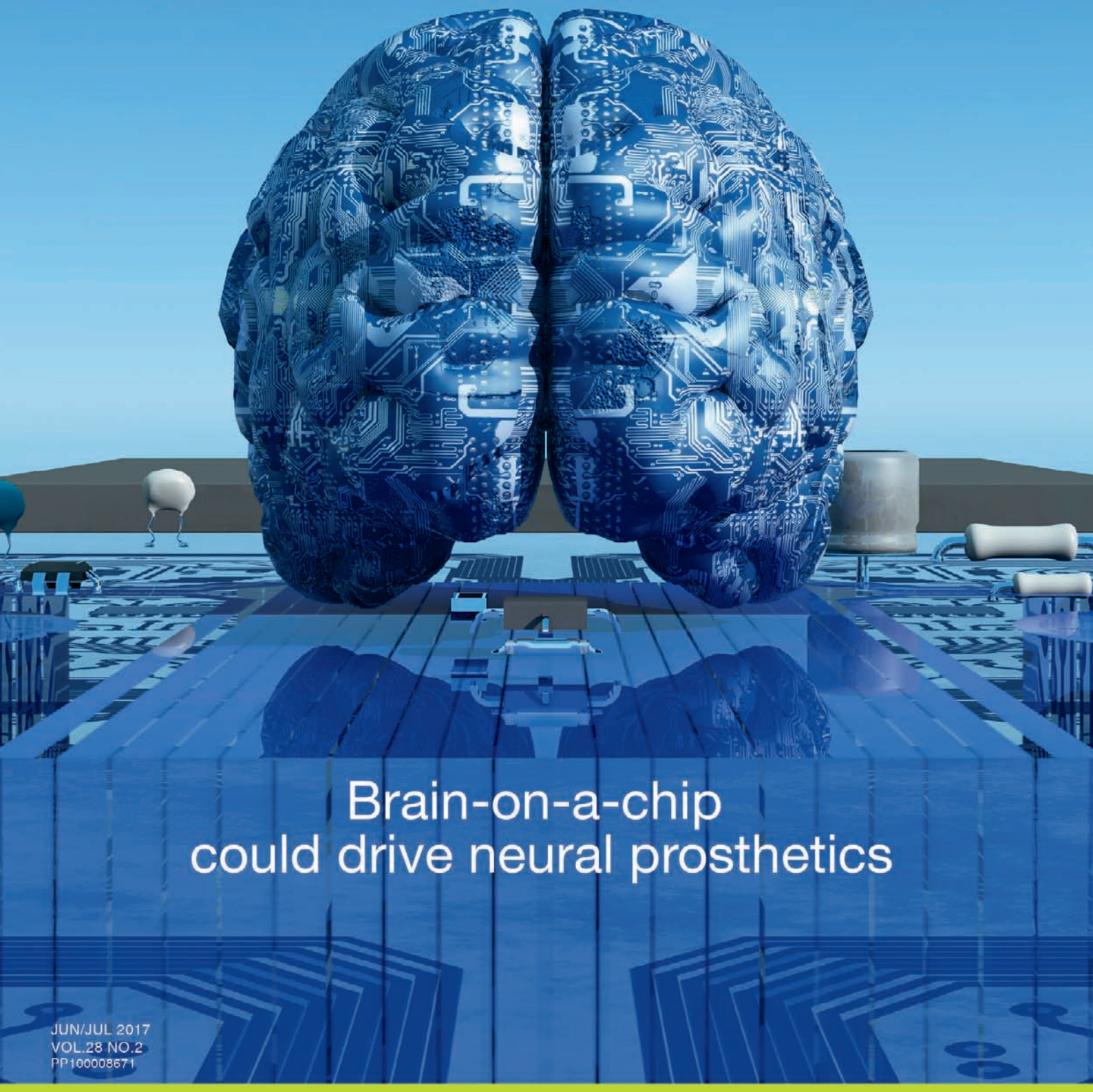
Lab+Life SCIENTIST



Brain-on-a-chip could drive neural prosthetics

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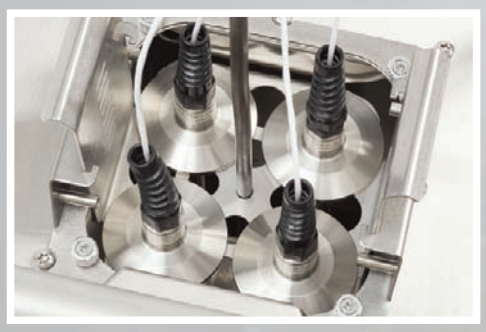

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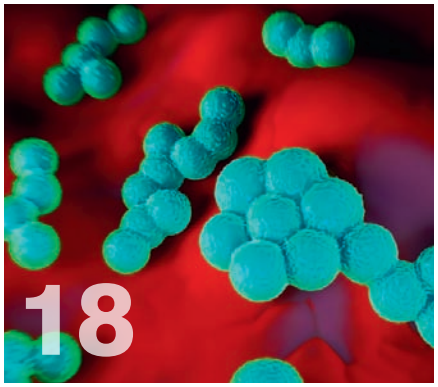

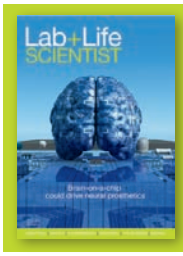

READ ONLINE! *This issue is available to read and download at* www.labonline.com.au/magazine

Riding the research wave

In May, Australia celebrated International Clinical Trials Day. The day is celebrated around the world to commemorate the first ever clinical trial in 1747, which was conducted by Scottish Physician Dr James Lind for the treatment for scurvy.

Two hundred and seventy years later, significant progress has been made, but we need to keep working together to further improve prevention, diagnosis and treatment. With some of the world's brightest minds, Australia has been at the forefront of medical health and research.

To get some insights on the current state of the Australian clinical trials market, I recently spoke to Sue MacLeman, CEO of MTPConnect, a not-for-profit growth centre for the medical technology, biotechnology and pharmaceutical (MTP) sectors. MacLeman is a strong believer in the Australian clinical trials market. Up to 1360 new clinical trials are started in Australia each year, with over half of these focused on the development and testing of new drugs and medical devices, and the remainder focused on improving the delivery of quality health care, she said. The industry supports over 7000 jobs.

Several factors such as cost-competitiveness, high-quality data and fast study start-up times make Australia an attractive country to conduct trials. "Our story is strong, we just need to communicate it more effectively," she said. MacLeman and her team have conducted an in-depth analysis of Australian clinical trial activity that demonstrates the significance of the local industry on the world stage. The findings are expected to be released in June, well after this issue of *Lab+Life Scientist* goes to press. Keep an eye out on our website for a detailed article on the report.

The uncertainty surrounding the future of R&D tax incentive has negatively affected industry confidence, but recent funding announcements have provided much-needed cheer. In May, Health Minister Greg Hunt announced a $33 million funding boost in medical research. Through the Medical Research Future Fund (MRFF), $13 million will be used to support research into a number of public health areas that contribute to the highest burden of disease, including the application of precision medicine. The Australian Clinical Trials Alliance received $5 million to support its work in ensuring Australia maintains its world-leading clinical trial standards and continues to support the clinical trials sector. The MRFF will inject $8 million to support the next generation of Australian researchers — including a major boost to the number of National Health and Medical Research Council fellowship schemes. The government will also provide $7 million over four years to help redesign state and territory clinical trial operating systems.

Regards,
Mansi Gandhi
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Lauren Davis

Shining a light on microbial dark matter

Last month, 21 new members were elected to the Australian Academy of Science for their outstanding achievements in a wide range of scientific disciplines. We spoke to newly inducted Fellow Professor Philip Hugenholtz, a microbiologist from The University of Queensland (UQ), about how he came to be a part of such a prestigious group.

Like many of the new Fellows, Professor Hugenholtz was inspired to become a scientist at an early age. In his case it was way back in primary school, when he was tasked to do a project on the microorganisms that live in pond water.

"I remember being fascinated by the fact that there were all these little swimming organisms, that I couldn't see by eye, that I could see under the microscope," he said. "That unseen world was very appealing to me."

Hugenholtz claims that microorganisms have been somewhat underappreciated throughout history, with plants and animals seen as "the crowning achievements of evolution" according to the narrative set by Charles Darwin.

"But in fact, it's the other way around — most of the diversity on the planet is microbial, and all the things that you and I can see are pretty recent innovations," said Professor Hugenholtz. "And that makes sense when you think about it, in terms of evolutionary timescales, because microorganisms have been around a lot longer than we have."

Professor Hugenholtz's fascination with the unseen world is more literal than one might expect, with the esteemed scientist taking a particular interest in 'microbial dark matter' — the vast

majority of microorganisms that have not be grown on an agar plate.

"I was doing a postdoc in the States in the mid-90s with Norman Pace, and my job was to identify bacteria present in a hot spring at Yellowstone National Park by sequencing a little piece of their genomes, the 16S rRNA gene," he recalled. "The important point is that we didn't need to grow the bacteria on an agar plate in order to identify them, the same way that you can identify a loaf of bread or packet of biscuits at the supermarket by their barcodes alone.

"And when we compared these sequences against the ones known from bacteria we can grow on a plate, there was a huge disconnect. Many had nothing closely related to them at all. They were essentially indicating that there were huge groups of microorganisms that had never been characterised, because we hadn't grown them.

"It's estimated now, 20 years on, that only about 15% of all the diversity in the microbial world has actually got a cultured representative. The other 85% is waiting to be described, and that's called microbial dark matter."

Luckily for Professor Hugenholtz, the past 20 years have also seen the rise of whole genome sequencing — the process of determining the complete DNA sequence of an organism's genome at a single time. "We can now obtain near complete genomes of uncultured organisms directly from their environmental settings, which tells us what they're able to do, rather than just that they're present," he said.

Professor Hugenholtz's team has applied this whole genome sequencing approach to many different habitats, including the notable discovery of microorganisms that are contributing to climate change. As part of a team led by Professor Gene Tyson, he and his colleagues extracted DNA from a permafrost environment, which was subsequently sequenced.

"We found a novel uncultured methane-producing organism that blooms in response to permafrost thawing," he said. "It's not a good idea to have something that can make methane when it's woken up from sleep, because methane's a potent greenhouse gas."

This groundbreaking research, published in the journal *Nature Microbiology*, indicates that this previously unknown group of methane-metabolising microorganisms appears to be widespread in permafrost. It also led the researchers to wonder if this organism can be grown in the lab — because while the practice of culturing organisms has been somewhat overtaken by genome sequencing, microbial isolates are of great practical use.

"For instance, if you identify an uncultured bacterium in the guts of mice that you think might be important in causing a disease, you could test this by putting it into germ-free mice if you can grow it in the lab first," Professor Hugenholtz noted. "So there are lots of experiments you can do with cultured organisms."

These days, Professor Hugenholtz is based at UQ's Australian Centre for Ecogenomics, which he co-founded with Professor Tyson. He is currently occupied working on the Genome Taxonomy DataBase (GTDB) — an Australian Research Council-funded project that seeks to use genome sequences to reclassify all microbial life.

"At the moment it's kind of a mess, because there are a lot of microbial species that don't form evolutionary coherent groups and the classification is very uneven," Professor Hugenholtz said. "So we're fixing up these issues using the genomes as a guide."

Even though classification is a human-made construct, it's very useful. As an example of this, Professor Hugenholtz used the analogy of time.

"We break down time into years, months, weeks, days, hours and minutes — it's a hierarchical classification system — so you and I knew to talk on this day, at this time. And it's the same with classification. We're organising microorganisms in a similar way, so that they're classified in robust and standardised heirachical system that reflects their evolution. This is particularly important as the mountains of microbial dark matter genomes come in the door — it provides the necessary framework for their classification."

He is also investigating the human gut microbiome — the trillions of microbes that live in our digestive systems — an area that is currently of intense interest to the public as it becomes increasingly apparent that the microorganisms that live in and on us play important roles in our health and wellbeing.

"We're applying the whole genome sequencing approach to the human gut and getting really high-resolution pictures of what's in the gut to find out how it works," Professor Hugenholtz said. "So I'm very excited by that too."

Professor Hugenholtz and 20 other researchers were elected to the Australian Academy of Science by their peers, following a rigorous evaluation process. Joining esteemed names such as Australia's Chief Scientist Alan Finkel, Nobel Prize winner Brian Schmidt and Dame Bridget Ogilvie, they bring the Academy's total fellowship up to 524 scientists.

Antibodies found to control seizures in epileptic mice

Japanese researchers have reported the effect of a particular type of monoclonal antibody on epilepsy in mice, with promising results. Their study has been published in the journal *Scientific Reports*.

The causes of epilepsy are largely unknown, but it has been established that high mobility group box 1 (HMGB1) protein expression may be linked to epilepsy-related inflammations. Researchers led by Masahiro Nishibori from Okayama University set out to investigate the HMGB1–epilepsy connection in detail.

Since an increased production of HMGB1 has been observed earlier in human and rat epileptic brains, Nishibori and colleagues tested the hypothesis that HMGB1 plays a role in epileptogenesis and, specifically, in disruptions of the functioning of the blood–brain barrier. The latter is a semipermeable membrane in the brain separating blood from other, extracellular fluid.

The researchers did experiments with mice treated with pilocarpine — a molecule which, when injected systematically with a high dose in mice, can initiate seizure and then cause status epilepticus. Nishibori and colleagues confirmed this disruption: pilocarpine-injected mice undergo a translocation of HMGB1 from the cerebrum (the principal part of the brain located at the front of the skull) to the blood, affecting the permeability of the blood–brain barrier. They also proved that administering of exogenous HMGB1 could exacerbate the blood–brain barrier disruption.

