

**The haematology of bobtail lizards (*Tiliqua rugosa*) in
Western Australia: reference intervals, blood cell
morphology, cytochemistry and ultrastructure**

This thesis is presented for the degree of Research Masters with Training at
Murdoch University.

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DECLARATION

I declare this is my own account of my research and contains as its main content, work which has not been previously submitted for a degree at any tertiary educational institution.

Cheryl Ann Moller

April 2014

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Finally, I dedicate this work to my Dad, Deniss Moller, who has always been my rock and has done more for me than he could ever know.

I hope this thesis is a resource for those with an interest in reptile clinical pathology, who, like me, are disappointed with the lack of published information about our favourite scaly creatures.

Cheryl Ann Moller, budding reptile clinical pathologist and lizard lady for life, April 2014

ABSTRACT

Bobtail lizards (*Tiliqua rugosa*) are native to Western Australia. Haematological evaluation is useful for health assessment: the only previous study of the haematology of this species sampled just six lizards (Canfield and Shea, 1988). The main aim of this study was to produce reference intervals for bobtail haematology.

Over the summers of 2011/12 and 2012/13, heparinised venous blood was collected from 46 clinically healthy, captive adult bobtails in Perth. Complete blood counts and blood smear evaluations were performed. Cytochemical stains, transmission electron microscopy, and bone marrow cytology and histology facilitated further characterisation of the blood cells. Reference intervals with 90% confidence intervals were determined using Reference Value Advisor freeware (Geffré et al., 2011). The packed cell volume (PCV) was 0.10-0.44L/L (n=40). Total plasma protein by refractometry was 36-74g/L (n=39). Haemoglobin was 20-154g/L (n=32). The manual red and white blood cell counts were $0.28-1.03 \times 10^{12}/L$ (n=38) and $2.75-30.76 \times 10^9/L$ (n=39), respectively.

Blood cell morphology was similar to that of other lizards - except the eosinophils which were uniformly vacuolated. A 200 cell leukocyte differential count was performed on each smear (n=46). Heterophils predominated (27-88%), with fewer lymphocytes (0-34%) and monocytes (1-27%), occasional eosinophils (0-22%) and basophils (0-20%). Thrombocytes were frequently clumped or present as bare nuclei. Slight polychromasia (0-7%) was typically present (n=45).

Many reference intervals were wide, particularly PCV, haemoglobin and white blood cell count. This was not unexpected as reptile haematology is influenced by many preanalytical factors.

Smears from 13 bobtails contained haemogregarine parasites, identified as probable *Hemolivia* species. There was evidence that this infection caused mild erythrocyte pathology.

The reference intervals were applied to the haematology of seven bobtails hospitalised with upper respiratory tract disease. Six bobtails possessed haematological evidence of inflammation. Thus the reference intervals appear to be clinically useful for the haematological assessment of captive bobtail lizards.

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ABBREVIATIONS

APTT- activated partial thromboplastin time

CLSI-IFCC - Clinical and Laboratory Standards Institute and International Federation of
Clinical Chemistry

CV- coefficient of variation

EDTA- ethylenediaminetetraacetic acid

H&E- haematoxylin and eosin

MCH- mean corpuscular haemoglobin

MCHC- mean corpuscular haemoglobin concentration

MCV- mean corpuscular volume

N:C ratio- nuclear to cytoplasmic ratio

PAS- periodic acid-Schiff

PCV- packed cell volume

PT- prothrombin time

QALS- Quality Assurance and Laboratory Standards

RBC- red blood cell

SD- standard deviation

T. rugosa- Tiliqua rugosa

TP- total protein

URTD- upper respiratory tract disease

WBC- white blood cell