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**The epidemiology and pathology of
Paranannizziopsis australasiensis in New Zealand
reptiles**

A thesis presented in partial fulfilment of the requirements

for the degree of

Master of Veterinary Science

In

Wildlife Health

at Massey University,

Palmerston North New Zealand

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2018**

Abstract

Paranannizziopsis australasiensis, has recently been diagnosed in tuatara at two captive facilities in New Zealand. This newly emerging fungal pathogen, is a member of the onygenalean fungal group formally known as *Chrysosporium* anamorph of *Nannizziopsis vriesii* (CANV). Fungi of this genera are thought to be obligate primary pathogens in reptiles, and closely related species such as *Ophidiomyces ophiodiicola*, and *Nannizziopsis guarroi* have caused significant morbidity and mortalities in captive and wild reptile populations. The detection of this disease raised concerns for wild and captive population health and resulted in a temporary cessation of tuatara breed and release programmes from affected facilities. Similar lesions have been reported in tuatara at multiple other captive facilities in New Zealand, but lack of veterinary assessment and, until recently, inadequate diagnostic capabilities has led to an inability to confirm the presence or absence of *P. australasiensis* in these populations.

This research aimed to investigate the epidemiology of *P. australasiensis* in New Zealand wild and captive endemic reptiles. Skin samples were collected from nine captive, six wild and two ecosanctuary populations of tuatara across New Zealand. Skin samples from in contact geckos and skinks were opportunistically collected to determine the possible cross species infection of *P. australasiensis*. Samples were tested for presence of *P. australasiensis* by fungal culture followed by PCR, and by loop-mediated isothermal amplification (LAMP). Soil samples were collected from burrows, basking areas and captive enclosures and analysed by LAMP to determine the presence of *P. australasiensis* within the environment.

Paranannizziopsis australasiensis was found to be wide spread in New Zealand captive and wild reptile populations. In populations where the pathogen was detected prevalence varied between 6.7% and 44.4% for tuatara, 3.8% and 40% for geckos and 6.7% and 66.7% for skinks. A low virulence of disease associated with infection was seen in tuatara across New Zealand, with many LAMP positive tuatara being asymptomatic. Increased severity of disease was seen in two captive tuatara, where

other concurrent disease was present. One fatality was reported. In other reptile hosts, no disease was identified, and it is suspected these species act as reservoirs for the transmission of this organism to tuatara. *Paranannizziopsis australasiensis* was detected multiple times in soil samples and may survive as an environmental saprophyte.

Paranannizziopsis australasiensis appears to have a close association with New Zealand reptiles. The prevalence, distribution and pathology of *P. australasiensis* observed in this study suggests that this organism is not a threat to tuatara or other endemic reptile populations in New Zealand. The findings of this study have enabled restrictions placed on tuatara translocations, based on *P. australasiensis* status, to be removed.

Acknowledgements

This project has been a huge collaborative effort and would not have been possible without the time and generosity of many people. I am particularly grateful for the assistance given by both Hye Jeong Ha and the staff at the Animal Health Laboratory, and Richard Winkworth, and associated staff at the Institute of Fundamental Sciences. Thank you for both providing countless hours, expertise and enthusiasm for this project, and for tolerating a never-ending number of samples. Special thanks also to Kate McInnes, for organising the collection of a significant amount of the data used in this study, for coordinating discussions on this disease and for assisting in gaining funding and support for this project.

My sincere gratitude is expressed to my supervisor Professor Brett Gartrell, without whom this project would not have been possible. Thank you for helping me find and build a project that I have loved. Thank you for your patience and encouragement throughout both my residency and this project and thank you especially for your perseverance in the analysis stage and for the many hours spent decoding my data.

Thank you to all of the PaNTS team, particularly the Auckland zoo vets Sarah Alexander, An Pas and James Chatterton, for sharing your knowledge and providing discussion and advice on all things fungal. Thank you to Karina Argandona-Gonzalez and Wellington Zoo for the permission to include the clinical cases used in this project, thank you to Nicola Nelson, and Stephanie Price for teaching me the tricks of tuatara hunting, and to Stuart Hunter and Adrienne French for the histology photos and assistance with the interpretation of these.

