Computational fluid dynamics modelling of pulmonary airflow in varanid lizards

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Understanding the biomechanical basis of unidirectional pulmonary airflow, a condition where lung gases travel in the same direction through most of the airways and throughout the respiratory cycle, has long been of interest to scientists. Recent work has revealed a wide phylogenetic distribution of this trait, beyond the confines of *Aves*, to include crocodilians, green iguanas, and monitor lizards. Advances in computational fluid dynamics, a technique where patterns of flow are simulated from prescribed boundary conditions by laws of fluid motions, provide a powerful tool to study airflow through these complex and fascinating structures. Australian monitor lizards (varanidae) are a promising group to investigate the significance of these lung traits because their adaptive radiation crosses many ecological niches with a similar body plan. Computed tomography scans of varanid species being made and segmented into a detailed computational meshes, representing the major and minor airways as has already been done for the savannah monitor, *Varanus exanthematicus*. Flow patterns are simulated through these airways in two ways on a high performance computing cluster using dynamic and static OpenFOAM solvers and visualized using ParaView.