

Name	HUYNH Loc Tan
Laboratory	Laboratory of Microbiology
Year (Grade)	D3
Internship institution	Australian Centre for Disease Preparedness, 5 Portarlington Rd, East Geelong VIC 3220, Australia
Internship period	Internship period: 11/19/2023 - 12/16/2023 (Departure Date from Sapporo: MM/DD/YYYY, Arrival Date in Sapporo: MM/DD/YYYY)

### 1. Purpose and the reason why you chose this institute

The Australian Center for Disease Preparedness (ACDP) is funded by the Australian Government through the Commonwealth Scientific and Industrial Research Organisation (CSIRO) and the Department of Agriculture, Fisheries and Forestry (DAFF). ACDP plays a vital role in maintaining and improving Australia's capability for timely diagnosis of new and emerging (terrestrial and aquatic) animal diseases, including exotic (foreign) and zoonotic diseases. Importantly, ACDP is equipped with maximum biocontainment facilities that allow it to undertake the above-mentioned diagnostic and research activities for animal diseases of national and international significance securely and safely. Therefore, obtaining an internship at ACDP will encourage my research attitude, and I will be able to apply what I have learned to biosecurity and health organizations in Vietnam for the management and monitoring of infectious diseases.

ACDP is a high-containment facility designed to allow scientific research into the most dangerous infectious agents in the world and accredited reference laboratory and collaborating center for a range of diseases. The laboratories at ACDP are World Organisation for Animal Health (WOAH) reference laboratories. ACDP is also a WOAH collaborating centre for new and emerging diseases, for laboratory capacity building and for diagnostic test validation science in the Asia-Pacific region. It also plays an important role as a Food and Agriculture Organization (FAO) collaborating centre for animal influenza, Newcastle disease and laboratory biological risk management. It is a member of World Health Organization (WHO) network of laboratories for severe acute respiratory syndrome (SARS) and a national reference laboratory for rabies and *Brucella* spp. So, it will be a great opportunity to join diverse teams and work with world class impact driven research leaders and promote my future collaboration.

**2. Result of the activity (about 800 words, provide photos, tables and figures that clearly show the activities during the period)**

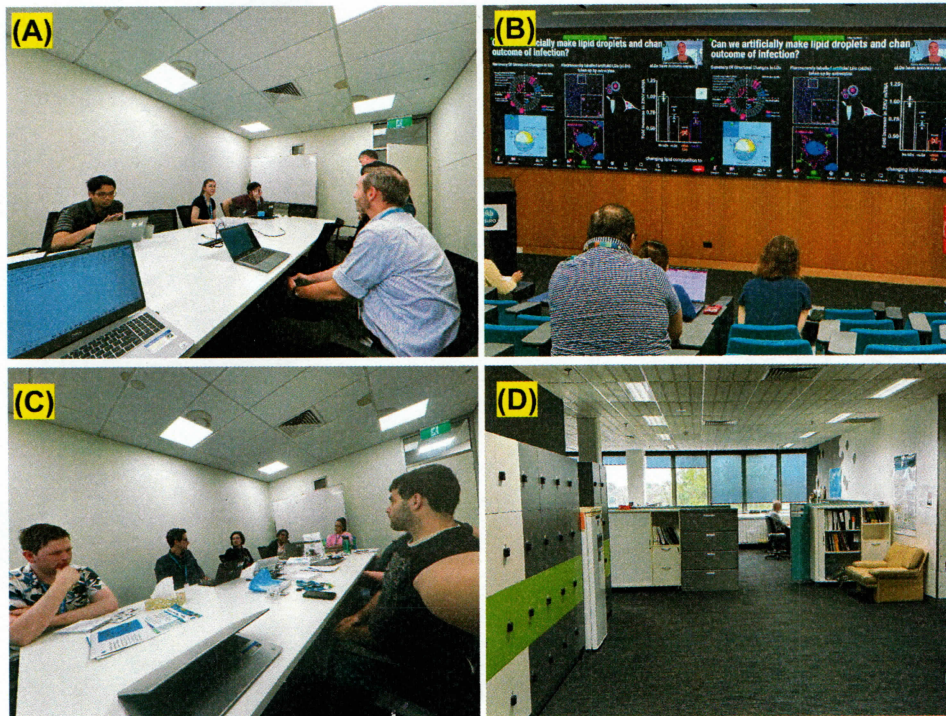
Training for both non-secure and secure areas is a crucial requirement for trainees at ACDP. This training is essential to ensure that individuals are equipped with the necessary knowledge and skills to work safely and effectively in various environments within the center. As part of this training process, I am typically required to complete a course within a single day, followed by an examination. Successful completion of this training and examination is a prerequisite for accessing and working in secure areas within the ACDP. This rigorous process underscores the center's commitment to maintaining high standards of safety and security in all aspects of its operations, particularly when dealing with potentially hazardous materials or pathogens. Figure 1 illustrated the training process for both non-secure and secure areas.