I would like to express my appreciation to all the staff from the many zoos and sanctuaries across New Zealand for your permission and assistance in the sampling of your reptiles. In particular; Chye-mei Haung and Chris Jerrum (Wellington Zoo), Matu Booth, Rhys Mills and Dave Banks (Nga Manu), Jess Flamy and Todd Jenkinson (Pukaha), Jo Ledington and Danielle Shanahan (Zealandia) Lindsay Hazley

(Southland Museum), Alyssa Salton (Orana), Paul Kavsey (Kiwi Birdlife Park), Sue Keall (VUW), Mark Paterson, Teresa McCauley, and Kelly-Anne Banks (Rainbow Springs), Tamsin Ward-Smith (Cape Sanctuary), and, Rob Chappell for making the island work possible. It has been a privilege to meet you all and witness the conservation work taking place across New Zealand.

Thank you to all my wonderful volunteers, Alisdair Eddie, Brittany Whitford, Amy Kachurowski, Sarah Michael (also thank you for the beautiful photography and for the coffee dates), Sarah Vermeer, Emily Kay, Christine Tan, Jaime Park, Maxine Jenkins and Kayla Aitken. And special thanks to the triangle team; Karissa Bernoth, Chye-Mei Huang, and Xue Qi Soon, for sharing many nights filled with coffee and chocolate, terrible singing, aching legs, and sometimes even tuatara. Thank you for sharing the trip of a life time with me I couldn't have hoped for a better team.

Thank you to Scotty the weird little welsh man who came to my rescue and fixed my computer when it crashed just two weeks before submission. And to PJ, my life assistant, thank you for your friendship and for helping me find a world outside of my tunnel of research.

Thank you to my wonderful family. My mummy, Jacqui, for always believing in me and for helping out on all the rainy days. Thank you to my boys Lachlan and Jai for putting up with long periods with an absent, busy and distracted mum. I am so proud of you both. And to my Loz, thank you for just being there, and for still being here. These last four years have been massive, and I feel blessed to have been on this roller coaster with you by my side.

And finally thank you to all the tuatara, for letting me poke you and for just being the perfect little beings that you are.

Funding and ethics approval

Funding for this project was provided in part by the Institute of Veterinary, Animal and Biomedical Sciences (IVABS) postgraduate fund, and the New Zealand Department of Conservation. All work was carried out with permission from the New Zealand Department of Conservation authorisation number 48536 – FAU and approved by the Massey University Animal Ethics Committee (MUAEC 55/99).

Table of contents

ABSTRACT.....	i
ACKNOWLEDGEMENTS.....	iii
FUNDING AND ETHICS APPROVAL.....	v
TABLE OF CONTENTS.....	vi
LIST OF FIGURES.....	ix
LIST OF TABLES.....	xi
CHAPTER ONE: Introduction, literature review and research aims	1
1.1 INTRODUCTION	2
1.2 EMERGING MYCOTIC DISEASES	3
1.3 MYCOTIC DISEASE IN REPTILES	4
1.3.1 Mycotic Disease in New Zealand Reptiles	4
1.4 REPTILE PATHOGENS OF THE GENERA <i>NANNIZZIOPSIS</i> , <i>PARANANNIZZIOPSIS</i> AND <i>OPHIDIOMYCES</i>	5
1.4.1 Classification	5
1.4.2 Diagnostics.....	6
1.4.2.i Loop mediated isothermal amplification	8
1.4.3 Transmission.....	9
1.4.4 Clinical Presentation.....	10
1.4.5 Predisposing Factors to Disease	11
1.4.6 Treatment	12
1.4.7 <i>Paranannizziopsis australasiensis</i>	14
1.4.7.i <i>Paranannizziopsis australasiensis in tuatara</i>	14
1.5 GENERAL BIOLOGY AND CONSERVATION OF TUATARA	15
1.6 ENVIRONMENTAL CHARACTERISTICS OF WILD TUATARA HABITAT	17
1.7 CAPTIVE HUSBANDRY OF TUATARA	17
1.7.1 Diet.....	19
1.8 RESEARCH AIMS AND THESIS STRUCTURE	20
LITERATURE CITED	21

