



## **PRESIDENT'S LECTURE**

# ***Evolution and Development of Reptiles: From Genomes to Venoms***

**Prof. dr . Michael Richardson**  
Professor of Animal Development  
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***6.00pm Wednesday 16 November 2016, The Linnean Society of London,  
Burlington House, Piccadilly, London W1J 0BF***

Reptiles, including birds, have evolved a remarkable range of body plans through modification of ancestral developmental pathways and some species have evolved specialised venoms which serve as a model for protein evolution. It might be predicted that some genes involved in limb development would be pseudogenised or missing in snakes. In fact, genome sequences reveal that all 'developmental toolkit genes' are intact suggesting that modification of the body plan depends on changes in regulation or downstream pathways. Gene expression profiling on a range of reptile embryos shows that, even when only one digit remains on the limb (as in the flightless emu) the posterior patterning pathways remain intact but the anterior pathways are modified. Conflicting selection pressures appear to result in a tradeoff whereby digits are lost through the modification of later pathways in limb development. Our snake genomes also give fascinating insight into venom protein evolution. Major components, such as three finger toxins, underwent massive duplication after recruitment to the venom gland through a variety of mechanisms. We find that venomous snakes are not only engaged in an arms race against their prey but may also be in an arms race against bacteria in the venom gland. Future study of ontogenetic changes in venom composition, as an individual switches from arthropod prey to larger rodent prey, requires a new generation of venom bioassays using low volumes and without using experimental mammals. We have developed miniaturised assays based on zebrafish embryos.

**The meeting is open to visitors and wine will be served after the lecture to members and guests**

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