The scientists then looked at the effect of intravenously introducing anti-HMGB1 monoclonal antibodies (mAb) to the pilocarpine mouse model. They found that such treatment leads to the inhibition of HMGB1 translocation and the protection of blood–brain barrier permeability. This in turn resulted in prolonged seizure latency.

"Thus, anti-HMGB1 therapy may provide a novel strategy for controlling the epileptogenesis," the researchers wrote — an important finding in the ongoing quest for understanding and curing epilepsy.

Promoting next-gen cancer research

Leaders from the Australian Nuclear Science and Technology Organisation (ANSTO), experts from Italy and clinicians from NSW recently met to explore how the full range of particle therapy treatments may be made available to Australians.

These experts are proposing a National Particle Therapy and Research Centre to provide Australians with access to the very latest in cancer treatments.

"A national particle therapy and research centre would help thousands of Australians now and into the future, by ensuring there is an ongoing research component. ANSTO is thrilled to be part of the continuing discussion of how we can work towards this game-changing national network," said ANSTO's Richard Garrett.

"It would deliver not only innovative and potentially life-saving treatments for patients, but cutting-edge research, for example, to understand more about the ways radiation interacts with living tissues," said Dr Sandro Rossi, the Director General, National Centre of Oncological Hadrontherapy in Italy. Rossi is in Australia this week to share his expertise.

Rossi's centre is Italy's national particle therapy centre and is focused on treatment of radio-resistant or inoperable tumours and broader research. "Our facility is one of a small number in the world that is focused on carbon ion particle therapy, providing new treatments to patients with cancer, which is the leading cause of death globally," said Rossi.

"What we see as the ideal model is a landmark national particle therapy and research centre for both life-changing patient treatment options and research, supported by state-based proton-based particle therapy facilities," said Garrett.

"We are already making progress on the business case, and will be liaising with the federal and state governments to make this innovative treatment and research approach available to Australians."

This discussion comes as the federal government announced a $68 million Budget contribution to establish a proton therapy centre in Adelaide — an important first step in Australia to establishing a capability to deliver particle therapies to treat cancers in Australia.

Dr Adi Paterson, CEO of ANSTO, said that discussions such as a Senate Select Committee into low survival rate cancers, and the conversations the researchers had around carbon ion therapy and other types of particle therapy, offer the opportunity to make a significant leap forward for Australian patients with cancer who, right now, have few treatment options.

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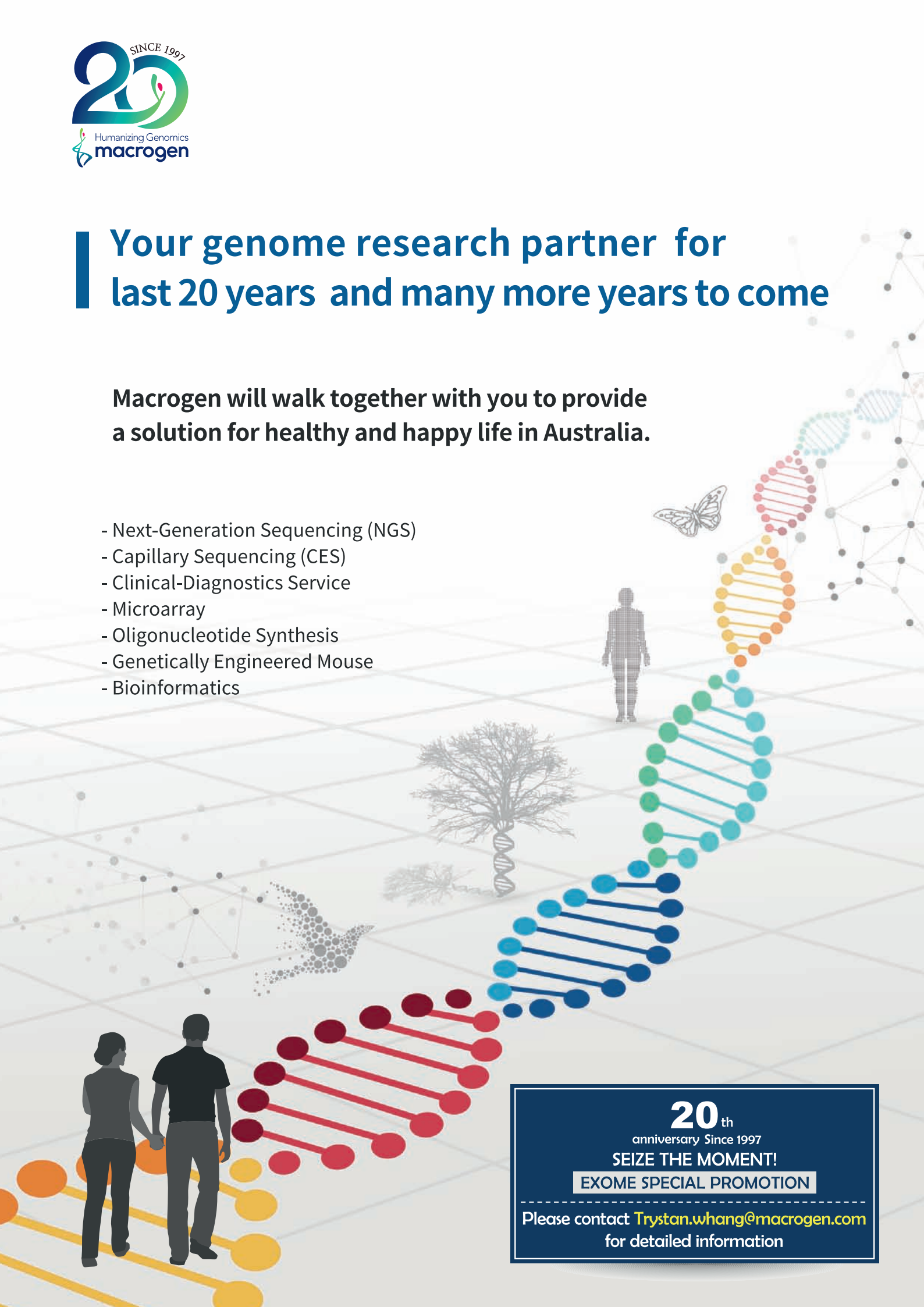

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Whole genome sequencing to diagnose kidney disease

Dr Amali Mallawaarachchi, a genomics researcher at the Garvan Institute of Medical Research, has been awarded a grant by PKD Foundation Australia to support the development of an improved genomic diagnostic tool for individuals with kidney disease.

The funding will support Dr Mallawaarachchi and her team as they work on developing a new test that uses whole genome sequencing to diagnose autosomal dominant polycystic kidney disease (ADPKD) — an inherited and currently incurable disorder in which cysts progressively expand and destroy the kidneys. Earlier diagnosis is vital in order to enable earlier intervention, which may prevent renal failure.

"Although the main genes that cause ADPKD are known, gene testing for this condition is particularly complicated and expensive," Dr Mallawaarachchi explained.

"This is due to six so-called 'pseudogenes' — non-functional genes that are almost identical in DNA sequence to the causative genes, and located right next to them in the genome, making it very difficult for traditional gene sequencing methods to accurately diagnose ADPKD."

Dr Mallawaarachchi recently published work demonstrating that whole genome sequencing may provide a more accurate, and less expensive, method of genetic diagnosis than existing techniques. The new funding will enable her to perform more extensive analyses of the whole genome approach to diagnosing ADPKD.

To do this, Dr Mallawaarachchi and her team have partnered with specialists at Mayo Clinic, USA, who have provided samples from 30 individuals with ADPKD. The genomes from these samples will be sequenced and analysed at Garvan's Kinghorn Centre for Clinical Genomics.

Star Wars superlaser steps out of sci-fi

Macquarie University researchers have proven a method for multiplying laser power using diamond, demonstrating that the superlaser from film franchise *Star Wars* may not remain in the realm of science fiction for much longer.

The superlaser in *Star Wars* — the primary weapon of the Death Star battle stations — was powered by eight kyber crystals. Laser beams generated from these crystals were focused and combined into a single blast, which was capable of destroying an entire planet at full output.

Similarly, the Macquarie University researchers demonstrate a concept where the power of multiple laser beams is transferred into a single intense output beam that can be directed to the intended target. Their study has been published in the journal *Laser and Photonics Reviews*.

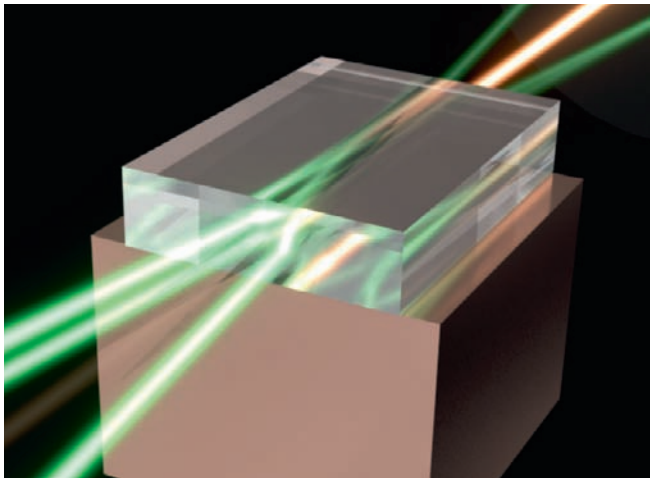
"This discovery is technologically important as laser researchers are struggling with increasing power beyond a certain level due to the large challenges in handling the large heat build-up, and combining beams from multiple lasers is one of the most promising ways to substantially raise the power barrier," said lead experimentalist Dr Aaron McKay.

The key to the high-powered beam is placing an ultrapure diamond crystal at the point of convergence. The beam-combining is achieved in diamond by harnessing a cooperative effect of the crystal that causes intense light beams to transfer their power into a selected direction while avoiding the beam distortion problems of single-laser technologies. The process also changes the colour of the laser beam.

"The particular wavelength of the directed energy beam is critical to the efficient transmission through the atmosphere and to reduce the eye hazard for people, or indeed animals, who may be in the vicinity of the beam," said study co-author Associate Professor Rich Mildren.

Although other materials have exhibited the same type of beam-combining properties, the choice of diamond is essential for high power. The power-transfer effect at the heart of the device, called Raman scattering, is particularly strong in diamond. Diamond is also outstanding for its ability to rapidly dissipate waste heat.

The new laser development has real-world and high-stakes applications, with high-power lasers seen as a key tool in areas such as defence.



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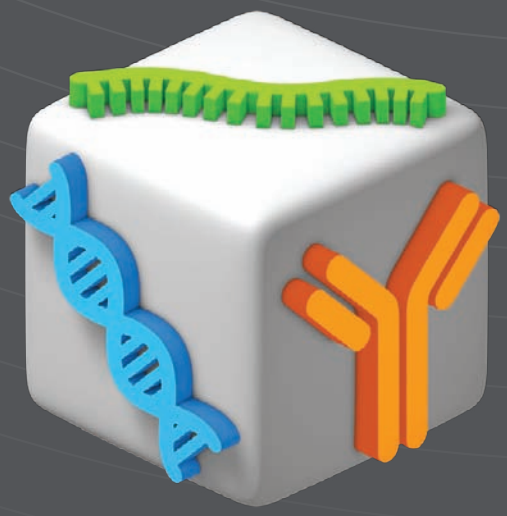

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Fungi — a goldmine for pharmaceuticals?

Researchers at Chalmers University of Technology have developed a method for finding new antibiotics from fungi. The findings, recently published in the journal *Nature Microbiology*, could prove useful in the battle against antibiotic resistance.

Antibiotics have saved millions of lives since they were discovered around eight decades ago. However, bacteria are now becoming increasingly resistant to antibiotics. This could lead to simple infections becoming lethal once again. The need for new antibiotics is, therefore, urgent.

The first antibiotic to be mass-produced was penicillin, derived from *Penicillium* fungi. In their quest for new antibiotics, Chalmers researchers sequenced the genomes of nine different types of *Penicillium* species. The results were remarkable. "We found that the fungi have enormous, previously untapped, potential for the production of new antibiotics and other bioactive compounds, such as cancer medicines," said Jens Christian Nielsen, a PhD student at the Department of Biology and Biological Engineering.

The researchers scanned the genomes of 24 different kinds of fungi to find genes responsible for the production of various bioactive compounds, like antibiotics. More than 1000 pathways were discovered, showing immense potential for fungi to produce a large variety of natural and bioactive chemicals that could be used by pharmaceutical companies.

"It's important to find new antibiotics in order to give physicians a broad palette of antibiotics, existing ones as well as new ones, to use in treatment. This will make it harder for bacteria to develop resistance," said Jens Christian Nielsen.

"Previous efforts to find new antibiotics have mainly focused on bacteria. Fungi have been hard to study — we know very little of what they can do — but we do know that they develop bioactive substances naturally, as a way to protect themselves and survive in a competitive environment. This made it logical to apply our research tools to fungi."

Researchers could now look at the production of the new yanuthone compound. The Chalmers researchers have already drawn up a map that makes it possible to compare hundreds of genes in the continuous evaluation of bioactive products with potent drugs in sight.

Image courtesy of Jens Christian Nielsen, Chalmers University of Technology

Supernova Remnant N 63A Menagerie

Image: NASA

Join the search for exploding stars

The Australian National University (ANU) is inviting citizen scientists with an interest in astronomy to join a search for exploding stars called supernovae.

Astrophysicists use supernovae, which are explosions as bright as 100 million billion billion billion lightning bolts, as light sources to measure the universe and acceleration of its growth. As explained by Dr Brad Tucker, co-lead researcher on the project, scientists can measure the distance of a supernova from Earth by calculating how much the light from the exploding star fades.

"Using exploding stars as markers all across the universe, we can measure how the universe is growing and what it's doing," Dr Tucker said.

