

PROGRESS REPORT

FOR WILDCARE TASMANIAN NATURE CONSERVATION FUND



Prepared by: The Tasmanian devil immunology research group, Menzies Institute for Medical Research, University of Tasmania

To: The Tasmanian Nature Conservation Fund in relation to a grant provided for the salary of the group's part-time research veterinarian, Ruth Pye BVSc, MVS (Conservation Medicine), PhD

Time period: September 2020 - December 2021

We are extremely grateful to the funding received from the Wildcare Tasmanian Nature Conservation Fund which has supported this ongoing work. The funding was enabled by donations to the Fund, in particular by generous support from Saffire Freycinet over the last five years. With this support, our progress towards getting on top of devil facial tumour disease and conserving the population of wild devils in Tasmania, has been made possible.

SUMMARY OF RESEARCH VETERINARIAN ACTIVITIES 2020-2021:

Identification of a suitable oral bait marker for the proposed DFTD bait vaccine

The Tasmanian devil immunology group at the Menzies Institute for Medical Research, University of Tasmania has made substantial progress on the development of an oral bait vaccine to protect devils against devil facial tumour disease (DFTD).

The proposed DFTD oral bait vaccine draws on many aspects of the oral rabies bait vaccine programs that use oral bait vaccines to immunise wildlife rabies reservoirs in Europe and the Americas. This includes the use of Iophenoxic Acid (IPA) as the bait vaccine biomarker. Use of a biomarker will help determine which devils have successfully consumed the bait and therefore received the vaccination.

In 2021 Ruth and Dr Andy Flies (leader of the devil immunology research group) tested the suitability of IPA as a bait marker in Tasmanian devils using two of the captive devils at the group's facility near Richmond. The results demonstrated that IPA is a suitable biomarker for carnivorous marsupials. Two more devils have since been tested and samples from these devils are currently being collected for analysis.

Opportunistic sampling from wild devils and collaboration with the Australasian Wildlife Genomics group, University of Sydney

Serum samples from wild devils have been collected and analysed by Ruth and Jocelyn Darby (research assistant) over the past five years. These have yielded some exciting results with respect to naturally occurring immune recognition of devil facial tumour disease.

In 2021, Ruth joined two field trips to Narawntapu National Park with the Save the Tasmanian Devil Program and the Australasian Wildlife Genomics Group from the University of Sydney to collect further blood samples from wild devils.

The Wildlife Genomics Group has developed a deep genome sequencing technique which will aid in determining whether there is a genetic explanation for the immune recognition found by Ruth in particular devils.



Images taken on field trips, Narawntapu National Park, 2021

Student support

Ruth provided guidance and advice for two of the devil immunology group's honours students in 2021.

The student projects were titled:

1. "Evaluation of oral baits and distribution methods for Tasmanian devils (*Sarcophilus harrisii*)"
2. "Investigating the role of immune checkpoints in the pathogenesis of devil facial tumour disease"



Images taken during the field bait trials, 2021

Captive devils at Richmond

The Menzies devil group currently has five devils at a facility near Richmond for research purposes. Ruth, as research vet, is responsible for the health and welfare of these devils, and liaises closely with the Richmond devil keeper.

Ruth collects blood samples from the devils for the research group, and performs procedures such as trial immunisations and the recent bait marker trial on the devils.

Publications 2020-21

First author: "Ethyl-iophenoxic acid as a serum marker for oral baiting of carnivorous marsupials"; Pye et al, published on the pre-print server: bioRxiv, December 2021, DOI: 10.1101/2021.12.14.472710

First author: "Post release immune responses of Tasmanian devils vaccinated with an experimental devil facial tumour disease vaccine"; Pye et al published in the journal: Journal of Wildlife Diseases, December 2021, DOI: 10.1071/WR20210

Co-authorship: "Cathelicidin-3 associated with serum extracellular vesicles enables early diagnosis of a transmissible cancer"; Espejo et al, published on the pre-print server: bioRxiv, December 2021, DOI: 10.1101/2021.12.06.471373

Co-authorship: "Evolution and lineage dynamics of a transmissible cancer in Tasmanian devils"; Kwon et al, published in the journal: Plos Biology, November 2020, DOI: 10.1371/journal.pbio.3000926

Presentations, conferences and meetings 2020-21

Oral presentation: "Dogs, devils and contagious cancers" at the Beaker Street Festival/ Ockham's Razor, Hobart, August 2021 <https://www.abc.net.au/radionational/programs/ockhamsrazor/dogs-devils-and-contagious-cancers/13522214>

Oral presentation: "Results of a devil facial tumour disease immunisation field trial; and MHC-I insights" at the 49th Annual Scientific Meeting of the Australian and New Zealand Society for Immunology, December 2021

Conference attendance: Australian and New Zealand College of Veterinary Scientists' Science Week, July 2021

Meeting presentation: Wildlife Disease Association Australasia, Tasmanian division, Maria Island, May 2021

Plans for 2022 onward

- Finalise the IPA (bait marker) study on captive devils and convert the pre-print manuscript for submission to a peer reviewed journal
- Continue collaboration with the Australasian Genomics Wildlife Group, University of Sydney, particularly in regards to analysis of samples from devils with demonstrated immune recognition of DFTD
- Complete the compilation and analysis of the DFT2 immunisation trial results, and prepare for publication.
- Continue to work closely with members of the devil immunology group at Menzies - e.g. lab meeting participation; project discussions and facilitation
- Continue care of and sample collection from the captive devils at Richmond
- Continue the quoll comparative immunology project (referred to in the 2019-20 Wildcare report)
- Continue to liaise with the Save the Tasmanian Devil Program and research collaborators (Dr E. Murchison and A. Strakova, Cambridge, UK; Dr H. Siddle, Southampton, UK; Dr C. Hogg, USyd; STDP) with respect to sample requirements, sample collection, sample analysis and research questions