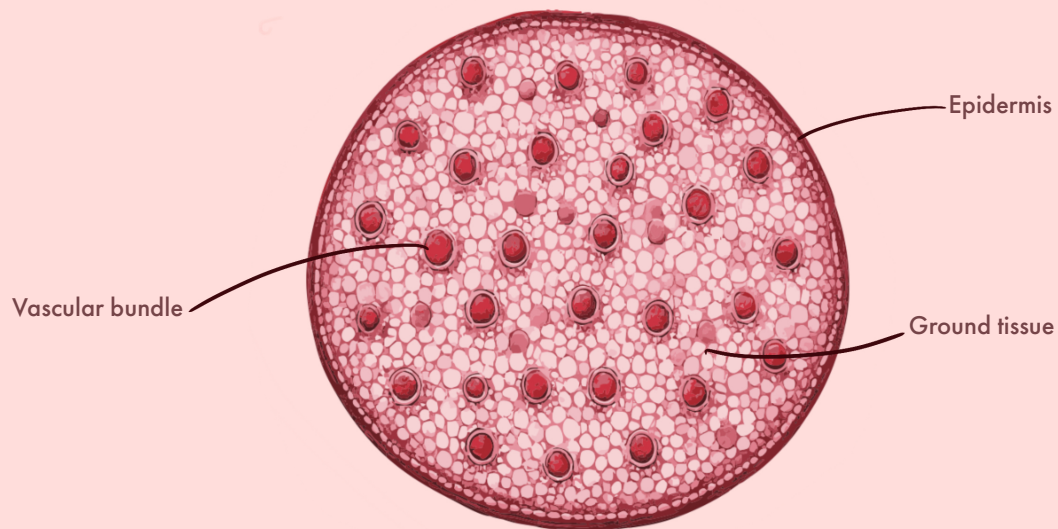
Tip for viewing

In monocot stems, look for scattered vascular bundles within the ground tissue. In dicot stems, the vascular bundles form a distinct ring around the central pith. The double staining highlights these differences clearly, illustrating how anatomical arrangements relate to evolutionary adaptation.

EUDICOT



MONOCOT



EUDICOT

In eudicot stems, vascular bundles are arranged in a ring around the central pith, allowing secondary growth such as wood and bark that strengthen the stem. Within each bundle, xylem lies on the inner side transporting water and minerals, phloem lies on the outer side transporting sugars, and the vascular cambium between them produces new tissue, enabling stem thickening.

MONOCOT

In monocot stems, vascular bundles are scattered throughout the ground tissue, each with an arrangement of xylem on the inner side and phloem on the outer. Unlike eudicots, monocots lack a vascular cambium, so they cannot produce secondary growth. As a result, their stems remain soft, flexible and non-woody, supporting growth without forming true wood or bark.

*Knowledge is an unending
adventure at the edge of
uncertainty.*

- Jacob Bronowski



MORNINGTON REGION PD

Submitted by Evan Salanoa
Morrington Regional Representative

In term 3, our Morrington Region Lab Tech PD was held on a bright and sunny (until it turned gloomy and rainy) afternoon on the 1st of September 2025. It started off with a real highlight; Afternoon tea. A range of sweets and the occasional savoury pastry was on hand to stave off dropping blood sugar levels.

Following a quick hello, we had Amanda Brick from MTA run us through the set-up, printing processes and troubleshooting with their Bambu Lab X1-Carbon 3D printer. The session provided a good overview on the pros and cons we may encounter when it comes to selecting printing materials, what speed to run at, and even the orientation of your printing project.

Afterwards, it was nice to just catch up and talk about how everyone runs their operation at their schools, and their tips and tricks. We finished the afternoon with a tour of our lab facilities spread across the school, just before the rain really set in for the evening. Thank you to everyone for a great afternoon and thank you again Amanda for all the effort you put into making the day a success.

I look forward to catching up again with everyone, hopefully soon!

HUME & LODDON, CAMPASPE, MALLEE REGION PD

Submitted by Claire Stock
Hume Regional Representative

Lab techs from across two large regional LTAV districts, Hume and Loddon/Campaspe/Mallee, gathered at the end of Term 2 for a day of networking, learning, and lively conversation. The event was hosted by Moama Anglican Grammar, with LTAV Regional Representative Jennifer Cain welcoming almost thirty attendees to her school.