"We can then use that information to better understand dark energy, the cause of the universe's acceleration."

The ANU project will allow citizen scientists to use a web portal on Zooniverse.org to search images taken by the SkyMapper telescope — the only telescope that is doing a comprehensive survey of the southern sky — at the ANU Siding Spring Observatory for the SkyMapper Transient Survey. Volunteers will be asked to scan the SkyMapper images to look for differences and mark up those differences for the researchers to follow up.

"With the power of the people, we can check these images in minutes and get another telescope to follow up," Dr Tucker said.

"Thousands of passionate people can achieve things that would take scientists working alone years to do."

Co-lead researcher Dr Anais Möller said SkyMapper is taking thousands of images every month for the supernova search project, examining an area 10,000 times larger than the full moon every week.

"As well as finding Type Ia supernovae, which we use to measure how the universe is expanding, we will also find other types of supernovae that change in brightness with time — ranging from a couple of weeks to months," she said.

"If we discover supernovae early we have a good chance of understanding them, as well as having better measurements for the expansion of the universe.

"The first people who identify an object that turns out to be a supernova will be publicly recognised as co-discoverers."

To join the citizen science project, visit www.zooniverse.org/projects/skymap/supernova-sighting.

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Human apolipoprotein panel

Bio-Rad Laboratories has announced the launch of the Bio-Plex Pro Human Apolipoprotein Panel. The 10-plex panel allows researchers to rapidly detect and quantify key human apolipoproteins associated with cardiovascular disease, especially within the statin pathway, as well as the biomarker C-reactive protein.

Detecting changes in apolipoprotein levels can be difficult with traditional ELISA techniques because they require a large sample input. The Bio-Plex offers a multiplex solution with low sample requirements to accommodate the study of precious samples. In addition, the panel allows researchers to measure the level of C-reactive protein, a commonly used biomarker for a wide range of conditions, in the same assay as apolipoproteins, and can assess how these different analytes work in concert in the human body.

The product is a ready-to-use, 96-well kit containing premixed magnetic capture beads and detection antibodies, standards and buffers. It is claimed to offer the largest number of apolipoproteins on the market and includes four targets (Apo C1, Apo D, Apo J and Apo H) not found on other multiplex panels. It is compatible with platforms including the Bio-Plex 200, Bio-Plex 3D and Bio-Plex MAGPIX, as well as all Luminex platforms.

For scientists in both biopharma and academia exploring cholesterol metabolism and the statin pathway, the panel facilitates the robust, sensitive and high-throughput study of a variety of apolipoproteins across many disease areas, including cardiovascular and neurological disease, hypercholesterolemia, diabetes, obesity and sepsis.

The product is said to enable detection of more samples than any other available assay, allowing researchers to get more data out of each run. Featuring premixed, ready-to-use reagents, it saves time and simplifies workflow with clear instructions. It also includes Bio-Plex Manager and Bio-Plex Data Pro Software for efficient analysis and data management.

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Lonza now offers a comprehensive portfolio of human and animal hepatocytes for ADME-Tox testing. The range includes both fresh and cryopreserved human and animal hepatocytes, supporting researchers with a variety of in vitro applications, including studies into drug metabolism and toxicity, drug-transporter activity and drug-drug interactions.

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The range also includes supporting ADME-Tox products such as specialised hepatocyte media and cell culture systems, helping to optimise hepatocyte culture performance for in-vitro drug screening or for research into drug-induced liver injury and other important liver diseases.

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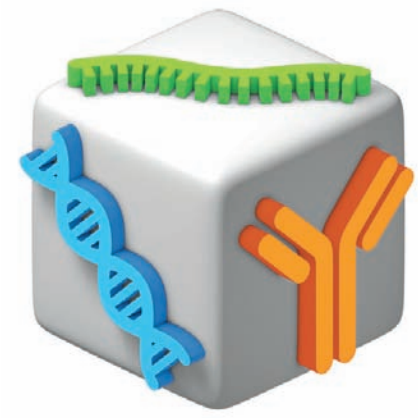

3D assay portfolio

3D Biology Technology is the ability to analyse combinations of DNA, RNA and protein simultaneously in a single experiment. NanoString Technologies is pioneering this digital molecule-counting technology to accelerate research and maximise the amount of information that can be generated from a given sample.

The nCounter Vantage 3D Assay portfolio is powered by 3D Biology Technology, enabling users to profile various combinations of DNA, RNA and protein targets up to 800-plex from a single sample. Designed for flexibility, users can select the right panel for each analyte type and profile all three at once with the nCounter Analysis System and free nSolver software. Multi-analyte prematched assays are available to simplify users' selection and provide curated content for specific research areas, including immuno-oncology, solid tumour and lung tumour profiling.

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Kiwi crystallographers benefit from X-ray diffractometer

Scientific equipment supplier AXT has announced the sale of an XtaLAB Synergy-S single-crystal X-ray diffractometer to the University of Auckland, where it will serve a large research community. The product is the first diffractometer to be released following the merger of Rigaku and Agilent, who formed Rigaku Oxford Diffraction, as well as the first Synergy system to be installed in the Oceania region.

Single-crystal small molecule diffractometers are fundamental tools for chemistry researchers, enabling them to understand the structure of molecules and providing them with valuable information about how they behave. The University of Auckland recently decommissioned an old system that had come to the end of its life and will be replacing it with this state-of-the-art system.

The Synergy-S is a fast and agile system that will provide performance far beyond the capabilities of the old system, according to AXT. It incorporates the latest technology, including a PhotonJet-S microfocus X-ray source, a redesigned Kappa goniometer, a photon-counting detector and highly parallelised optics. All this hardware is exploited by the researchers using a user-inspired software interface optimised for throughput and accuracy as well as structural resolution.

"The Synergy-S offered us the levels of performance that we required," said Associate Professor Tilo Söhnel from the University of Auckland. "We were after a system that could measure samples quickly and the Synergy-S has reduced measurement times literally from days to minutes and hours. It is also able to resolve structures of small, weakly diffracting crystals that we simply could not measure before, as well as heavily diffracting and absorbing materials. It also offers new levels of versatility and will allow us to venture into biological chemistry looking at proteins."

The versatility of the system is enhanced through the use of two X-ray sources, copper and silver. Associate Professor Söhnel noted, "Copper will be our high-intensity workhorse, while we will defer to silver for the analysis of highly absorbing and highly diffracting samples."

In the process of evaluating the Synergy-S for their requirements, some samples were measured by the applications team at Rigaku Oxford Diffraction. The data generated on fused-ring metallabenzene structures was of such good quality that it was published in chemistry journal ***Angewandte Chemie***. According to Dr Söhnel, "This is no doubt the first of many publications that will be produced using data generated by the Synergy-S."

This Synergy-S will be used by academics, postgraduate students and external researchers from countries as far afield as Malaysia and Iran, who do not have this type of facility. These researchers are involved in topics as diverse as metal-organic materials, macromolecules, catalysts, organic and inorganic chemistry, bio-inorganic chemistry, medicinal chemistry and drug discovery.

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Aspirator systems

Biosan's self-contained aspiration systems, the FTA-1 and FTA-2i, are designed for the removal of supernatants from microtest tubes during DNA/RNA purification and other centrifugation steps, as well as for cell culture aspiration in biological safety cabinets.

The aspirator operation principle is based on creating negative pressure in the trap flask using a built-in, microcompressor-controlled diaphragm pump. No vacuum source is necessary.

The collecting tip is connected with a polyethylene tube to the trap flask. Liquid is removed from a tube when the collecting tip touches the solution surface. A tube holder-organiser is conveniently located at the right-hand side; it accommodates two tubes (eg, for washing solution and storage).

The FTA-1 is the more basic device, with a 1 L Schott bottle for waste collection and single-speed operation. A 200 μL yellow tip connects to the tubing. An 8-channel manifold is available for microplate aspiration.

The FTA-2i is the advanced option, with a 2 L waste collection bottle, liquid level detection, a variable speed control knob, multiple attachments for microplates (with disposable tips), a blue or yellow tip attachment, a hand controller for aspiration regulation and metal long tips for reaching into falcon tubes or dishes.

Point of Care Diagnostics
www.pocd.com.au

Syringe controller

World Precision Instruments (WPI) has announced the SMARTouch controller, for use with up to two independently controlled UltraMicroPumps (UMP3).

The syringe and controller can be calibrated together as a system. This feature eliminates the variability of the syringes and delivers the calibrated volume. The controller can also be set to automatically adjust microstepping according to the injection rate to deliver the smoothest flow.

The user can set the limits for a specific syringe in the software. This prevents the pump from over-driving the plunger into the syringe, potentially causing syringe breakage. The product also visually displays the volume left in the syringe.

The system features all the functionality of the previous Micro4 analog controller, plus: all operations controlled through the interactive touch screen; graphical indication of the flow and the volume in the syringe; automatic end stop detection, dependent on volume; dual pump display; automatic pump detection; a pause/resume feature that allows dosing during infusion/withdrawal.

Coherent Scientific Pty Ltd
www.coherent.com.au

Flow cytometry system

The UF-5000, based on Sysmex's fluorescence flow cytometry (FFC), represents the latest in urinalysis technology, according to the company. It can be used as a standalone analyser or as part of the modular UN-Series for a walkaway, seamless urinalysis workplace solution from sample loading to the final digital image.

The system has a throughput of 110 tests/h and can analyse up to 19 parameters with high sensitivity and specificity. Added value can be achieved by reporting important clinical values such as dysmorphic red cells and Gram-positive or -negative bacteria present in the sample.

The system also has the ability to analyse body fluids.

Sysmex
www.sysmex.com.au

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Monash researchers discover key to superbug antibiotic resistance

Deaths from antimicrobial resistance could rise to 10 million by 2050, surpassing the total deaths caused by cancer and diabetes combined, according to the World Health Organization. This has prompted the WHO to issue a warning about the need to urgently develop new antibiotics to counter the growing threat of superbugs.

Superbugs are bacteria that are resistant to commonly used antibiotics, presenting a global health threat. To tackle this global challenge, researchers from Monash's Biomedicine Discovery Institute (BDI) collaborated with Israel's Weizmann Institute of Science and the NTU Institute of Structural Biology in Singapore. The researchers have now discovered the molecular mechanism by which the potentially deadly superbug 'Golden Staph' evades antibiotic treatment, providing the first important clues on how to counter superbug antibiotic resistance.

Their findings have been published in the journal *mBio*.

Researchers used the latest-generation electron microscopes at the Monash Ramaciotti Centre for Electron Microscopy to image at the molecular level — for the first time — the changes that take place in superbugs that have become resistant to the most modern antibiotics.

Examining bacterial samples of antibiotic-resistant *Staphylococcus aureus* or 'Golden Staph' taken from a hospital patient, they compared data of a non-resistant strain with their counterparts overseas. These included Shashi Bhushan from NTU and Zohar Eyal and Nobel Laureate Professor Ada Yonath from the Weizmann Institute who won the Nobel Prize for Chemistry in 2009.

"Using the combined data we could rationalise how the bacteria escapes drug treatment by a really important hospital antibiotic and describe in molecular detail how it becomes like a superbug," said Monash BDI scientist and lead researcher Dr Matthew Belousoff.

"The bacteria mutates or evolves to change the shape of the molecule to which the antibiotic would bind so the drug can no longer fit there," Dr Belousoff said.

"Knowing what your enemy is doing is the first step to the next phase of new drug design," he said.

"We've developed a technique that others can use that might help us speed up the arms race of antibiotic development."

Dr Belousoff said Monash BDI researchers are now using this new tool to investigate other drug-resistant bacteria. The research, involving the expertise of Monash microscopist Dr Mazdak Radjainia and mentoring of Professor Trevor Lithgow, was supported by the Australian National Health and Medical Research Council (NHMRC).

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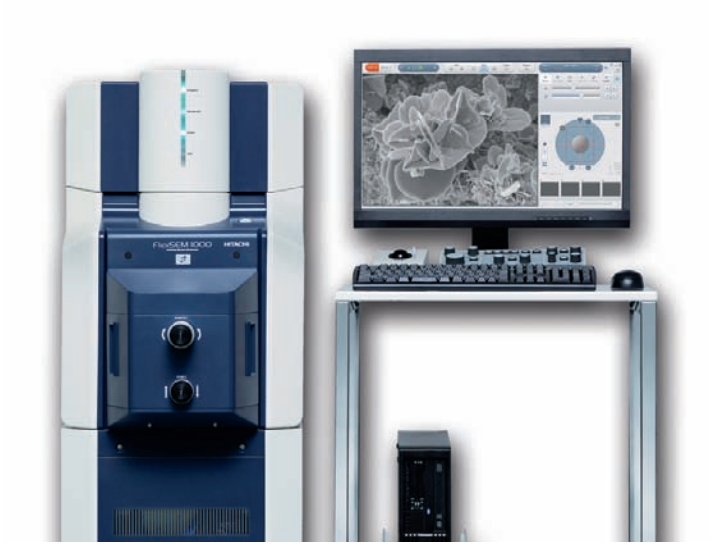
Filtered chemical workstations

Isola filtered chemical workstations are a series of high-efficiency products that provide protection to the end user and environment from hazardous chemical fumes and vapours. The key feature of the workstations' safety is the filtration matrix, which is configured with three stages of filtration media that effectively adsorb and capture a wide range of contaminates.

The workstation series consists of three models, providing users with a variety of options without compromising safety. The Isola VUE features a 360° clear viewing area, which makes it suitable for demonstration experiments. The Isola PRO is a polypropylene filtered chemical workstation offering good chemical resistance for corrosive applications. The Isola EDGE offers a dual-wall, thermally fused, solid polypropylene main chamber, allowing the installation of common laboratory fixtures and electrical outlets if needed.