CHAPTER TWO: The prevalence of <i>Paranannizziopsis australasiensis</i> in New Zealand reptiles and environmental sources	27
2.1 INTRODUCTION	28
2.2 MATERIALS AND METHODS	30
2.2.1 Location, capture and sample technique.....	30
2.2.2 Culture and PCR.....	32
2.2.3 Loop mediated isothermal amplification	32
2.2.4 Sex and age determination.....	33
2.2.5 Soil samples	34
2.2.6 Statistical Methods	34
2.3 RESULTS.....	35
2.3.1 Tuatara.....	35
2.3.1.i Culture and PCR	35
2.3.1.ii LAMP	35
2.3.1.iii Dermatitis	36
2.3.2 Geckos and Skinks.....	37
2.3.3 Association between <i>Paranannizziopsis australasiensis</i> presence and dermatitis	39
2.3.3.i All reptiles combined.....	39
2.3.3.ii Tuatara only.....	40
2.3.4 Analysis of risk factors for presence of <i>Paranannizziopsis australasiensis</i>	40
2.3.4.i All reptiles combined.....	40
2.3.4.ii Tuatara only.....	44
2.3.5 Analysis of risk factors for presence of dermatitis	45
2.3.5.i All reptiles combined.....	45
2.3.5.ii Tuatara only.....	50
2.3.6 Soil	53
2.4 DISCUSSION.....	53
LITERATURE CITED.....	57
CHAPTER THREE: The pathology of <i>Paranannizziopsis australasiensis</i> in tuatara (<i>Sphenodon punctatus</i>)	60
3.1 INTRODUCTION	61

3.2 MATERIALS AND METHODS	63
3.2.1 Skin samples and lesions	64
3.2.2 Treatment and quarantine of positive cases	65
3.2.3 Morphometrics	65
3.2.4 Haematology	66
3.2.5 Statistical Methods	66
3.3 RESULTS.....	66
3.3.1 Lesions	66
3.3.1.i Case 1	67
3.3.1.ii Case 2	68
3.3.1.iii Case 3.....	69
3.3.1.iv Other lesions.....	72
3.3.2 Effect of presence of <i>Paranannizziopsis australasiensis</i> on morphometrics and haematological parameters in tuatara.....	72
3.4 DISCUSSION.....	76
LITERATURE CITED.....	79
CHAPTER FOUR: GENERAL DISCUSSION.....	82
4.1 OVERVIEW OF RESEARCH AIMS AND CONCLUSIONS.....	83
4.1.1 Prevalence of <i>Paranannizziopsis australasiensis</i> in wild and captive tuatara	84
4.1.2 Pathology of <i>Paranannizziopsis australasiensis</i> in tuatara	85
4.1.3 <i>Paranannizziopsis australasiensis</i> in endemic geckos and skinks	86
4.1.4 <i>Paranannizziopsis australasiensis</i> in soil samples.....	86
4.1.5 <i>Paranannizziopsis australasiensis</i> on Stanley and Cuvier Island	87
4.2 DERMATITIS IN TUATARA	88
4.3 LIMITATIONS OF THE STUDY	89
4.4 CONSERVATION MANAGEMENT IMPLICATIONS.....	90
4.5 AREAS OF FURTHER RESEARCH	91
4.6 CONCLUSIONS	93
LITERATURE CITED.....	95

List of figures

FIGURE 2.1. Prevalence of <i>Paranannizziopsis australasiensis</i> for tuatara geckos and skinks at wild and ecosanctuary locations by LAMP test	39
FIGURE 2.2. Frequency of <i>P. australasiensis</i> detection in all reptiles in the study by LAMP test in different locations in New Zealand	43
FIGURE 2.3. Frequency of <i>P. australasiensis</i> detection in all reptiles in the study by reptile family	44
FIGURE 2.4. Frequency of <i>P. australasiensis</i> detection in tuatara by LAMP test in different locations in New Zealand	45
FIGURE 2.5. Frequency of the presence of dermatitis lesions in all reptiles examined by location	47
FIGURE 2.6. Frequency of presence of dermatitis lesions by management type (captive, ecosanctuary or wild population) in all reptiles examined.	48
FIGURE 2.7. Frequency of presence of dermatitis lesions by reptile family in all reptiles examined.	49
FIGURE 2.8. Frequency of presence of dermatitis lesions by age. The juveniles (*) have a significantly higher odds ratio for dermatitis presence than the adults.....	51
FIGURE 2.9. Frequency of the presence of dermatitis lesions in tuatara examined by location.....	52
FIGURE 2.10. Frequency of the presence of dermatitis lesions in tuatara examined by age cohort.	52
FIGURE 3.1. Map of New Zealand showing sampling sites	64
FIGURE 3.2. Mild dermatitis lesions. a. A focal area of skin discolouration and flaking on the ventrum of a tuatara from North Brothers Island b. Multifocal discolouration of scales on the ventrum of a tuatara from Curvier Island.	67
FIGURE 3.3. Case 1. Ulceration of the mid ventral dermis of an adult male tuatara associated with a positive LAMP test result for <i>Paranannizziopsis australasiensis</i>	68
FIGURE 3.4. Case 2. Multifocal granulomatous lesions on A. the dorsal and right lateral aspects of the tail base (arrows), and B. between digits 2 and 3 of the right front foot (arrow) of a juvenile	

