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

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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.

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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