Each version features the EverSafe III Touch Screen controller, which puts control of the workstation at the end user's fingertips.

AMT Group Australasia
www.amtintlgroup.com



Scanning electron microscope

The FlexSEM 1000 VP-SEM is a compact system (450 mm wide) that delivers the performance of a conventional SEM in a lab-friendly footprint and requires only a standard wall outlet for power. The electron optical column enables high-quality imaging of specimen surfaces at low accelerating voltages, while the ultravariable-pressure detector (UVD) allows the use of low vacuum conditions to minimise charge build-up.

The user-friendly GUI and ultrafast AFC (auto focus control) and ABCC (auto brightness and contrast control) algorithms, which take only 5 s, enable optimised imaging performance with minimal time and effort. The SEM MAP function makes traversing across an entire specimen effortless. Users can navigate their samples with the use of an optical camera and deliver correlated optical and SEM images using only one click.

NewSpec Pty Ltd
www.newspec.com.au

Sterilisable encoder

maxon motor has unveiled the ENX EASY sterilisable encoder for brushless DC motors, creating many opportunities for advances in medical technology.

The sterilisable encoder is available as an incremental (1024 CPT) and an absolute version (4096 CPT). It can be integrated into suitable motors without increasing the length. The encoder has allowed maxon to create a sterilisable drive system featuring a brushless DC motor, gearhead and integrated encoder.

The product is suitable for demanding medical/surgical applications where speed and positioning control tasks are performed. It is available with ball bearings or in a ceramic version. The encoder delivers high speeds, precise commutation, low vibration and reduction of heat build-up. To optimise space restrictions, the encoder is integrated into the brushless DC motor.

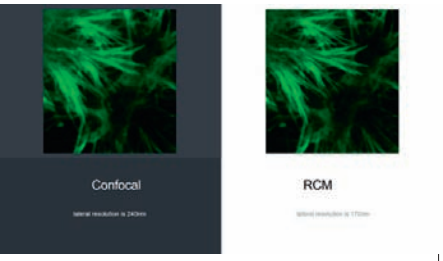
maxon motor Australia Pty Ltd
www.maxonmotor.com.au

Portable calibration kit

Futek Advanced Sensor Technology announces the QLA383 Portable Calibration Kit — a three-channel monolithic force sensor calibration tool used to audit testing probes for touch-screen devices. When the product is paired with Futek instrumentation, it offers high precision.

The kit features a low 7 mm profile, to mimic the height of the latest in consumer touch-screen devices, and a 2 kHz natural frequency for a fast dynamic response. It provides three individual channels that can be triangulated to determine location, load distribution and total force across the entire active surface.

Metromatics Pty Ltd
www.metromatics.com.au



Super-resolution and confocal upgrade for microscopes

Re-scan confocal microscopy (RCM) is a super-resolution technique based on standard confocal microscopy extended with an optical (re-scanning) unit that projects the image directly on a CCD camera. The RCM is an economical alternative to a confocal microscope and allows users to upgrade new and existing microscopes.

The Rescan Confocal Microscope from SANE Asia includes two scanning-mirror sets: the scanner and the re-scanner. While the scanner scans the specimen, the re-scanner writes the emission signal on the camera chip.

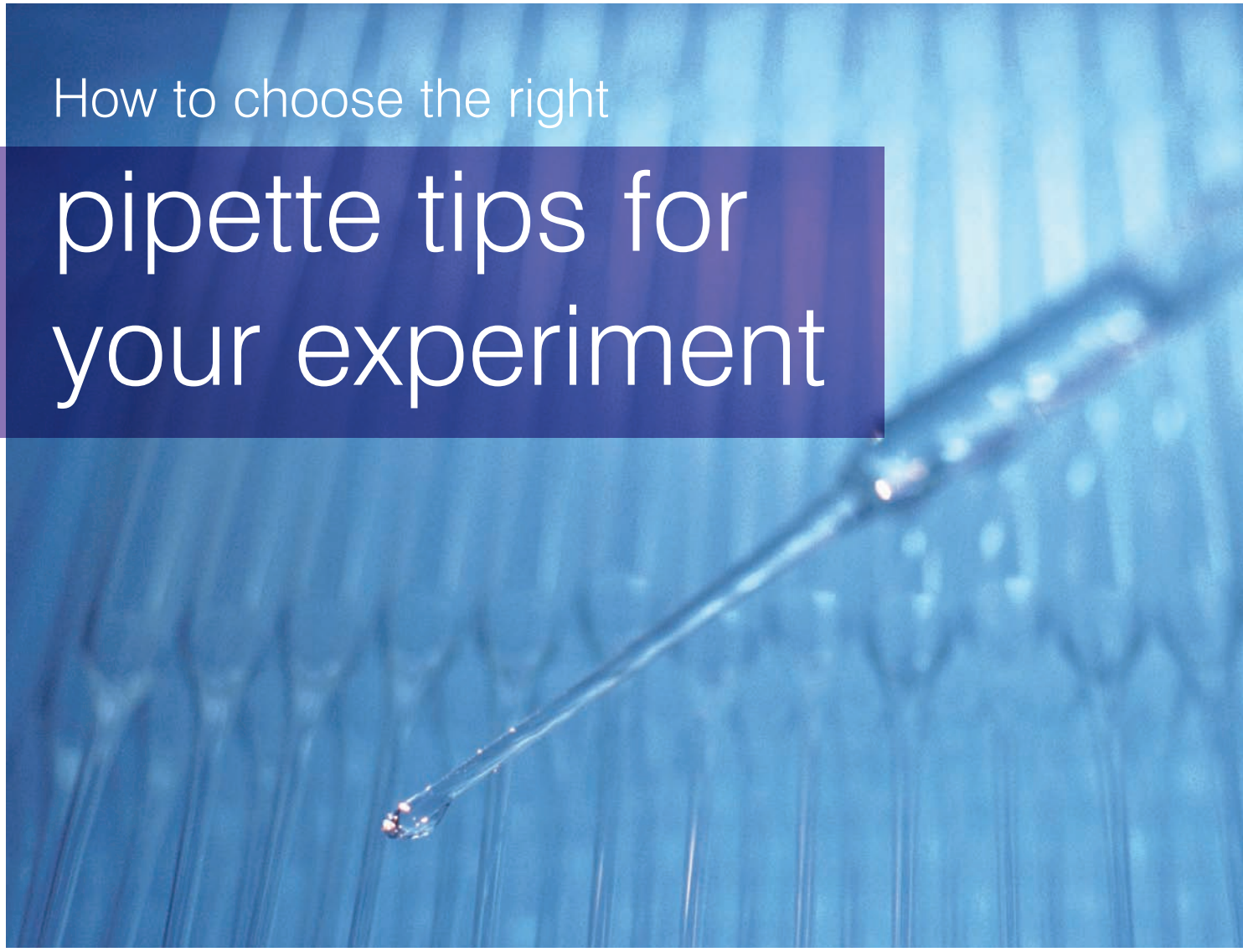
RCM has an axial resolution of 600 nm and lateral resolution of 170 nm at 488 nm excitation, as well as a quantum efficiency of 80–95% (depending on the camera). It also has a scan speed of 1 fps at 512 x 512 resolution images and is flexible in its configuration, with excitation wavelengths using up to four lasers (eg, 405, 488, 561 and 632 nm) and emission wavelengths with up to four emission bands.

The technology is useful for biological applications where the combination of high resolution and high sensitivity is required.

SciTech Pty Ltd
www.scitech.com.au

How to choose the right

pipette tips for your experiment



The precision and accuracy of even the best calibrated pipette can be wiped out if you choose the wrong kind of tips. Depending on the experiment you are doing, the wrong kind of tips can also make your pipette a source of contamination, lead to waste of precious samples or reagents — or even cause you physical harm in the form of repetitive stress injury (RSI).

There are so many different kinds of tips to choose from. How do you know which is the best for your pipette and situation?

This article will help you understand your options so that you can choose the correct pipette tip and prevent costly experimental errors and all the rest.

Choose high-quality pipette tips for precision and accuracy

The first consideration that tends to spring to mind when thinking about which tip type to choose is precision and accuracy.

If there is any batch-to-batch, or within-batch, variation in the shape of the pipette tips, then your pipetting will not be precise. This is a build quality and quality control issue, and — as in any manufacturing process — build quality and quality control cost money. So steering away from cheap tips and buying good quality is generally safer to get minimum variability between tips.

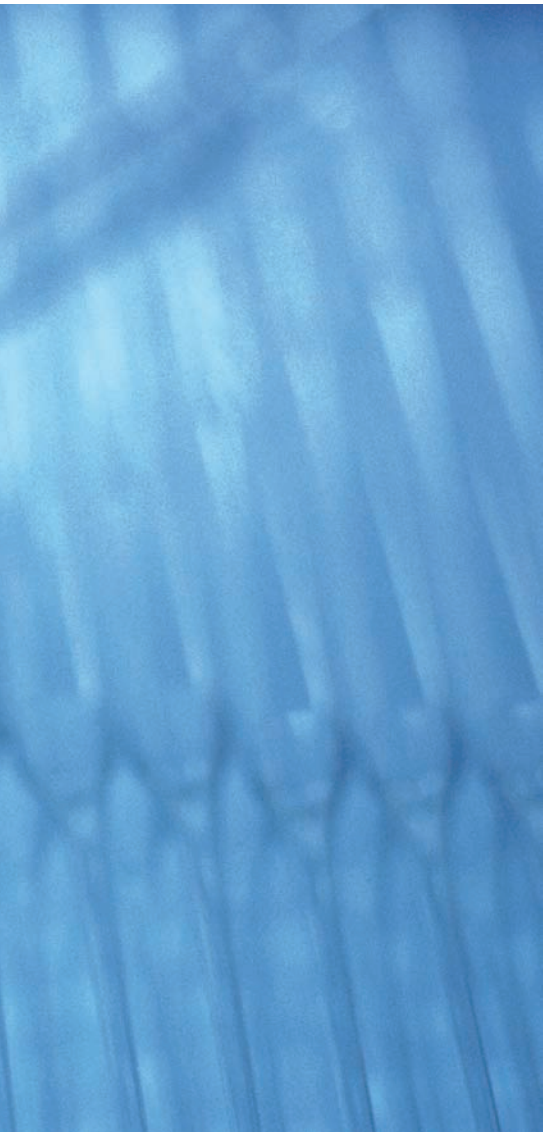
The accuracy of your pipette can be affected if the tip does not fit your pipette properly. If there is a poor seal between your pipette barrel and tip, then the drawn-in air can escape and the correct volume of liquid is not aspirated. Therefore, the final volume dispensed is not absolutely correct. Choosing a tip that is a good fit for your pipette can be a tricky business.

Which brings us to the question…

Universal or pipette-specific tips?

There is always the option to go for the tips that the pipette manufacturer sells, if available. But, very often, the best option for your pipette and application is to use high-quality universal tips.

These universal tips can be used with most micropipettes on the market. Universal tips are



designed to fit securely and tightly around all pipette barrels, which vary slightly in diameter from manufacturer to manufacturer. But, of course, all universal tips are not made equal, so you must carefully examine the choices.

Companies that focus specifically on universal tip design closely examined the issues that can arise with pipette tips and developed technologies to overcome them. You can find both universal and pipette-specific tips with all the features discussed below (aerosol barrier, graduated, ergonomic, etc).

Non-barrier or barrier (filter) pipette tips

Non-barrier and barrier tips, or filter tips, are designed for different conditions. Non-barrier tips are designed for everyday lab work. However, if you will be pipetting something that could contaminate your pipette — for example volatile, corrosive or viscous chemicals — then you'll want to consider barrier tips to protect your pipette and your samples.

Non-filter/non-barrier or standard pipette tips

You can use non-filter/non-barrier, or standard, pipette tips for many non-sensitive applications. Commonly, laboratories use these tips to load agarose gels, isolate plasmid DNA and other similar applications. Non-barrier tips are the workhorse in any lab and, as a bonus, usually are the less expensive choice.

These tips come in bulk (ie, in a bag), pre-racked (ie, in racks that you can easily place into boxes) or convenient reloads that allow you to easily re-use your racks but avoid the pain of racking bulk tips. While bulk and most reloads are not sterile, you can sterilise them and their storage boxes/racks in the autoclave.

Aerosol barrier pipette tips prevent PCR contamination and help for PCR positive controls

Aerosol barrier tips, also called filter pipette tips, are fitted with a filter inside the proximal part of the tip. The filter protects your pipettes from aerosols and aspirating volatile or viscous solutions into the barrel, all of which can contaminate and damage the pipette. These tips usually come pre-sterilised and DNase/RNase-free. However, 'barrier' is a bit of a misnomer for some of these tips. Only certain high-end tips provide a true sealing barrier. Most filters only slow the liquid from entering the pipette barrel.

The filter barrier in these tips makes them the choice for sensitive applications, like qPCR. The barrier prevents PCR contamination by stopping sample carryover from the pipette, which will give you more robust results. Also, remember to run your PCR positive control and negative control to find sample carryover.

In addition, filter tips are good 'training wheels' for newbies. Many times pipette contamination occurs when a new lab member accidentally aspirates liquid into the pipette itself. It is much easier, and more cost-effective, to throw away a tip than to send the entire pipette in for repair because liquid is in the piston.

Low-retention tips

No matter which tip you choose, low retention is a key feature. Low-retention tips do exactly as the name suggests — retain low levels of liquid. If you've ever looked at a standard pipette tip, you might see a little bit of liquid left after dispensing. Low-retention tips reduce this from happening because they have a hydrophobic plastic additive that keeps the liquid from sticking to the inside of the tips.

Nice but not necessary pipette tip features

Other features are often incorporated into both standard and barrier tips. These features can help maintain accuracy and even prevent injury. While none of these are strictly necessary, they are nice features to have in a tip.