Held on a Monday, several participants made a weekend of it, taking time to explore Echuca–Moama and the mighty Murray River. In true country style, Moama Anglican Grammar greeted everyone with warm hospitality and delicious food. The relatively young, 20-year-old school boasts impressive facilities, including multiple science labs with dedicated prep rooms for each subject area, and a large barn-inspired learning center for agricultural science.

As well as touring the school's buildings, attendees enjoyed exploring the lab cupboards and prep room storage setups, gaining plenty of ideas and inspiration from Jenny's organisation.

The day's training sessions began with Theresa Holt from Southern Biological, who presented an overview of the CRISPR/Cas9 process, short for Clustered Regularly Interspaced Short Palindromic Repeats and CRISPR-associated protein 9. As Theresa explained, CRISPR is part of a microbial immune system that protects against viruses by incorporating a fragment of an invader's DNA into its own,

creating a guide RNA (gRNA) capable of recognising that virus if it returns. Cas9, an endonuclease discovered by Jennifer Doudna and Emmanuelle Charpentier, cuts both strands of DNA at targeted locations using that guide RNA. Their work on CRISPR–Cas9 earned them the 2020 Nobel Prize in Chemistry.

Theresa guided attendees through the "Chopped!" learning lab, a hands-on activity introducing students to CRISPR–Cas9 technology by cutting DNA in a test tube. Using micropipettes, a microcentrifuge, and an incubator to prepare aliquots, participants then ran their samples through BlueGel electrophoresis units. Theresa described electrophoresis as a method for separating DNA fragments by size: smaller fragments move quickly through the agarose gel, while larger ones move more slowly, creating distinct bands for comparison.

Working in small groups, lab techs used all the equipment themselves, sharing techniques and discussing microbiology practices. While the results weren't always perfect, the learning (and laughter) certainly were!

After a generous lunch, the afternoon session was presented by Oakley McMillan and Niall Collins from Westlab. They introduced the company's new business model, which consolidates stock into a single warehouse in Ballarat, close to Melbourne Airport, for faster national delivery. Westlab has also implemented feedback from



schools, including stronger glassware with integrated bases (so students can't pull them apart!) and updated chemical labels featuring regulatory data and colour-coded bands for clearer storage information.

By removing middle suppliers, Westlab aims to keep chemical prices lower, and attendees received a 25% discount card to explore the new range. Congratulations also to Tenille Russell from St Anne's College in Kialla, who won the jellybean-counting challenge!

It was wonderful to have presenters travel from Melbourne, Adelaide, and Ballarat to share their expertise, and equally inspiring to see lab techs journey from 22 schools across the region, including Bendigo, Broadford, Cranbourne East, Echuca, Kialla, Kilmore, Moama, Mount Beauty, Myrtleford, Rochester, Rutherglen, Seymour,

Shepparton, Tallangatta, Wangaratta, and Wodonga.

As always, conversations flowed easily, from lab organisation and workload management to service quality and the use of programs such as RiskAssess for due diligence and practical scheduling. Favourite lab hacks were also shared, including agar U-tubes made by Dale Unwin from Wangaratta High School as a clever, reusable alternative to chromatography paper bridges for galvanic cells.

A huge thank you to Jenny and the team at Moama Anglican Grammar for their outstanding organisation and hospitality. Morning tea, lunch, and afternoon tea were co-funded by LTAV and the school, and were enjoyed by all. Plans are already underway for next year's regional gathering in Benalla in June, so keep an eye out for details and come along!

BALLARAT REGION PD

Submitted by Jenny Callahan & Robyn Price

The absence of a Ballarat Regional Rep has left us in PD withdrawal for several years. After attending (muscling in on) the Wimmera region PD day in 2024, we decided that we really needed to get something up and running for our region to reconnect and reestablish our local network. This is particularly important for those Techies who work solo. With substantial help from Jodie Pignataro, Loreto College became the venue, and we were able to gather a really good number of techs from local and regional schools as well as luring a few of our Wimmera buddies along as well.

We opened the morning with the obligatory signing-in debacle (would it even be a PD day if we didn't all stand around shaking our fists at the pass tab screens?). Having finally circumvented the cascading system hurdles, we were off and away. After a round of introductions we welcomed Megan Simkin from Ciderhouse Tech who had brought along an impressive array of PASCO sensors. We were able to have a go at calibrating the wireless pH sensors and then performed something affectionately known as "a bush titration" under her expert guidance and tutelage.