male tuatara with *Paranannizziopsis australasiensis* confirmed by lamp test, culture and DNA sequencing 69

FIGURE 3.5. Case 3. A. Multifocal granulomatous lesions on the ventral chest, abdomen and tail (arrow heads) and B. transverse section through the palmar carpal aspect of the right front foot showing multiple granulomas (arrow heads) adjacent to the carpal bones of a juvenile male tuatara with *Paranannizziopsis australasiensis* confirmed by LAMP test, culture and DNA sequencing 70

FIGURE 3.6. A. Case 1: Hyperkeratosis (arrow) of the lesion edges, with gram negative and occasional gram-positive coccobacillus embedded in this material (arrow head). **B.** Case 2: Necrotic dermis and epidermis infiltrated with moderate numbers of septate parallel walled hyphae with right angled branching (arrow heads) **C – F.** Case 3. **C.** Granulomatous dermatitis and myositis with heterophilic infiltration (arrow head) and pyknotic debris (bold arrow). The dermis is intact with areas of hyperkeratosis (arrow). **D.** A granuloma containing fungal hyphae with occasional branching (arrow heads) PAS stain. **E and F:** Right front foot, Case 3. Granulomas extend deep into the dermis and muscle, with large amounts of necrotic debris surrounding bones and joints (bold arrows), with early cortical inflammation (arrow head).
..... 71

List of tables

TABLE 2.1. Number of reptiles, organised by family, tested for <i>P. australasiensis</i> by LAMP and culture at each location	31
TABLE 2.2. LAMP results for <i>Paranannizziopsis australasiensis</i> in tuatara by location within New Zealand	36
TABLE 2.3. LAMP results for <i>Paranannizziopsis australasiensis</i> in New Zealand geckos and skinks by species and location.....	38
TABLE 2.4. Contingency table for presence or absence of dermatitis (lesions) and the result of the LAMP analysis for <i>Paranannizziopsis australasiensis</i> in all reptiles studied	40
TABLE 2.5. Contingency table for presence or absence of dermatitis (lesions) and the result of the LAMP analysis for <i>Paranannizziopsis australasiensis</i> in tuatara only	40
TABLE 2.6. Results of a reduced model binomial logistic regression for risk factors associated with a positive <i>P. australasiensis</i> LAMP test result in all reptiles in this study.....	42
TABLE 2.7. Results of a reduced model binomial logistic regression for risk factors associated with the presence of dermatitis lesions in all reptiles examined.....	46
TABLE 2.8. Results of a reduced model binomial logistic regression for risk factors associated with the presence of dermatitis lesions in tuatara	49
TABLE 3.1. Lesion presence in tuatara tested for <i>Paranannizziopsis australasiensis</i> (PA) on LAMP. There was no significant association in the frequency of dermatitis lesions with a positive result on the PA LAMP test (Chi-square 0.016, df = 1, p = 0.901)	67
TABLE 3.2. Descriptive statistics for morphological and haematological variables between tuatara testing positive and negative for <i>P. australasiensis</i> by LAMP test.....	73
TABLE 3.3 AND 3.4. Analysis of differences between morphological and haematological parameters in tuatara testing positive and negative for <i>P. australasiensis</i> by LAMP test	74