Graduated tips

Graduated tips have measurement markings on their side. These tips work well as a secondary precaution and make it easy to see that the volume reaches the same place on the tip every time. They also serve as reminder to pay attention to your pipetting technique.

Ergonomic tips

Doing repetitive tasks, like pipetting, can cause damage to joints and result in RSI. In light of this, companies have designed ergonomic tips that require lower insertion and ejection forces and, therefore, reduce the risk of RSI. That said, this feature all goes back to good fit. A tip that is specifically designed to fit your pipette properly is by definition an ergonomic tip.

Cost considerations in choosing a pipette tip

As with most products, you get what you pay for. Well-made, properly fitting tips are essential for accuracy, precision and ease of use. Investing in good-quality tips that have been specifically developed for optimal performance is worth the money, unless you are happy with your precision micropipette being not so precise anymore.

For the other features (graduated markings, barriers, etc) you should consider whether there is a price for the added feature. If there is an additional cost, choose tips with those features when experimentally necessary. For example, barrier tips are more expensive than non-barrier tips. So you might want to save the barrier tips for sensitive applications where contamination could wreck your experiment and use the sterile, non-barrier tips for other techniques.

Remember that you can always request samples of high-quality, value-for-money generic pipette tips from Pathtech's Neptune range to find what works best for your research.

Your pipette and tip work together to achieve accurate and precise measurements. The variety of tips can be mind-boggling. Using this guide will help you choose the correct tip for each application to give you cleaner, more robust results.

Pathtech Pty Ltd
www.pathtech.com.au

Australian researchers make melanoma breakthrough

Australian researchers have achieved a major breakthrough in the fight against advanced melanoma, giving hope to over 1800 Australians expected to die from the deadly disease this year.

Researchers from Melanoma Institute Australia (MIA) are said to be the first to demonstrate that patients with advanced melanoma which has spread to the brain can have increased life expectancy and possibly even beat the disease.

MIA researchers conducted a 'groundbreaking' Anti-PD1 Brain Collaboration (ABC) clinical trial that involved advanced melanoma patients being given a combination of two different immunotherapy drugs: nivolumab (Opdivo) and ipilimumab (Yervoy).

Results from an early analysis of this trial show 79% of advanced melanoma patients with brain metastases treated with the combination immunotherapy were still alive at six months. 66% of those who got nivolumab alone were also alive after six months.

Typically, patients with active brain metastases survive only four to five months and never even used to be admitted to clinical trials because their prognosis was so dire. Australian researchers are the first to demonstrate that patients with advanced melanoma which has spread to the brain can have increased life expectancy and possibly even beat the disease.

"This is an absolute game changer for how we treat patients with advanced melanoma which has spread to the brain. It provides new hope to the 1800 Australians expected to die from melanoma this year," said Professor Georgina Long, the study's chief investigator, Conjoint Medical Director of Melanoma Institute Australia and Chair of Melanoma Medical Oncology and Translational Research at The University of Sydney.

"Quite simply, having brain metastases is no longer a death sentence," she said. "We can now offer additional years of life and also the hope of ultimately beating this disease to a significant number of people."

The promising results from a clinical trial developed and run by investigators at Melanoma Institute Australia were presented in Chicago at the world's largest oncology conference, the American Society of Clinical Oncology (ASCO) Annual Meeting, attended by more than 30,000 delegates from around the world.

In February 2016, Australia approved the use of nivolumab for advanced melanoma patients as a standalone treatment or in combination with ipilimumab.

However, patients with brain metastases were excluded from previous clinical trials, including the ones that led to the drugs' approval. This was what prompted MIA to develop and run the world-first ABC trial. "I have melanoma patients with brain metastases who would not be alive today if they had not participated in this trial," Professor Long said.

The study also examined patients who had no previous drug therapy prior to joining the trial, and those who received previous targeted drug therapy which is effective in patients with BRAF mutations in their melanoma. It found that the combination of nivolumab and ipilimumab was more active in patients who had not received prior targeted BRAF-directed drug therapy.

Under the current Pharmaceutical Benefits Scheme (PBS) in Australia, doctors are restricted in the order in which they can prescribe the targeted BRAF-directed drug therapies and immunotherapy as treatments for melanoma. The restrictions make it very difficult to give immunotherapy first to patients who have the BRAF mutation in their melanoma (approximately 40% of all melanoma patients).

However, this new research strongly suggests that immunotherapy should be the first-line treatment in suitable patients, in particular, those with brain metastases.

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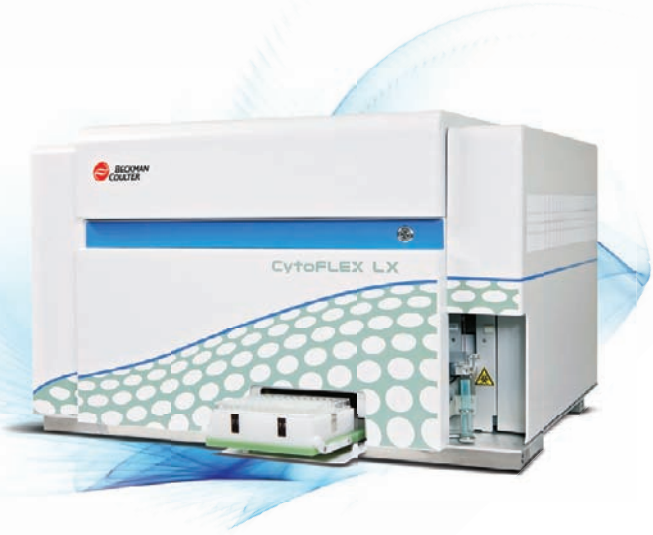

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FLOW-2491ADV03.17

Fluorescence microscopy illumination system

The Lumen 200 Fluorescence Illumination System from Prior Scientific is a powerful alternative to 100 W mercury and halogen lamp houses for microscopy applications. The combination of Prior's 2000 h life, 200 W metal arc lamp and 2 or 3 m liquid light guide provides high levels of versatility and illumination power.

The product utilises a metal halide lamp, rather than the more traditional high-pressure mercury or xenon burners. This means 2000 h of stable output, compared to a maximum of 300 h for a mercury lamp. The use of a liquid light guide means there is little heat transfer, helping to eliminate thermal drift during time lapse experiments. The unit also incorporates a variable light attenuation control to reduce the potential of bleaching and phototoxicity.

Prior Scientific also offers the Lumen 220 Fluorescence Illumination System, with extended wavelength in UV and IR. Fluorophores requiring light in the 360 nm and below range will see significant increases in signal strength from the Lumen 220 as compared to the Lumen 200 models.

SciTech Pty Ltd
www.scitech.com.au

Live imaging and analysis at the nanoscale

The Nanolane N-Lab Station uses optical sensors to enable label-free live imaging, surface interaction studies and topographic analyses at the nanometre scale.

The product allows live molecular interactions to be studied on selected areas and adsorption/desorption kinetics of reactions to be calculated. Users can assess sample surface topography (profile section, roughness, 3D view) and track structural and morphological changes in real time. Applications include molecular biology, surfactants, thin films, nanolithography, nanotubes, lab-on-chip devices and more.

The intelligent analytical capabilities are due to the optical contrast-enhanced sensors (SEEC Sensors). These sensors modify the polarisation of light to allow nanoparticles and films to be visualised in static or dynamic mode, in air or liquid.

The station is fully automated. It incorporates an internal microscope with a motorised stage and autofocus, integrated fluidics and temperature control for easy sample analysis. LabSOFT software is the user-friendly interface that facilitates live nanoscale imaging. A proprietary algorithm (Q-SEEC) is used for quantitative measurements and enables the determination of the sample thickness.

ATA Scientific Pty Ltd
www.atascientific.com.au

Microscopes for live cell imaging

Nanolive, the creator of the holographic tomographic 3D Cell Explorer (3DCX), has expanded its family of microscopes to include two more systems.

The original 3DCX allows users to see inside cells, using variations in refractive index within the sample, without the need for stains, dyes or markers — a completely label-free system for high-resolution 3D and 4D cell imaging. The technology allows users to visualise subcellular structures in real time, offering 200 nm resolution and generating 3D reconstructions from 96 slices through a 30 μm-thick sample.

The recently released 3DCX-fluo offers the same powerful holo-tomographic microscopy but adds a fluorescence channel. This enables users to measure up to 10 channels, including overlaying refractive index data, with up to three fluorescence channels and with the option of adding a stage top incubator for time-lapse experiments. This can reveal more information than conventional fluorescence microscopy, according to the company, by combining physical structural imaging (refractive index) with functional information about organelles, proteins and drugs interacting within the cell (fluorescence).

The latest addition to the Nanolive family is the 3DCX-discovery, designed for teaching environments. Based on the original 3DCX, the 3DCX-discovery is a plug-and-play system capable of providing high-quality images with nanometric resolution in just seconds, with minimal sample preparation. Without the need for markers, stains or dyes, the product is a powerful teaching tool and a suitable introduction to imaging live cells in real time.

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Geoscience research gets a 3D boost

Hawker Richardson recently installed a GE Nanotom M micro-CT scanner in the laboratory of Professor Ralf Haese and Dr Jay Black, where it will support their research into carbon capture and storage (CCS) technology. The 3D inspection and visualisation instrument has a resolution in the submicrometre scale, enabling a wide range of applications in the areas of geosciences and material sciences.

Based in the School of Earth Sciences at the University of Melbourne, Haese and Black use the micro-CT scanner as a tool to visualise and extract 3D data from sediment cores to reveal the distribution and connectivity of grains and voids. Such data is then used to identify preferential pathways for water and CO_2 and to determine how much CO_2 can be stored in the pore space.

The challenge was that the researchers needed an inspection system that supplies good-quality imagery, is reliable, is easy to use and comes with a supplier providing the proper training, service and technical support and good advice on data processing software and computer hardware requirements. After much research and a competitive tender, the scientists decided to go with the GE Phoenix Nanotom X-ray machine and Hawker Richardson as a supplier.

"The service level at Hawker Richardson was exceptional — we'd say nine out of 10," said Haese.

"The scheduling and timing of the GE Phoenix Nanotom X-ray machine was spot on. The technical support was exceptional, along with the entire team who planned and facilitated installing the 1.5-tonne machine up to the fourth floor of our building via a crane."

Comprehensive training was provided by Hawker Richardson, with the company flying out Gerhard Zacher, a geophysics applications engineer for GE in Germany. Zacher demonstrated how to use the machine to its full capacity and extract the imagery and data necessary for the client's needs.

"The training given from Gerhard was great!" said Haese. "Extremely straightforward, clear and he covered everything we needed within the training. No issues at all."

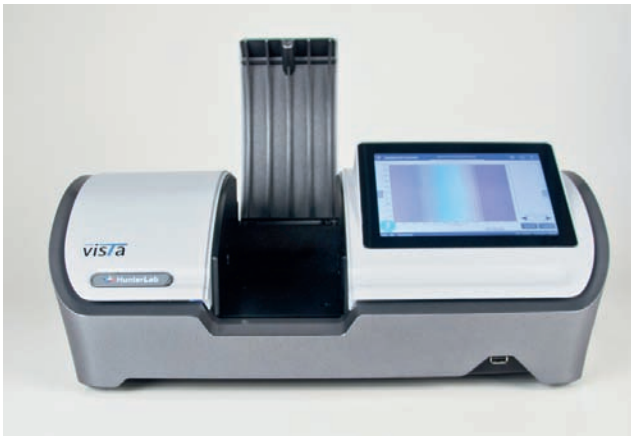
The micro-CT scanner is part of the university's Trace Analysis for Chemical, Earth and Environmental Sciences (TrACEES) Platform, with the aim to share the facility with researchers within and outside of the university. A range of samples has already been analysed after just a few months, including diamonds, stalagmites (rocks forming in caves), marine polychaetes (a type of worm) and reservoir rocks (sandstones).

"The imagery is incredible," said Haese. "It's the first time we've used a micro-CT scanner in this context, but it has been really impressive and has allowed us to see samples literally in 3D at the micrometre scale.

"We scanned a sandstone sample with 5 mm diameter in the GE Phoenix Nanotom and could immediately see mineral grains and the pore network, and identify locations of dense minerals — the machine allows us to look at the samples closely enough to see how the voids are connected within the rock. We can then look at 3D rendering of the rock pore space."

The machine currently gets used about twice a week, and the five-year service contract and three-year warranty ensures the GE Phoenix Nanotom M will be supported for a long time. When asked whether he would recommend the GE Phoenix Nanotom M and Hawker Richardson to other universities, Haese's reply was, "Absolutely."

Hawker Richardson
www.hawkerrichardson.com.au



Spectrophotometer

HunterLab has introduced Vista, a visible range transmission colour and haze spectrophotometer. The product achieves simultaneous colour and haze measurements, providing users with a solution to the challenges facing the chemical, food, pharmaceutical and plastics industries.

The design aims to meet the needs of laboratory professionals by allowing various sample types and sizes to be measured effectively, providing spectral transmittance data for liquids, film and/or solids. At the product's core is the ability to automatically capture haze results during colour measurement, providing the QA indicators needed for increased product integrity and improved manufacturing processes.

The colour management software embedded with Vista, EasyMatch Essentials, is built on smart OS technology. It offers applications to streamline production, allowing users to create their own workplaces to meet their specific application workflow needs. The software is provided preloaded with most colour scales and indices.

With one-touch internal standardisation, USB and Ethernet connectivity, plus the ability to save, print and email directly from the instrument, the spectrophotometer features a high level of functionality to perform both within and across industry lines.

Novasys Group Pty Ltd
www.novasys.com.au

Australian researchers build brain-on-a-chip

Image supplied by ANU

Australian researchers have grown brain cells on a semiconductor wafer patterned with nanowires which act as a scaffold to guide the growth of brain cells.