**Figure 1.** Biosecurity training encompassed sessions held in various settings. (A) Training sessions are conducted in designated rooms. (B) Training tailored for the non-secure area; (C) Specialized training for the secure area.

During my internship at ACDP, I had the opportunity to work in various settings, including both non-secure and secure areas. This experience was invaluable as it provided me with firsthand exposure to the operations of a high-containment facility. In the non-secure areas, I engaged in tasks such as data analysis, research, and administrative duties, which allowed me to understand the broader context of the organization's work. Furthermore, I played an active role in meetings conducted by both the virology and sequencing teams, as well as the virology conference. This immersion allowed me to bolster my confidence in verbal communication skills significantly. Through these experiences, I refined my capacity to represent our research team adeptly, both within our organization and on the global stage. This entailed presenting our

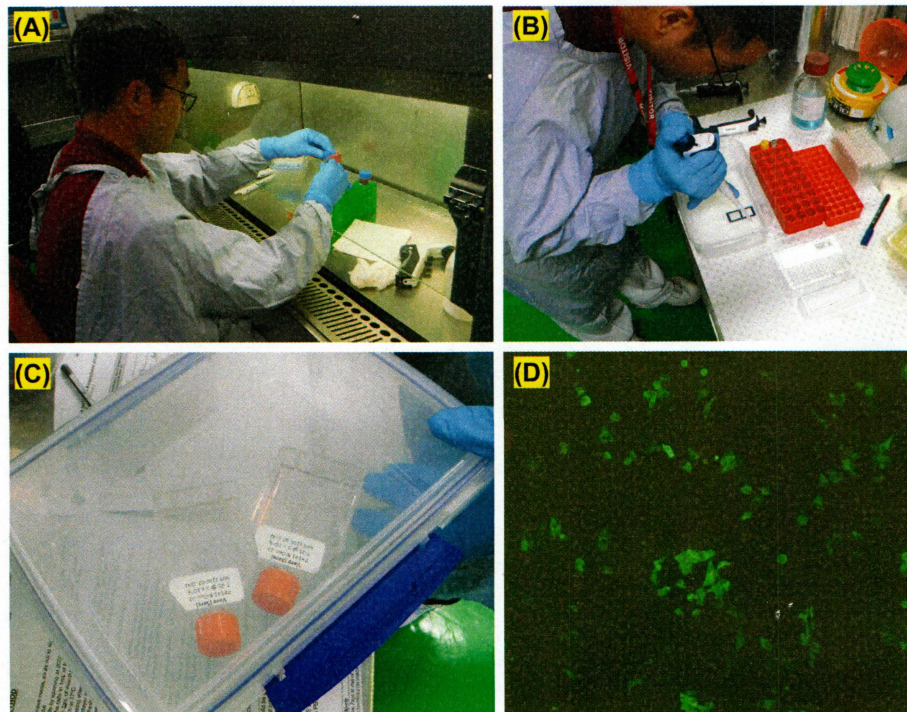
work with clarity and precision, even in an international atmosphere, thereby contributing to collective success. Figure 2 indicated the activities in the non-secure area.