Jenny had spent about 14 hours on the previous evening baking an impressive selection of fabulous cakes and slices and Jodie brought along the world famous PD day brownies. We were able to retire to our campus library and enjoy a morning tea while overlooking the

fabulous Lake Wendouree. At times like that, we are much more in tune with the gratitude we should more often feel given the amazing outlook we enjoy not only from our library also from our science classrooms. The inevitable tech chat ensued.

After we were able to round up everyone and reconvene in the science lab again, Daniela from Science Supply Australia took us on a STEAM journey – the seamless merging of art and science through the construction of an origami model of a double helix. Everyone threw themselves into the activity – a perfect way to explore origami models while being able to continue the tech chats started at morning tea. Daniela was also able to demonstrate a few Science Supply products and pieces of equipment and she and Megan expertly fielded questions as the techs gathered and bombarded them.

After a break for lunch we pretty much let everyone free range through our science wing. We toured the science labs, discussed risk assess, storage, chemical disposal, displays, prep labs and about a million other things! We were able to give everyone a very quick run down on our *Drosophila* breeding program, which was still in full swing for our year 11 Biology students. Overall we really enjoyed hosting the day and want to say a huge thanks to Jodie for helping us to organise it and also to Megan and Daniela for presenting so professionally and fabulously.



GIPPSLAND REGION PD

Submitted by Debby Butler
Gippsland Regional Representative

Finding a location for our annual PD proved difficult. Many would be hosts (including my school) are experiencing maximum usage of their classrooms, with science rooms often being used as general classrooms! I had two kind offers from the ends of the Gippsland region in Mallacoota Secondary College and New Haven College on Phillip Island (thank you Sabine and Jess), in the end Mary-Therese Gorman from Neerim district came up with a date that was a student free day at Neerim District SC.

On arrival Mary-Therese had a wonderful country style morning tea for us complete with 3 different slices, a passionfruit iced sponge with other biccies and fruit. Mary-Therese is on the local hall committee and had got us 'mates-rates' for the catering.

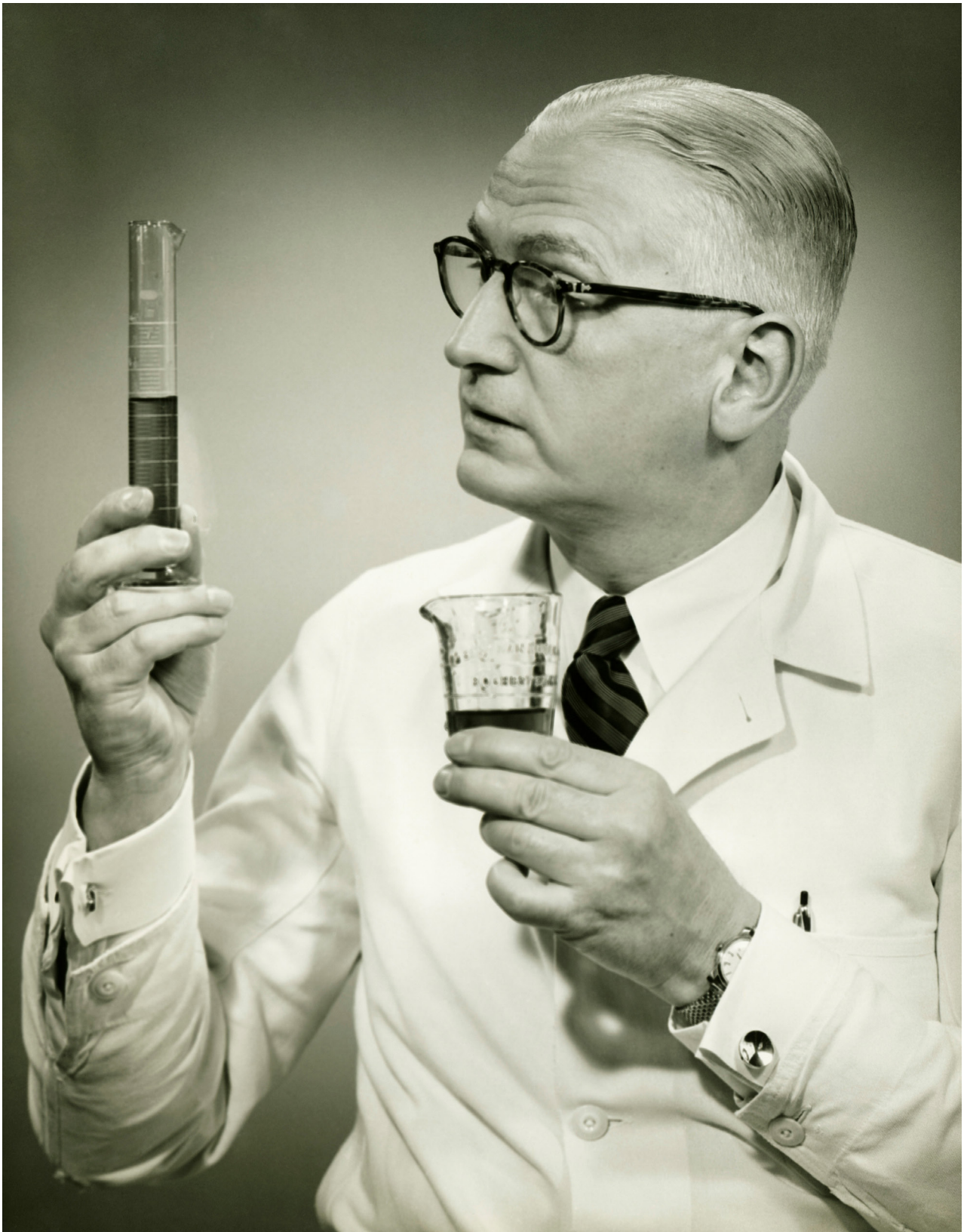
Our presenters for the day were Amanda Brick and Mel Dodds from Modern Teaching Aids. Amanda presented on using the 3D printer in the science lab, taking us through all the steps to making a product. She showed us some of the useful items she had made with the printer, many of which were made at a fraction of the cost of buying them from MTA or other suppliers. She showed us how easy it was to use the 3D printer and talked through the models available,