Lead researcher from the Research School of Engineering at The Australian National University, Dr Vini Gautam said the scaffold provides a platform to study the growth of the brain cells and how they connect with each other, said

"The project will provide new insights into the development of neuro-prosthetics which can help the brain recover after damage due to an accident, stroke or degenerative neurological diseases," Dr Gautam said.

The study is claimed to be the first to show the neuronal circuits grown on the nanowire scaffolds were functional and highly interconnected, opening the potential to apply their scaffold design for neuro-prosthetics.

Project group leader Dr Vincent Daria from The John Curtin School of Medical Research hopes to use the brain-on-a-chip to understand how neurons in the brain form computing circuits and eventually process information.

"Unlike other prosthetics like an artificial limb, neurons need to connect synaptically, which form the basis of information processing in the brain during sensory input, cognition, learning and memory," Dr Daria said.

"Using a particular nanowire geometry, we have shown that the neurons are highly interconnected and predictably form functional circuits."

Dr Daria said it was important to build up the appropriate environment where neurons can be predictably connected into functional circuits. "We were able to make predictive connections between the neurons and demonstrated them to be functional with neurons firing synchronously," he said.

"This work could open up a new research model that builds up a stronger connection between materials nanotechnology with neuroscience." The research was a multidisciplinary collaboration between physics, engineering and neuroscience. The nanowires were fabricated by a group led by Professor Chennupati Jagadish at the Research School of Physics and Engineering at ANU.

The research has been published in *Nano Letters*.

FFF-MALS system

Postnova Analytics announces the AF2000 MALS — a temperature-controlled system developed to provide good separation, characterisation and fractionation of biopharmaceutical proteins.

The system employs a similar set-up to a traditional GPC-MALS system but avoids the limitations of column-based chromatographic separations. The liquid chromatography column is replaced by a separation channel technology that retains molecules based only on size and by the influence of a crossflow as a separation force. Because of the design of the system and the absence of any stationary phase, separation is achieved without exerting shear forces and stress on the proteins and aggregates being separated.

Incorporating multiangle light scattering (MALS) and asymmetric flow field-flow fractionation (AF4), the product offers separation over a broad molar mass and particle size range. With the additional benefit of being able to undertake precisely temperature-controlled experiments, the unit is able to achieve separations with high resolution, reproducibility and recovery.

Scientex Pty Ltd
www.scientex.com.au

Intelligent pipette stand

Mettler-Toledo's Rainin SmartStand is an intelligent, customisable and highly scalable pipette asset management system that is easily adapted to any laboratory's standard operating procedures, helping to drive compliance in regulated environments such as pharma, GLP and QC laboratories. Non-regulated laboratories can also take advantage of the product to conveniently and efficiently monitor large numbers of pipettes.

Each stand can accommodate four manual or electronic Rainin XLS and XLS+ pipettes, reading the embedded RFID chip to determine the current calibration status, which is instantly and clearly displayed on the color LCD screen. A detailed view of the pipette's service history and calibration status is revealed whenever it is removed from the stand, enhancing compliance by minimising the risk of accidentally using out-of-specification equipment.

The unit is supplied with EasyDirect Pipette Asset Management software, a flexible, scalable Windows-based tool that simplifies and streamlines data management. It can connect to multiple SmartStands simultaneously via Bluetooth, monitoring anything from tens to hundreds of pipettes, identifying their location and capturing usage data to help laboratory managers reduce asset costs and eliminate obsolete equipment. Customisable fields allow information such as the user and lab, application and ID/inventory number to be entered for each pipette and transferred to its RFID chip.

An interim quick check can be scheduled — enabling deviation from specifications to be identified at an early stage — and service due dates indicated graphically, with the relevant documentation automatically completed and printed. After servicing and calibration, the updated record is conveniently exported to EasyDirect by replacing the pipette on any SmartStand. Data can also be transferred from EasyDirect to Microsoft Excel and most LIMS applications, eliminating manual record keeping.

Mettler-Toledo Ltd
www.mt.com

Paul Daniel and Jon Aldous

Chamber vs room monitoring

Which temperature sensors are best for your application?

Many chamber applications are cold temperature applications and usually temperature is the only parameter monitored. Cold air cannot hold much moisture so it is uncommon to use a humidity sensor in a cold temperature situation.

There are four different sensor types commonly used for cold temperature monitoring:

- Mercury or alcohol thermometer.
- Thermistor (thermal resistor).
- Resistance temperature detectors (RTDs) usually made from a pure metal, such as platinum, copper or nickel, around a ceramic or glass core.
- Thermocouple, two wires of different metals. The junction between the two metals will show a voltage change from a change in temperature.

In our experience, when folks want to monitor cold temperatures, they simply select a vendor, then accept the sensor type that the vendor has decided will work best in that particular application. So, in many cases the decision of what sensor to use is based on your choice of vendor. Monitoring does not require a high accuracy sensor for most applications, especially for cold temperatures, so most types of sensors can be used with equal efficacy. However, it can be valuable to understand how each of the four types of sensors work in case there are variables in your environments that will cause one sensor to function better, last longer, and measure more accurately.

Currently the most modern method is to collect the data from the electronic sensor and store it in a logger for later collection and download.

Glass thermometers, while simple, reliable, and inexpensive, are used less often in industrial applications because they require human labour for daily checks, data recording, and manual reporting. Obviously these tasks are rife with opportunity for error. However, thermometers are still used in emerging nations where labour is inexpensive and higher tech solutions are prohibitively expensive. Thermistors, RTDs (Resistance Temperature Detector), and thermocouples are electronic versions of the thermometer. The temperature causes the electrical characteristics of the sensor to change, thereby allowing us to determine the temperature by measuring an electrical value, such as resistance.

These devices vary widely in terms of cost, initial accuracy, long-term stability, and range. For most applications in monitoring cold temperatures (8°C to -80°C), a device equipped with an RTD or a thermistor would be selected. For instance, the Vaisala Wi-Fi data logger HMT140 uses RTDs that measure from -200°C to +200°C with good accuracy (±0.5°C over that range). For very cold applications, such as liquid nitrogen cryogenic applications, a thermocouple can be used due to the extreme cold (as low as -196°C).

Here is a rough breakdown of the differences between the types of temperature sensors. These are general, and subject to disagreement.

- Thermocouples — inexpensive, linear response to temperature changes (easy to calibrate), relatively low accuracy, low stability, very wide range of temperatures that can be measured, durable, energy efficient (takes little energy to operate). Good for extreme temperatures like freezers, very low temperature applications, ovens, etc.
- Thermistors — inexpensive, non-linear response (harder to calibrate), high accuracy, high stability, narrow range of temperatures, durable, energy efficient. Excellent for ambient, controlled room temperature.
- RTDs — expensive, linear response, high accuracy, high stability, moderate range of temperatures, fragile, energy inefficient (needs external power). Also good for controlled room temperature, ambient monitoring.

The measurements from these electronic sensors are typically measured by a device like a chart recorder or a data logger. Chart recorders — due to the labour requirements of changing charts and the real possibility of mechanical failure — seem to be disappearing from the field, though they are still quite popular in some countries. We have a chart recorder replacement calculator tool that shows the costs of running these, versus the cost of data loggers.

Currently the most modern method is to collect the data from the electronic sensor and store it in a logger for later collection and download. The data logger is generally considered to be superior because there is a very low risk of data loss. The downside of the data logger is that we need to download the data. This disadvantage of the data logger was mitigated with the advent of automated monitoring systems where data is automatically downloaded over a network connection. No more walking from sensor to sensor, no more compiling manual reports.

Humidity is another beast altogether

Humidity is measured in both ambient and chamber applications, although as stated, because of temperature dependency it's rarely measured in low temperatures. As a parameter, humidity is both simpler and more complex. It's simple because when you measure humidity, you will almost always use sensor based on a thin-film capacitor. It's complex because the sensors are prone to drift. Achieving accuracy in humidity sensors is time consuming and expensive because, unlike a temperature sensor, the sensor is degraded by the environment. When both temperature and humidity are measured, a thin-film capacitor humidity sensor is combined with a thermistor or RTD.

Vaisala Oyj
www.vaisala.com/en/

Homogeniser

The Omni GLH850 laboratory homogeniser is a high-performance instrument capable of processing virtually any laboratory sample in seconds. Even the toughest samples, such as bone, wood and seeds, can be easily processed.

A powerful 850 W motor provides maximum versatility for homogenising, dispersing and emulsifying a wide variety of samples at speeds up to 25,000 rpm. An integrated digital control system ensures repeatability. The digital timer includes a countdown timer for remote applications, eg, fume hoods or biosafety cabinets, and a soft start ensures a smooth start-up and minimises splashing.

A wide range of stainless steel probes are compatible with the product, from 5 to 30 mm in diameter, capable of processing samples from 200 μL up to 5 L. Alternatively, plastic OmniTips can be used to completely eliminate the risk of carryover or cross-contamination between samples.

The homogenisers are suitable for molecular biology, forensics, food analysis, pharmaceuticals and industrial applications.

Capella Science
www.capellascience.com.au

Floor-mounted fume hoods

The UniMax series of hoods has been expanded to include a wide selection of models that feature greater interior working dimensions. Standard models range from 1.8 to 7.3 m wide, 1.2 to 2.4 m deep and 2.1 to 4.9 m high. Botanical extractions, tall apparatus/distillation processes, roll-in reactors or long integrated instrumentation systems can be easily accommodated in the hoods.

The floor-mounted hoods are constructed of chemical-resistant, non-conductive modular panels featuring composite resin surface material. This modular design allows for on-site assembly and the ability to disassemble at a later date, move and reassemble. Custom sizes and designs can be built to exact specifications.

HEMCO Corporation
www.hemcocorp.com

Cooling and heating circulators

Huber Kältemaschinenbau presents the KISS model series cooling and heating circulators. The circulators are suitable for routine laboratory applications such as sample temperature control, analyses and material testing, as well as the external temperature control of measuring devices and test set-ups. Users can choose from over 50 models for heating and cooling.

Apart from an RS232 interface, the circulators now also include a USB interface. Another addition is a modern OLED display with intuitive menu navigation. The white display can be read well at all times, even in bright environments. Another advantage is the simultaneous display of actual temperature and setpoint value, as well as high/low temperature limit values. As a factory-fitted option, a connection socket for a Pt100 sensor can be fitted. This permits the display, eg, of an external process temperature.

The devices offer easy operation and meet high standards in terms of safety. All models are equipped with overtemperature and low-level protection according to Safety Class III/FL (DIN 12876) and are thus also suitable for flammable liquids. The circulation pump ensures optimal mixing and homogeneous temperatures. The temperature stability is ±0.05 K. A pump adapter for external applications is available as an accessory.

The range includes baths made of transparent polycarbonate (up to 100°C) or high-grade stainless steel (up to 200°C) as well as refrigeration circulators for working temperatures down to -30°C. Accessories include test tube racks, adjustable bases, bath covers, sensors, hoses and heat transfer liquids.

Scitek Australia Pty Ltd
www.scitek.com.au

Microbore format LC columns

Phenomenex has expanded its Kinetex core-shell and Luna Omega fully porous media offerings to a 1 mm ID microbore format. The stainless steel columns are compatible with micro LC systems, which operate at low flow rates and effectively separate small-volume samples. With lower solvent requirements than traditional HPLC, micro LC systems and columns produce less organic waste.

The microbore columns deliver the technological advances of the Kinetex and Luna Omega media, with better sensitivity and lower analyte detection than other offerings on the market, according to the company. Suitable applications for the 1 mm ID columns include metabolomics, biopharmaceutical and bioanalytical research, and trace contaminant analysis in food and environmental labs.

Phenomenex now offers a range of media in the updated microbore format, including Kinetex 2.6 µm XB-C18, Kinetex 1.7 µm EVO C18, Luna Omega 1.6 µm Polar C18 and Luna Omega 1.6 µm C18. Phenomenex Kinetex Core-Shell Technology and Luna Omega columns together provide a complementary UHPLC solution for good efficiency and separation power.

Phenomenex Australia
www.phenomenex.com

Reagent reservoirs

Reagent reservoirs are used by many laboratories for the temporary storage of reagent during pipetting applications. INTEGRA Biosciences offers a range of multichannel reagent reservoirs that feature re-usable bases. The environmentally friendly design allows users to re-use the sturdy base and only replace the disposable inserts.

INTEGRA reagent reservoirs have been designed to nest inside each other, making it possible to get twice as many reservoirs in half the space of traditional reservoirs. Each reservoir base accommodates two reservoirs, with one acting as a lid to allow short-term benchtop storage of reagent while preventing evaporation or contamination from airborne particulates.

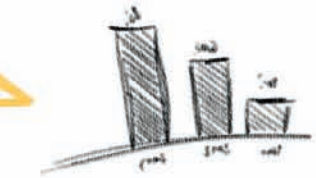
The reagent reservoirs are made of clear polystyrene and fit into a re-usable base with bold, clearly visible graduation markings. The unit is designed to refract light so graduations below fluid become clearly visible, making it easier to identify the exact desired volume line. This design feature is said to lead to better reagent measurements, no over-pouring and less reagent waste.

Moulded into each corner of the reagent reservoir inserts are convenient pour back spouts to control liquid flow. These allow users to quickly and easily return excess fluid to a source container, if their protocol allows.

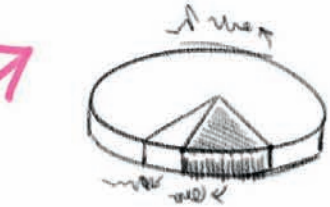
BioTools Pty Ltd
www.biotools.com.au

*Dr Cameron Ferris, Commercialisation Manager**

Six characteristics of the scientist-entrepreneur



The message has been clear — we need to get medical research out of the lab and into the real world. It is vital for the health of the nation, both in the literal sense and to generate new economic drivers for our future prosperity.



