

Research collaboration targets plant-based vaccine development

A new research collaboration aims to develop new methods and tools to non-invasively monitor the growth and performance of plants used in the production of Virus-Like Particles (VLPs). In doing so, the research will help to optimise the biotechnology for plant-based vaccine development.

Initiated and supported by the Centre for Entrepreneurial Agri-Technology (CEAT) and ANU Innovation, the project will involve researchers from the National Collaborative Research Infrastructure Strategy (NCRIS) - supported Australian Plant Phenomics Facility (APPF), ANU's Research School of Biology (RSB) and the ANU College of Engineering and Computer Science (CECS), in collaboration with Canadian biopharmaceutical company, Medicago R&D Inc.

Medicago R&D Inc uses a proprietary plant-based technology to develop vaccines and protein-based therapeutics. Key to their technology is the production of Virus-Like Particles (VLPs) as vaccines. VLPs mimic the structure of viruses and can induce an immune response without causing an infection. When purified, VLPs have the potential to be used as vaccines against a range of viruses, such as influenza, rotavirus, and norovirus.

Medicago's proprietary technology is rapid, versatile, and scalable. Importantly, its recombinant technology allows the production of a vaccine that can match the circulating strains, such as in the case of seasonal influenza.

A five-year collaboration agreement between ANU and Medicago has recently been signed, with the collaboration consisting of multiple projects, starting with a \$1M project to take place over 14 months.

In this initial project, the APPF's Plant Phenomics Group at ANU – that includes Dr Tim Brown and Dr Richard Poire-Lassus - is contributing its full range of facilities and expertise in phenomics, bioinformatics, and data visualisation, as well as access to state of the art equipment and infrastructure such as hyperspectral scanning, and sophisticated controlled environment growth chambers.

As Dr Tim Brown, APPF's ANU Node Director, said, *"This technology is very exciting, delivering the capacity to use plants to rapidly make vaccines. To be able to contribute ANU/APPF's advanced phenotyping know-how and technologies to the project is really special."*

During the initial project, CECS will be contributing the expertise of Professor Hongdong Li and Dr Liang Zheng.

Professor Hongdong Li from CECS said he is *"pleased to be supplying expertise in the application of computer-based approaches to develop deep-learning models of plant growth"*.

Together with Medicago R&D Inc, the ANU partners will work to develop new methods and tools to non-invasively monitor the growth and performance of plants used in the production of VLPs.

Professor Owen Atkin, Director, Centre for Entrepreneurial Agri-Technology (CEAT) is proud that CEAT has been able to play a central role in bringing together the APPF, RSB, CECS and Medicago R&D Inc.

“The collaboration highlights the value of university-based, interdisciplinary teams working with an industry partner to help address complex challenges of global significance – in this case, the urgent need to improve global access to vaccines,” said Professor Atkin.

CEAT was founded by the ANU, CSIRO, and the ACT Government in 2018, and became an ANU Innovation Institute in 2020. CEAT’s mission is to bring together experts from a range of academic disciplines to collaborate with producers, industry, and end-users to co-design innovative, interdisciplinary solutions to challenges facing the agriculture sector.

The APPF is a NCRIS enabled facility, and this project reflects the aim of NCRIS to support high-quality research that will drive greater innovation and address key national and global challenges. APPF’s distributed network of complementary nodes include the Plant Phenomics Group at ANU, CSIRO’s High Resolution Plant Phenomics Centre and The Plant Accelerator at the University of Adelaide.

The ANU CECS is a world leader in the research and teaching of ground breaking fields, including quantum cybernetics, robotics, software engineering, computer-centred learning and computational mechanics.

Medicago is a biopharmaceutical company headquartered in Quebec City with production sites in Quebec, Canada and Durham, North Carolina, USA. Medicago’s mission is to improve global health outcomes by leveraging innovative plant-based technologies for rapid responses to emerging global health challenges.

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