programs and types of filament that can be used in the process. The items included baskets which could be scaled to size, which would be very handy for storage in labs; test tube supports insets to put on beakers, thermometer clips for beakers. I have to confess that I was rather 3D printer agnostic before the presentation, but now really want one for my lab now.

Amanda and Mel also put out a big display of their equipment that can be purchased through MTA and were happy to respond to requests to source equipment not currently in their catalogue. We went outside onto the basketball courts for a catapult and trebuchet demonstration and discussion on how these items could be used for investigations. Lots of fun for those who were happy to step up and try their artillery skills.

The day finished off with a lunch and a chance to network with other the other Lab Techs from the Gippsland region. We had 28 attendees in all including Jodie Pignataro from Horsham College, who is on the LTAV committee representing regional Lab Techs and 5 Lab Techs from adjacent regions to Gippsland. A huge thanks to Mary-Therese, Amanda and Mel for making the day a success.





GENERATIVE AI FOR LABORATORY OPERATIONS

ETHICAL & RESPONSIBLE IMPLEMENTATION IN SCHOOL LABORATORIES

Submitted by Dr. Aneela Yasmin
Lab Manager & STEM Specialist
East Preston Islamic College

Throughout this series, we have explored the transformative potential of Generative AI (Gen AI) for laboratory operations, from streamlining administrative tasks to enhancing professional development and well-being. We have seen how well-crafted prompts can unlock efficiency, creativity, and support. However, to truly integrate these powerful tools into the laboratory ecosystem, we must conclude with a critical discussion on their ethical and responsible use.

Implementing AI in a school laboratory is not just a technical shift; it's a cultural one. It requires a framework built on awareness, critical thinking, and shared responsibility to ensure these tools benefit the entire lab community without introducing new risks.

The Core Ethical Principles for School Labs

For Gen AI to be a responsible partner in science laboratories, its use should be guided by five key principles:

- The output of an AI is only as reliable as its training data and the prompt provided. In a scientific context, where precision is paramount, 'Accuracy and Scientific Integrity' are the foremost concern.
- Lab personnel must be protected from having their personal or sensitive data exposed to AI platforms so think about privacy and confidentiality when interacting with AI tools.
- The benefits of AI should be available to all, and its use should not exacerbate existing inequalities.

- We must be mindful of the hidden environmental cost of AI and use it in a way that minimizes its carbon footprint, aligning our digital actions with planetary health.
- Users must understand that they are interacting with an AI, and a human must always remain ultimately accountable for decisions and transparency especially those related to safety. The Hidden Environmental Cost of AI.

The principle of 'Sustainability and Environmental Stewardship' must address a less visible impact - the significant energy and water resources required to power AI systems.

Training and running large AI models demands immense computational power in vast data centers. These data centres consume enormous amounts of electricity, contributing to a carbon footprint, and require extensive water for cooling systems. A single complex AI query can consume more energy than a traditional web search.