In a previous article exploring barriers to research commercialisation, I highlighted the dependence on the right *people* — a sentiment echoed clearly at the Research Innovation 2017 conference. The fact is this: we have never been in shortage of great research, we perhaps no longer lack risk capital, there is plenty of government and private sector focus on making it happen… but we are still lacking enough people who can get it done. We are in desperate need of the *scientist-entrepreneur*.

Well who are these people? Perhaps not the entrepreneur in a stereotypical sense — there is a reason why Silicon Valley produces billionaires before they turn 30, but no Nobel Laureate has amassed 10-figure wealth. I have come across scientists trying to artificially adopt the entrepreneurial archetype as they proudly tout a self-proclaimed CEO title. It doesn't go down well. Don't get me wrong, some individuals have hallmarks of both the classic scientist and entrepreneur… but they are rare.

What we need are true scientist-entrepreneurs who are able to navigate the complex pathway from the lab to the market with integrity, passion and determination, often in partnership with others. I have been privileged to work with some of these individuals and witness them in action. While no formula could define a scientist-entrepreneur, I have observed six common characteristics that I believe set them apart.

1. They know the science

This goes without saying, but has to be said — fundamental scientific research remains the bedrock on which medical innovation is built, and the best in the game know their science. They are leaders in their field, understanding the immense value, and barrier to entry, afforded by a body of deep scientific knowledge.

> Leading innovation requires incredible patience and incredible impatience; it requires optimism and absolute brutal realism.

2. They begin with the end in mind

It is very easy to get caught up in scientific research and forget what it is all for. Those that actively stay connected to the end game — to the unmet needs of patients or customers — are more likely to have meaningful impact. This is a key premise of programs like NSF I-Corps in the US or CSIRO ON in Australia. The scientist-entrepreneur gets to know the end user intimately, and uses this knowledge to craft a vision that others can embrace.

3. They develop commercial acumen

"Scientists are well suited to learning the skills they need to navigate the entrepreneurial pathway because they are intelligent and logical, and they understand how to do research." (C&EN) — many, however, never do. Successful scientist-entrepreneurs develop at least a high-level understanding of intellectual property protection, regulation, marketing and commercial strategy (including drivers for investment). Encouragingly, many research institutions are increasingly focused on instilling these skills in their students and academics.

4. They embrace risk

Risk is synonymous with entrepreneurial endeavour, but is often antithetical to the DNA of a scientist. The scientist-entrepreneur embraces a healthy relationship with risk. They don't need to have all the answers before taking action. They don't let perfection be the enemy of success. There is risk in shifting focus away from academic pursuits (though thankfully funding bodies are beginning to recognise commercial experience), but what is the alternative? *"There are risks and costs to action. But they are far less than the long range risks of comfortable inaction." (John F Kennedy).*

5. They value failure

If innovation is to prevail then one must differentiate between setback and capitulation; being defeated is a temporary position, giving up is permanent.

The scientist-entrepreneur understands that innovation is neither systematic nor is it predictable. Leading innovation requires incredible patience and incredible impatience; it requires optimism and absolute brutal realism. It means viewing inevitable failures as the ultimate educator.

6. They leverage others

The scientist-entrepreneur recognises their limitations and leverages the expertise of others, with the people skills to lead cross-functionally. Steve Blank (father of the Lean Startup movement) puts it simply: *"The 'must' is to realize that just because you are the smartest person in the building does not make you capable to run a company."*

These are the kind of people we invest in at The iQ Group — because with our expertise supporting and championing a scientist-entrepreneur with these qualities, we are confident that together we can build great companies that will make a significant impact on human health. They are the kind of people that the nation desperately needs if we are to capitalise on our wealth of medical research.

*Dr Cameron Ferris is passionate about the Australian innovation ecosystem, having spent the last 8+ years across research (3D bioprinting), commercialisation and commercial innovation (most recently with Ernst & Young).

The iQ Group Global
www.theiqgroupglobal.com

Stainless steel cabinet cooler systems

EXAIR's Small 316 Stainless Steel Cabinet Cooler Systems with ETC (electronic temperature control) keep electrical enclosures cool with -7°C air while maintaining the NEMA 4X rating of the enclosure and resisting the heat that could adversely affect the internal components.

The wear, corrosion and oxidation resistance of Type 316 stainless steel assures long life and maintenance-free operation. Cooling capacities up to 550 Btu/h are suitable for small enclosures and heat loads. Models with higher cooling capacities up to 5600 Btu/h for NEMA 12, 4 and 4X enclosures are also available.

The ETC maintains a constant temperature in the electrical enclosure that is slightly under the maximum rating of the electronics. It permits just enough cooling for the electronics without going so cold as to waste compressed air. A digital LED readout displays the temperature of the electrical enclosure, then displays the user temperature setting when pressing the 'push to set' button. When that setting is exceeded, the cabinet cooler system is activated.

The cabinet cooler systems include an automatic drain filter separator to ensure no moisture passes to the inside of the electrical enclosure. They are available with cooling capacities of 275 and 550 Btu/h and are UL Listed and CE compliant. There are no moving parts to wear out.

Applications include cooling control panels used in food processing, pharmaceutical, foundries, chemical processing and other corrosive locations.

Compressed Air Australia Pty Ltd
www.caasafety.com.au

NMR research platform

Bruker has announced the AVANCE NEO platform, the company's next-generation NMR electronics console in the AVANCE series, which is said to offer fast control, improved dynamic range and enhanced flexibility and scalability. The product extends the frequency range to 1.2 GHz and beyond.

The unit features novel transceiver architecture which combines transmit and receive functionality for every channel, offering enhanced experimental control, especially for the rapidly increasing number of multireceiver NMR applications. As a result, each system now offers multiple receivers as a standard feature.

The platform is suitable for enhanced multichannel/multireceive NMR experiments. The transceiver architecture essentially enables each channel to operate as a fully functional spectrometer. NMR multireceive experiments can be implemented for any combination of nuclei, with four receiver channels now standard for typical HCN-D biological NMR systems.

The unit supports NMR pulse programs developed on previous AVANCE platforms, plus multireceive pulse sequencing and experimental design capabilities not previously available. Other features include fast switching times, expanded onboard memory (1 GB/channel), an embedded acquisition server and several user enhancements.

Bruker has also launched its NMR software, TopSpin 4, which introduces the concept of an embedded acquisition server with client-server architecture. This enables the spectrometer to be run independent of the client computer and provides users with the opportunity to control the system via their chosen operating system. Both the AVANCE NEO platform and TopSpin 4 software are available for high-end and research NMR spectrometers up to 1.2 GHz.

Bruker Pty Ltd
www.bruker.com

Gas generator maintenance plan

Peak Scientific has introduced a maintenance plan for its gas generators that allows customers to fix maintenance costs for a set number of years.

The Fixed Price Preventative Maintenance (FPPM) plan was developed to remove the worry of rising annual servicing costs. It negates the need for lab managers to factor the variable costs of annual maintenance into budgets by introducing a measure of stability and predictability at a fixed cost.

In order for gas generators to continue performing at operating specification, periodic maintenance is required. The plan allows those covered to preschedule necessary maintenance around their workload, with all servicing carried out by certified Peak service engineers. This allows users to rest assured in the knowledge that their generator will be thoroughly serviced by a qualified professional at a time that will not impact their workflow. In the rare event that unplanned generator maintenance is required, the plan provides around-the-clock priority access to the company's global technical support team.

As its name suggests, Fixed Priced Preventative Maintenance is a fixed price regardless of a generator's specific maintenance requirements at each scheduled interval. Those covered by the plan also receive a 20% discount on any additional services or replacement parts they may require from Peak Scientific.

Peak Scientific Instruments Pty Ltd
www.peakscientific.com

Dual-entry fume hoods

UniFlow SE Dual Entry Fume Hoods are designed to allow convenient access from the front and rear of the hood. Offered in widths of 48″, 60″, 72″ or 96″, and with depths of 30″, 36″ or 48″, the hoods feature a constant volume (air bypass) design.

Whether an instructor performs an experiment on one side and students observe on the other side or large equipment is used from one side and maintenance service is performed from the other side, the dual-entry hood will safely isolate, contain and exhaust fumes and meet airflow requirements. The hood would typically be located on a lab furniture island or within a wall between two rooms; however, only one side of the hood can be opened at any given time.

The fume hoods are constructed entirely of chemical-resistant, flame-retardant, non-metallic composite resin featuring HEMCO's 'Unitized' construction. The exterior is laminated to the liner without screws, bolts, rivets or other metallic hardware.

The hood includes horizontal slide glass sash doors, a vapour-proof light and switch, a ceiling baffle and a removable front access panel. A wide selection of optional accessories includes plumbing and electrical services, an airflow monitor, side windows, clear acrylic baffles, work surfaces, cabinets, tables and exhaust systems.

HEMCO Corporation
www.hemcocorp.com

Anthony Baker, Chairman of the local organising committee for ASM2017, Tasmania

Australian Society For Microbiology 2017

The president of the Australian Society for Microbiology, ASN Conference organisers and the organising committee would like to invite you to stunning Tasmania for the 45th Annual Scientific Meeting and Trade Exhibition. The event will be held at Hotel Grand Chancellor in Hobart from 2–5 July.

The 2017 conference has the theme of Planetary Health, a fitting title for a Hobart meeting given the tumultuous history of Tasmania's environmental battles. Planetary Health represents a new discipline that highlights the interconnectedness between human health and the natural systems that underpin our civilisation and planet Earth. Microbiologists are aware of the importance of the 'unseen' life that surrounds us; however, recent discoveries continue to highlight just how significant microbes are on a global scale.

Advances in genomics and sequencing technologies in particular have allowed unprecedented insight into microbial communities; insights that have led to the realisation that microbial complexity plays an underpinning role in all aspects of human civilisation. This year's scientific theme aims to emphasise the diversity of microbial life as it pertains to Planetary Health, from global systems affecting climate to individual molecular mechanisms of microbial function and everything in between. It is only through the study of microbial life that we can truly begin to understand and manipulate the systems that nourish, sustain and impact our civilisation.

The meeting will commence on Sunday, 2 July, with a comprehensive workshop program delivering content pertinent to antimicrobials, virology, serology, biofilms and mycobacteria.

The meeting will commence on Sunday, 2 July, with a comprehensive workshop program delivering content pertinent to antimicrobials, virology, serology, biofilms and mycobacteria. For the first time the conference will also be hosting a 'Writer's Corner' workshop specifically aimed at those who wish to expand into writing scientific literature outside of the standard peer-reviewed journals.

As always, the meeting will feature eminent scientists from Australia and around the globe, commencing with the annual Public Lecture on Sunday afternoon. This year, ASM's opening speaker will be Professor Anthony (Tony) Capon from the University of Sydney who is recognised as the world's first professor of Planetary Health. The event will be shortly followed by the Bazeley Oration presented by Professor Mariagrazia Pizza. The Bazeley Oration is fully supported by the Commonwealth Serum Laboratories to recognise significant achievements in the field of vaccines. Professor Pizza is recognised as the first woman in history to discover and bring to licensure two innovative live-saving vaccines: Meningococcal B and Pertussis.

The annual Rubbo Oration recognises outstanding contribution to the field of microbiology. This year, the awardee is Professor Pascale Cossart, director of the Unité des Interactions Bactéries-Cellules at the Pasteur Institute, Paris. Professor Cossart has dedicated much of her working life to the study of intracellular pathogens, particularly *Listeria monocytogenes,* for which she has received numerous prestigious awards. The Society is honoured to host her at ASM2017.

In addition, ASM will be hosting Professor Robin Patel (biofilm associated infections), Professor Christopher Sassetti (mycobacterial host-pathogen physiology), Doctor Sonja Best (innate immunity to viruses), Professor Bill Petri (enteric infections), Associate Professor Christian Voolstra (coral reef health) and Professor Bart Weimer (foodborne and veterinary pathogen population genetics). The symposia invited speakers, proffered papers, posters, Special Interest Group and specific discipline meetings will provide an excellent opportunity for innovative thinking and to catalyse connections with colleagues.

In conjunction with the Annual Scientific Meeting, EduCon 2017 will be hosted prior to the main event on Saturday, 1 July. EduCon will focus on contemporary and exciting ways to engage students and teach microbiology at all levels. It is open to educators of any field, not just microbiology, and definitely has something to offer anyone on the front line of education.

The social program has been developed with the objective of facilitating networking and interactions, while showcasing some of the food and beverages that Tasmania is becoming famous for. It will be a great opportunity to catch up with old friends and colleagues and develop new relationships within our profession, while having a bit of fun at the same time. The event's location puts it in close proximity to a host of world-class restaurants, museums (including the new Mawson's Hut replicas), the iconic Salamanca Markets, the Royal Tasmanian Botanical Gardens and, with a short ferry ride, the Museum of Old and New Art (MONA) — ranked consistently as one of the world's best modern art galleries. For those who wish to venture slightly further, Mt Wellington summit offers spectacular views of Hobart and its surrounds while an assortment of wineries or the Cascade Brewery are places worthy of further investigation for the food and drink connoisseur.

The Tasmanian local organising committee is proud to present an outstanding scientific and social program with an ensemble of leading scientific speakers from around the globe. We hope to see you in Hobart for the 45th Annual Scientific Meeting and Trade Exhibition of the Australian Society for Microbiology. Please visit the meeting website for times and further details of the program at: www.asmmeeting.theasm.org.au.

