

POSTERS

THE EVOLUTION OF NEURONAL SCALING IN AMNIOTES

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Similarly sized brains can be made of highly different neuron numbers, that is along the evolution of amniotes multiple shifts in the evolution of the scaling relationships between brain-size vs brain-neurons should have occurred to justify the diversity we observe today. However, if such relationships are conserved within clades, a strong correlation between brain size and brain neurons evolutionary rates should be detected within all clades.

We analysed previously published data of brain and body size and brain neuron numbers of 201 amniotes species spanning from Squamata, Testudines, Aves and Mammalia. We applied phylogenetic ridge regression (RRphylo) to measure evolutionary rates of the scaling relationship between body- and brain-size and brain neuron numbers. We employed Bayesian phylogenetic regression and robust phylogenetic regression to understand the evolutionary relationship between each variable. We identified five major shifts in the rates of evolution of neuron numbers. Galloanserae (Aves), Ferungulata (Mammalia) and Primates (Mammalia) showed

a positive rate shift, whereas Testudines (Reptilia) and Squamata (Reptilia) showed a negative shift. Furthermore, we detected a marked change in slope and intercept in Primates, Ferungulata and Galloanserae when compared with Squamata and Testudines. We detected a strong correlation between the rates of body- and brain-size and brain neuron numbers in all clades except for Testudines and a weaker correlation in Squamata.

We confirm the presence of a marked shift in the scaling relationships between body- and brain-size and brain neuron numbers within mammals and birds. Primates display the highest slope, whereas Squamata and Testudines show the lowest. These results suggest that not all amniotes show similar scaling trends between body- and brain-size and brain neuron numbers and that coordinated evolution between brain size and neuron numbers is an emergent property only of the most encephalised clades.

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