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Proteomic and functional variation within black snake venoms (Elapidae: *Pseudechis*)

Jonathan Goldenberg[1,2], Vittoria Cipriani[1], Timothy NW Jackson[1,3], Kevin Arbuckle[4], Jordan Debono[1], Daniel Dashevsky[1], Nadya Panagides[1], Maria P. Ikonomopoulou[5,6,7], Ivan Koludarov[1], Bin Li[8], Renan Castro Santana[1], Amanda Nouwens[9], Alun Jones[10], Chris Hay[1], Nathan Dunstan[11], Luke Allen[11], Brian Bush[12], John J. Miles[5,13], Lilin Ge[14], Hang Fai Kwok[8]*, Bryan G. Fry[1]*

1. Venom Evolution Lab, School of Biological Sciences, University of Queensland, St Lucia, QLD, 4072, Australia
2. Evolution and Optics of Nanostructures Group, Department of Biology, University of Ghent, Ledeganckstraat 35, Ghent 9000, Belgium
3. Australian Venom Research Unit, Department of Pharmacology, University of Melbourne, Parkville VIC 3000, Australia
4. Department of Biosciences, College of Science, Swansea University, Swansea SA2, 8PP, UK
5. QIMR Berghofer Institute of Medical Research, Herston, QLD 4049, Australia
6. School of Medicine, The University of Queensland, Herston, QLD 4002, Australia
7. Madrid Institute for Advanced Studies (IMDEA) in Food, CEI UAM+CSIC, Madrid, 28049, Spain
8. Faculty of Health Sciences, University of Macau, Avenida da Universidade, Taipa, Macau, China
9. School of Chemistry and Molecular Biosciences, University of Queensland, St Lucia, QLD, 4072, Australia
10. Institute for Molecular Biosciences, University of Queensland, St Lucia, QLD, 4072, Australia
11. Venom Supplies, Tanunda, SA, 5352, Australia
12. Snakes Harmful & Harmless, 9 Birch Place, Stoneville, WA, 6081, Australia
13. Australian Institute of Tropical Health and Medicine, James Cook University, Cairns, QLD 4878, Australia
14. School of Pharmacy, Nanjing University of Chinese Medicine, Qixia District, Nanjing, China

* To whom correspondence should be addressed bgfry@uq.edu.au, hfkwok@umac.mo

Abstract

Pseudechis (black snakes) is an Australasian elapid snake genus that inhabits much of mainland Australia, with two representatives confined to Papua New Guinea. The present study is the first to analyse the venom of all 9 described *Pseudechis* species (plus one undescribed species) to investigate the evolution of venom composition and functional activity. Proteomic results demonstrated that the typical *Pseudechis* venom profile is dominated by phospholipase A_2 toxins. Strong cytotoxicity was the dominant function for most species. *P. porphyriacus*, the most basal member of the genus, also exhibited the most divergent venom composition, being the only species with appreciable amounts of procoagulant toxins. The relatively high presence of factor Xa recovered in *P. porphyriacus* venom may be related to a predominantly amphibian diet. Results of this study provide important insights to guide future ecological and toxinological investigations.

Keywords: venom evolution, *Pseudechis*, black snakes, diet, toxins, proteomic, enzymology, Oxyuraninae, PLA_2

INTRODUCTION

The production of venom is considered to be metabolically 'expensive' (reviewed by Morgenstern & King 2013), and this can create selection pressure for the 'fine-tuning' of venom to target specific prey (Jackson et al. 2013). For this reason, venom composition and activity can vary according to