Rapid tube identification

Tecan is helping to reduce waiting times for bulk sample identification with a high-speed barcode scanner for its Fluent laboratory automation solution. The Fluent ID module eliminates the need for users to watch and wait while their liquid handling platform scans and identifies each individual sample tube, allowing 32 barcoded samples to be loaded and identified in just 3 s.

The scanner is fitted with a status indicator light offering a clear pass/fail notification as soon as the tube rack is loaded onto the worktable. If one or more barcodes is unreadable, the system's graphical interface provides step-by-step instructions to quickly and easily resolve any issues, either by rescanning the barcodes or manually inputting the tube IDs. The user can then simply press 'Start' and walk away, confident that there will be no tube identification errors. For larger sample batches, the system can even start pipetting the first rack of samples while additional tubes are being loaded onto the system.

The easy-to-use solution supports all major 1D barcode formats and is compatible with 10–16 mm diameter tubes, as well as microcentrifuge tubes. By combining rapid scanning with instant feedback and error handling, the product can save several days of technician time annually compared to traditional automated approaches, helping to streamline busy laboratory workflows.

Tecan Australia
www.tecan.com.au

Handheld XRF analyser

Olympus's latest addition to the Vanta series of handheld XRF analysers is optimised to help ensure compliance with RoHS and local or international regulatory laws. The product combines fast results with a durable design for maximum uptime.

The analyser provides on-the-spot chemical analysis to quickly scan for toxic metals like lead, cadmium, mercury, chromium and bromine in consumer products such as toys, apparel, footwear and electronics to comply with RoHS regulations. Good sensitivity and repeatability enable the product to achieve low detection limits.

The product is IP65 rated for protection against dust and water and drop tested to military standards (MIL-STD-810 G) for greater uptime. It also incorporates Olympus's Axon XRF signal processing technology that utilises ultralow-noise electronics to deliver high X-ray count rates per second and test-to-test repeatability.

The analyser's low limits of detection accommodate future compliance as regulations change over time. Other features include: an intuitive interface and responsive touch screen; optional Wi-Fi and Bluetooth connectivity for fast data downloads; and a customisable home screen.

Olympus Australia Pty Ltd
www.olympusaustralia.com.au

Vibration-free chilling/heating incubators

Torrey Pines Scientific announces two large models of EchoTherm vibration-free benchtop chilling incubators, suitable for protein crystallography. The incubators have a 100 L capacity and can hold 66 assay plates without stacking.

The incubators are Peltier-based for heating and chilling. They are also vibration-free, making them suitable for protein crystallisations. Other applications include incubating marine samples below room temperature, enzyme reactions and deactivations, hybridisations, ligations and general lab incubations.

The IN55 model is fully programmable for temperature cycling crystals for better growth, while the IN50 is simple digital. Both models feature temperature ramping up and down. The chamber size for both is 100 L. They are settable from 4–70°C and feature temperature control to ±0.1°C. They can be controlled at or near room temperature.

Both models feature digital display to 0.1°C, accuracy to ±0.2°C and an RS232 I/O port for remote control and data collection. Also included are a digital timer in hours, minutes and seconds with user-settable auto-off, temperature ramping and audible alarms.

The chamber comes with eight stainless steel racks with room for 12 racks. Racks are split in the middle for variety of sample sizes.

Both units are shipped with universal power supplies that take AC line inputs from 100 to 265 VAC, 50/60 Hz and convert that to 12 VDC for the unit. They also include an AC line cord for the country of use and a user's manual. They are UL, CSA and CE compliant.

Edwards Group Pty Ltd
www.edwardsco.com.au

AACB Annual Scientific Conference

The Australasian Association of Clinical Biochemists' 55th Annual Scientific Conference will be held from 12–14 September 2017 at Pullman Melbourne Albert Park Hotel, Victoria.

Leading international and local scientific experts will provide insights on current concepts and strategies to deliver the timely diagnostic services required for clinical management.

Professor Hans Schneider (Direction of Pathology, Alfred Hospital) will present the 2017 David Curnow Plenary Lecture on 'Critical Result Communication'. Dr Sunil Sethi (National Hospital Singapore; President of the Asia Pacific Federation of Clinical Biochemistry and Laboratory Medicine) will deliver the Tuesday plenary lecture on 'Laboratory response times — meeting clinical needs'.

Professor Jeffery Lipman (Director of Intensive Care Services at the Royal Brisbane and Women's Hospital) will present 'Assessment of the shocked patient' on the Wednesday.

Dr Mario Plebani (Professor of Clinical Biochemistry and Clinical Molecular Biology, School of Medicine, University of Padova; Chief of the Department of Laboratory Medicine, University Hospital of Padova; Chief of the Center of Biomedical Research, Italy) will present the QAP Plenary on Thursday, titled 'Detection and prevention of errors in the time-sensitive testing situation'.

Professor Olaf Drummer (Head of the School of Public Health and Preventive Medicine's Department of Forensic Medicine; Deputy Director at the Victorian Institute of Forensic Medicine) will deliver the closing, thought-provoking plenary lecture on drug driving, from roadside to emergency to coroner.

Complementing these plenary lectures, concurrent symposium sessions will focus on relevant innovations in the field. The popular poster hot topic and oral sessions will again be offered in addition to the poster presentation sessions to showcase the work and achievements of young and more experienced scientists and clinicians.

RACI National Congress

The Royal Australian Chemical Institute's National Centenary Conference 2017 will be held from 23–28 July at the Melbourne Convention and Exhibition Centre.

The congress will bring together several thousand delegates from across the breadth of the chemical sciences and technologies, celebrating Australian chemistry's place in the Asia–Pacific region and the world. It will incorporate the energetic and enthusiastic contributions of many student and early-career scientists and engineers from academia and industry as well as industrial leaders, world-renowned researchers and leaders in chemistry education. Congress plenary speakers include several Nobel laureates and other outstanding chemists that may well be future laureates.

The congress will encompass the RACI National Centenary Conference, based on the traditional national scientific gathering of chemists from across the breadth of the discipline, both technical and geographic. However, it will be so much more as it is being held in collaboration with several partner conferences, including:

- The 17th Asian Chemical Congress (17ACC), which is the biennial gathering of the Federation of Asian Chemical Societies;
- Carbon 2017 (The World Carbon Conference);
- Chemeca (The Australian and New Zealand Federation of Chemical Engineers Conference);
- AIMECS17 (The Asian Federation of Medicinal Chemists' Conference);
- ACCC6 (The Asian Conference on Coordination Chemistry);
- GSC8 (The 8th International Conference on Green and Sustainable Chemistry);
- Elsevier's Tetrahedron (an Asian seminar); and
- The Asian Hub for e-Drug Discovery (AHeDD) conference.

Centenary Congress delegates will be freely able to contribute to and enjoy the scientific and technical programs of all of these partner meetings at no extra cost. A key element of the congress will be the comprehensive exhibition program showcasing the latest innovations in chemistry. Interested organisations are encouraged to make contact.

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Australian Marine Science Conference
July 2–6, Darwin

The 54th Annual Conference of Australian Marine Sciences Association (AMSA) will be held in Darwin at the Doubletree Hilton – Darwin Entertainment Centre complex from 2–6 July 2017. The theme for the AMSA 2017 conference is Connections through Shallow Seas, which alludes to the linkages between different disciplines of marine science, connecting traditional knowledge and western science and the domestic and international collaborations. The conference attracts an international community of researchers, academics, government and industry scientists as well as students from a wide range of disciplines including marine biology, ecology, oceanography, geology, molecular biology and chemistry.
http://events.amsaconference.net/

ASM 2017: Planetary Health
July 2–5, Hobart
www.asmmeeting.theasm.org.au/

VIZBI 2017
June 14–16, Sydney
https://vizbi.org/2017/

SPARCS VII The Precursors Awaken
July 17–21, Perth
www.icrar.org/conferences/sparcs7/

AIMECS2017
July 23–26, Melbourne
www.racicongress.com/AIMECS2017/

Chemeca 2017
July 23–26, Melbourne
www.racicongress.com/Chemeca2017/

International Conference on Green and Sustainable Chemistry Conference
July 23–26, Melbourne
www.racicongress.com/GSC8/

Tetrahedron Asia Symposium
July 23–27, Melbourne
www.racicongress.com/TetrahedronSymposium/

6th Asian Conference on Coordination Chemistry
July 23–28, Melbourne
www.racicongress.com/ACCC6/

Asian Chemical Congress
July 23–28, Melbourne
www.racicongress.com/17ACC/

Carbon 2017
July 23–28, Melbourne
www.racicongress.com/Carbon2017/

RACI National Centenary Conference 2017
July 23–28, Melbourne
www.racicongress.com/RACIConference/

ICPEAC XXX
July 26–August 1, Cairns
http://icpeac30.edu.au/

The Asia Hub for e-Drug Discovery (AHeDD) Symposium 2017
July 27–28, Melbourne
www.racicongress.com/AHeDD2017/

The Lancet Summit: COPD and Lung Cancer
July 28–29, Perth
www.thelancetsummit.com/

Analytical and Bioanalytical Techniques Congress
August 2–4, Melbourne
www.meetingsint.com/pharma-conferences/analytical-bioanalytical

National Science Week
August 12–20, Australia-wide
www.scienceweek.net.au/

SAFETYconnect 2017
August 16–27, Rosehill
www.safety-connect.com.au/

ARCS Annual Conference 2017
August 22–24, Randwick
www.arcs.com.au/conferences/arcs-sydney-2017

2017 BMJD Congress
August 31–September 2, Perth
http://bmjd-congress.org/

IAMG2017
September 2–9, Fremantle
http://iamg2017.com/

Australian Entomological Society 48th AGM and Scientific Conference
September 17–20, Terrigal
www.aesconferences.com.au/

ISEB23
September 24–29, Cairns
www.cvent.com/events/iseb23/event-summary-8154be59091a42868709c3e8542fe5a1.aspx

ComBio 2017
October 2–5, Adelaide
www.combio.org.au/combio2017/

AusBiotech 2017
October 25–27, Adelaide
http://ausbiotechnc.org/

Innovate Biotech 2017
November 27–28, Brisbane
https://innovateconferences.com/biotech

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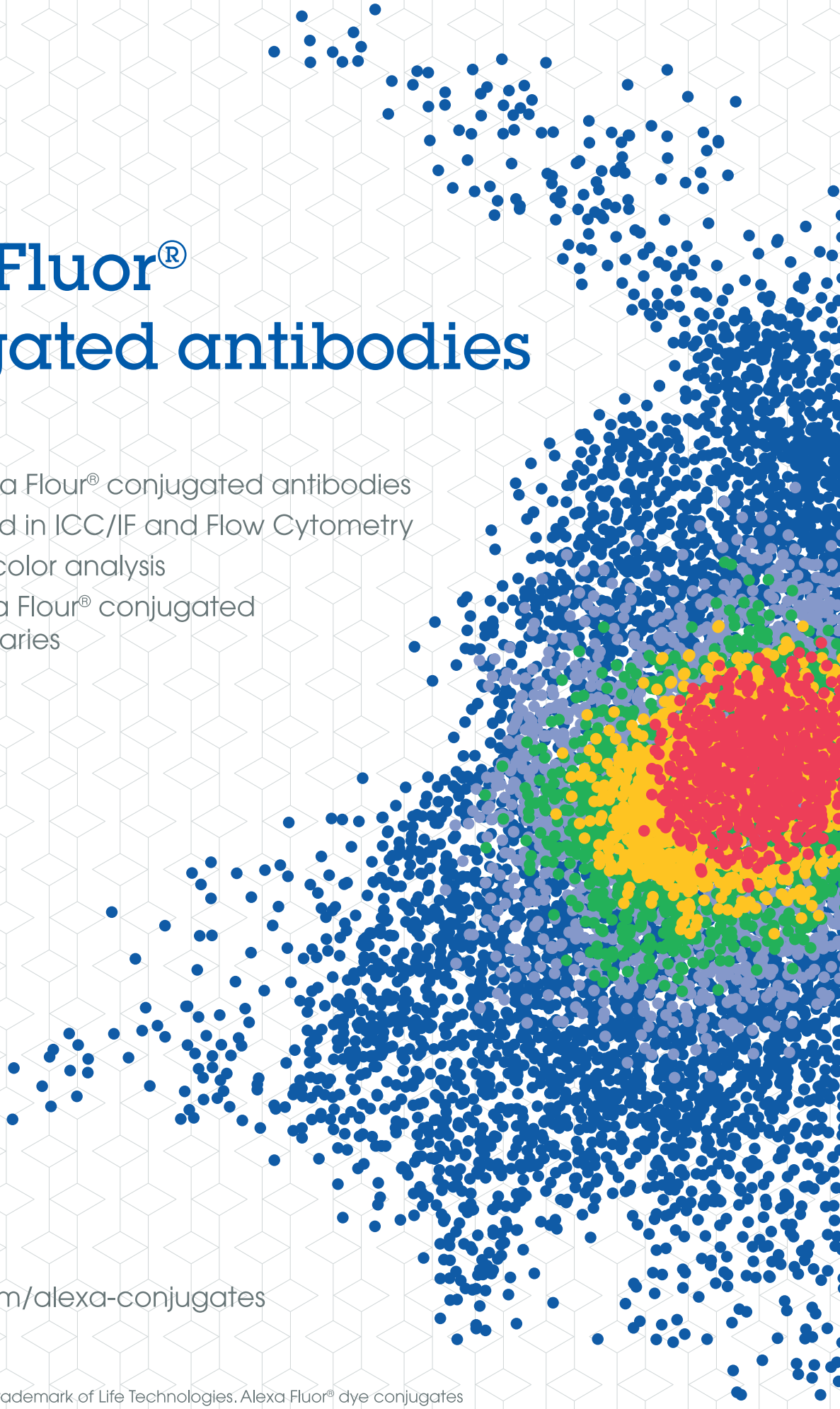

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