Unidirectional airflow in the lungs of alligators and birds

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When birds breathe, air flows unidirectionally through most of their gas-exchanging bronchi. This design is often presumed to be unique to birds and to have arisen to meet the high oxygen demands of flight. In this talk I will discuss data showing that airflow is unidirectional within the lung of the American alligator, a member of the extant sister taxon of birds. The implications of the work are that airflow was probably unidirectional in the lungs of basal archosaurs of the Triassic and their descendents: phytosaurs, aetosaurs, rauisuchians, crocodylomorphs, pterosaurs, and all dinosaurs including sauropods, theropods, and ornithischians. The discovery of unidirectional airflow in alligators poses new questions regarding the evolution of the respiratory systems of reptiles, but also regarding the evolution of mammalian lungs.