As responsible users, how can we mitigate this?

- Use targeted prompts like clear, specific, and well-structured prompt gets to the desired output faster, requiring fewer computational cycles and less energy than a chain of vague, iterative queries. "Quality in" means efficiency out.
- Consolidate requests so instead of sending five separate short prompts, combine them into one multi-faceted request. This single, efficient transaction is more resource conscious.

- When possible, use AI models that are optimized for efficiency. Some newer models are designed to deliver high-quality outputs with a lower computational burden.
- Encourage the use of AI for purposeful, high-value tasks that save tangible resources in the physical lab (e.g., reducing chemical waste through better planning) rather than for casual experimentation or tasks that could be done manually with minimal effort.

By being mindful of these hidden costs, we can use AI not just to create a more sustainable lab, but to do so in a way that is, itself, environmentally responsible.

Garbage In, Garbage Out: The Dual Meaning in the Age of AI

This old computer science saying has never been more relevant. In the context of AI for labs, it has two critical interpretations:

- The quality of the prompt is of great importance because the AI model is a sophisticated pattern-matching engine. A vague, poorly structured, or biased prompt will inevitably produce a low-quality, generic, or even incorrect response. For example, the second prompt demonstrated below, with its specific role, audience, structure, and safety focus, yields a far more useful and reliable output.

Poor Prompt: “Tell me about Bunsen burners.”

Effective Prompt: “As an experienced lab technician, explain the safe setup and lighting of a Bunsen burner to a year 7 student. List the steps in a clear, numbered sequence, highlight the two critical safety checks before lighting, and use simple, non-technical language.”

- Always consider the integrity of the training data. Gen AI models are trained on vast datasets from the internet, which contain both high-quality scientific information and errors, biases, and outdated practices. An AI does not “know” truth; it generates plausible text based on patterns. It might confidently present an outdated safety procedure or a fictional chemical property if such information exists in its training data. Therefore, every piece of AI-generated content must be treated as a draft to be verified, not a final authority. This is non-negotiable in a scientific setting.

A Practical Framework for Responsible AI Use in Labs

Verifying AI-Generated Information: The Technician as the Final Checkpoint!

- Cross-reference AI-generated protocols, safety information, and material substitutions against official sources like SDS sheets, Australian Standards, and verified educational curricula.
- Critically review and amend your AI generated documents based on the context and your professional expertise.
- AI is a tool for inquiry, not a source of absolute truth.