**Figure 2.** Tasks undertaken within the non-secure area. (A) Participating in virology team meetings; (B) Attending an international virology conference; (C) Engaging in sequencing team meetings; and (D) Conducting desk work for paperwork and computer-based analysis.

Transitioning to the secure areas, I was immersed in a controlled environment where strict protocols and procedures were implemented to ensure safety and confidentiality. Here, I had the chance to participate in hands-on activities related to the handling and manipulation of pathogen materials, as well as the use of specialized equipment and technologies. During my time with the virology team, I was fortunate to participate in the African swine fever (ASF) project, which provided me with valuable hands-on experience. Specifically, my involvement in the ASF project revolved around laboratory diagnostics, where I contributed to virus isolation in cell cultures and conducted serological tests using immunofluorescent antibody (IFA) staining on ASFV-infected Vero cells. This role allowed me to engage directly with diagnostic procedures essential for understanding and combating ASF. I was fortunate to have an excellent opportunity to familiarize myself with CRISPR-based techniques for developing new or modified cell lines. Through these tasks, I gained insight into the complexities of ASF diagnosis and the significance of accurate testing methods in disease management. Overall, my

involvement in the ASF project within the virology team was a formative experience that broadened my skill set and deepened my appreciation for the critical role of diagnostics in virological research. Figure 3 presented an overview of various activities and outcomes achieved in the virology team.



**Figure 3.** The tasks were carried out within the secure virology laboratory, a secure area. (A) Cultivating cell cultures for the isolation of ASFV; (B) Executing immunofluorescent staining with ASFV-infected Vero cells; (C) Propagating the ASFV in the Vero cells through passaging for virus propagation; (D) Employing immunofluorescence staining to detect ASFV using the ASFV-p30 antibody, visualized in green.

Within the sequencing team, a pivotal endeavor involved the utilization of next-generation sequencing (NGS) technology, specifically utilizing the Illumina MiSeq platform and Nanopore sequencing technology. This advanced sequencing method was employed to scrutinize the genome of African swine fever virus (ASFV), aiming to unravel its genetic composition and glean insights into its structure and function. Moreover, the team embarked on pioneering work to establish a robust methodology for the full-length sequencing of the bovine viral diarrhea virus (BVDV) using the NGS technology on an Illumina MiSeq platform with the aim to underscore the commitment to advancing diagnostic and research capabilities in veterinary virology for pestivirus. Figure 4 showed the tasks carried out within the sequencing

laboratory, secure area.



**Figure 4.** Tasks were conducted within the secure sequencing laboratory, comprising: (A) Ensuring appropriate attire for laboratory staff; (B) Preparing polymerase chain reactions (PCR) to amplify the target genome; (C) Operating the thermocycler for PCR processes; (D) Utilizing the Illumina MiSeq platform for BVDV sequencing; (E) Employing Nanopore sequencing for ASFV analysis; and (F) Analyzing genomic data through the Geneious Prime bioinformatics software platform.

In our future plan, we are currently in the process of preparing ASFV-positive samples collected in Vietnam. These samples are obtained both before and after the implementation of the ASFV vaccination program in the region. The collection and analysis of these samples hold significant importance in understanding the effectiveness of the ASFV vaccination program and its impact on the prevalence and characteristics of the virus in Vietnam. By examining samples from both pre- and post-vaccination periods, we aim to assess any changes in ASFV strains, viral load, or other relevant factors following the implementation of vaccination efforts. Our objective is to ship these samples to the ACDP facility for in-depth analysis as part of our collaborative project.

Working in both non-secure and secure areas enabled me to appreciate the importance of adherence to safety protocols and the significance of maintaining confidentiality in sensitive environments. Moreover, it broadened my understanding of the complexities involved in conducting research and operations within a high-containment facility. Overall, this internship provided me with invaluable knowledge and experience that will undoubtedly benefit my future endeavors in this field. **(Total words: 795)**

### **3. What do you think the positive impact of the activity will have on your further career path?**

I experienced a new work/life environment at ACDP, which enhanced my communication skills, teamwork, and creativity. It was helpful for my academic career through science and engineering excellence in the future since I have experience working with world-class, impact-driven research experts with excellent tools and resources at ACDP. Thanks to this opportunity, I can explore funding sources for future collaborative projects aimed at fostering research cooperation between Vietnam and international organizations. Importantly, a material transfer agreement (MTA) being prepared for future collaboration between Can Tho University in Vietnam and the ACDP signifies a fostering of fruitful partnerships.

For my career path, I want to contribute to research activities as a virologist related to disease control at the national, regional and international levels. As a researcher staff at Can Tho University (CTU), Vietnam, my previous research was in bacteriology; however, I had a great chance to experience the basic and applied research activities on virology during my Ph.D study at Hokkaido University. After my doctoral graduation, I am ambitious to join the academic field at CTU as a lecturer; therefore, I plan to build up the capacity of the scientific community and maximise the use of infrastructure for research to control infectious diseases. Importantly, CTU has established the biosafety level 3 (BSL-3) laboratories; therefore, the internship at ACDP was beneficial for my future work as a principal investigator in operating and managing the infrastructure and contributing to the research on viral infections by applying leading-edge technologies that I have learned at ACDP.

In addition, I had a discussion with my supervisor at ACDP about how to make a bridge for the next generation who wish to study or pursue their career path at ACDP, which will promote research activities and develop human resources. It will promote joint research between ACDP, Hokkaido University and Can Tho University in future that would produce real impacts via excellent publications in science and engineering.

### **4. Report how your activity could link to One Health Approach (If applicable)**

If you also conducted OH onsite training, please describe some of the examples of One Health approach you implemented in your activity. Otherwise, explain the possibility(ies) how you could link this activity to One Health approach for your future.

My internship at ACDP exemplifies the principles of the One Health approach through collaboration, research, and capacity building:

**Collaboration across disciplines:** Throughout my internship, I had the valuable opportunity to work alongside professional teams from diverse backgrounds, including virology, informatics, and molecular biology. This collaborative environment allowed me to contribute

to research projects that spanned multiple disciplines, which will be beneficial for future collaboration.

**Research and policy development:** my involvement in research activities focused on African swine fever (ASF) genomic analysis has provided insights that could potentially inform evidence-based policies and interventions for ASF vaccination. By contributing to research efforts at ACDP, I am playing a role in advancing our understanding of ASF dynamics and facilitating the development of effective strategies for ASF prevention and control.

**Capacity building and education:** my internship at ACDP has provided me with the opportunity to work within a high-containment facility, gaining hands-on experience in pathogen handling. Additionally, participation in meetings and conferences has allowed me to share knowledge and expertise gained contributing to the education and training of others in the field.

### 5. Advice for your junior fellows



**Set your goals clearly:** Before starting your internship, define your goals. Whether you are gaining specific skills, exploring a particular field, making professional connections, or something else, having clear goals will guide your efforts.

**Be proactive and expand your network:** Have a conversation with your supervisor or mentor to discuss expectations for the internship. Take initiative and seek out opportunities to connect with the desired institutes or organisations for your internship using your social media network (ResearchGate, LinkedIn, Google Scholar, Meledy, etc.).

**Building your academic relationships at the University:** Take advantage of networking opportunities within the organization. Connect with colleagues and attend Faculty or University events.

**Be professional:** maintain a professional demeanour at all times.

Last but not least, **think carefully, work hard, be patient, and hold onto your beliefs.**

Approval of supervisor	Institution • Official title • Name Laboratory of Microbiology, Department of Disease Control, Faculty of Veterinary Medicine Prof. Yoshihiro Sakoda  
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※1 A certification form from the host should also be submitted.

※2 The Career Path Committee will first confirm the content of this report and report will be forwarded to the