Safeguarding Privacy: Protecting Our School Community

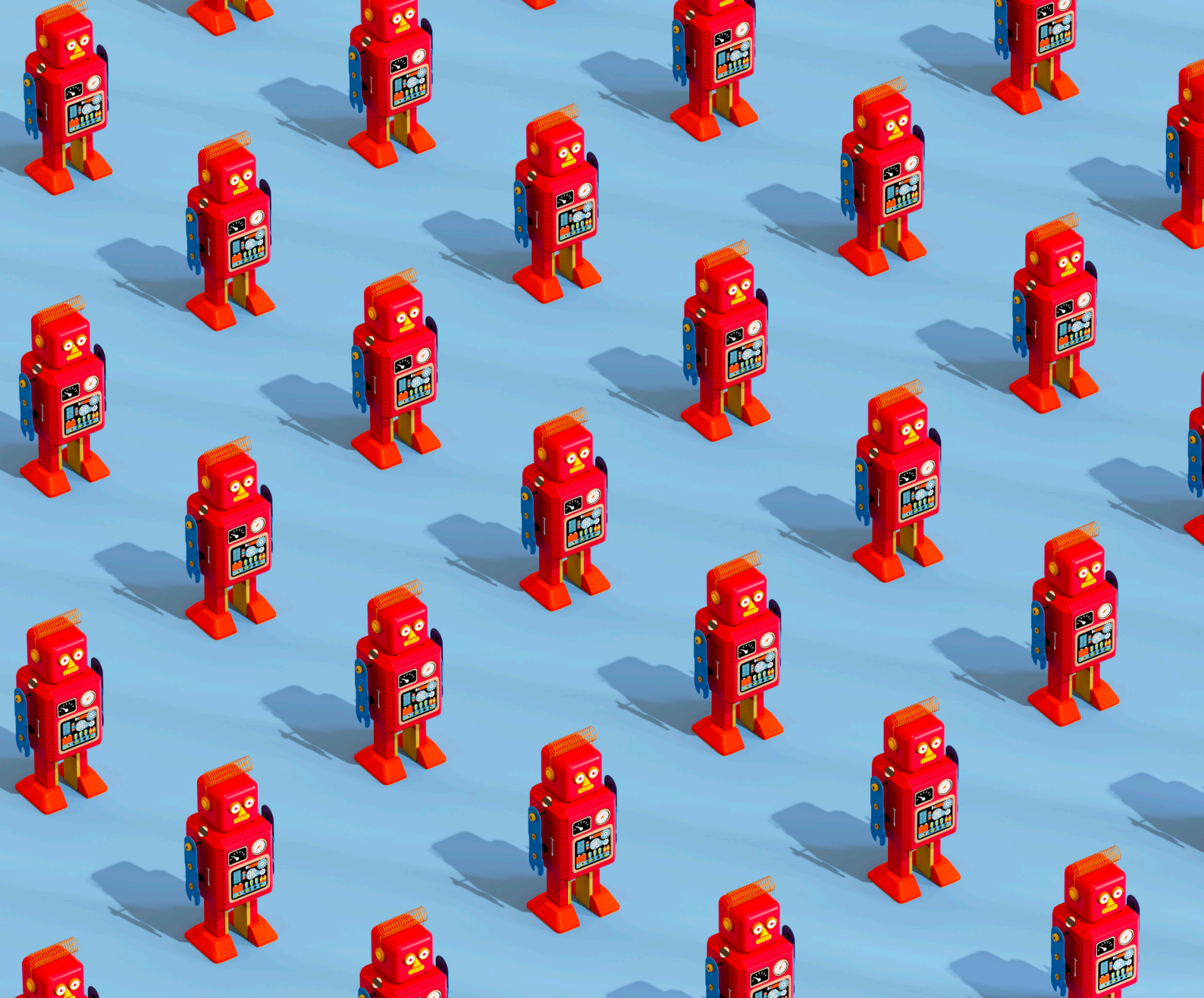
- Never input student names, staff details, medical information, or any other identifiable personal data into a public AI chatbot.
- When creating example scenarios for training, use completely fictionalized data (e.g., “a student spilled a hypothetical 0.1 M HCl solution”).
- Be aware of your school’s or education department’s policy on using third-party AI tools, as they may have specific data privacy requirements.

Promoting Equity and Mitigating Bias

- Understand that AI can reflect and amplify societal biases. Be cautious if using AI to generate content about historical figures in science or to make assumptions about student capabilities.
- Favour AI tools that offer free tiers or are provided by the institution to ensure all staff and students can benefit, regardless of personal resources.

Fostering Transparency and Accountability

- When sharing AI-generated checklists, emails, or protocols with colleagues, it is good practice to add a note such as “Drafted with AI assistance and reviewed for accuracy.”
- The lab technician is always the responsible professional. The AI is an assistant; the human is the expert accountable for safety and educational outcomes.



The journey of integrating Generative AI into school laboratories is a collective responsibility. It requires us to be not just users, but critical thinkers and ethical guides. By embracing the power of prompt engineering while anchoring our practice in verification, privacy, and transparency, we can harness this technology to create safer, more

efficient, and more inspiring learning environments. Let us move forward not with uncritical adoption or fearful rejection, but with a commitment to thoughtful implementation. In doing so, we model the very principles of scientific inquiry and responsibility we strive to instill in our students.

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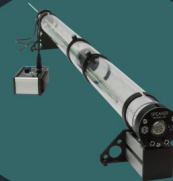
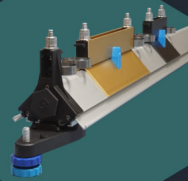
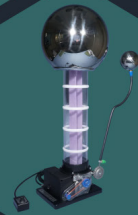
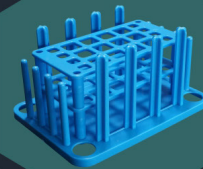
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I may be able to send instructions on how to fix it yourself!

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Email: harvey@principlespractice.com.au, Phone: 0459 768 392



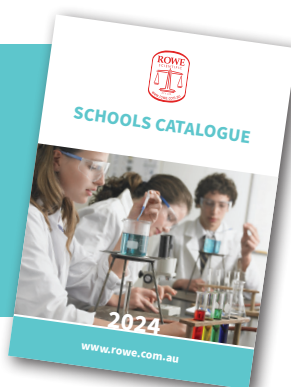
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