

# Respiratory Anatomy – Form and Function in Reptiles\*

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Dr. Wyneken received her PhD in biology from the Department of Ecology, Ethology and Evolution, University of Illinois, in 1988. Her dissertation was entitled *Comparative and Functional Considerations of Locomotion in Turtles*. In addition to training graduate and undergraduate students in comparative anatomy at Florida Atlantic University, she teaches conservation and biology of sea turtles at Harbor Branch Oceanographic Institution and Duke University Marine Laboratory. She is a frequent author and speaker, educating through peer-reviewed research publications, book contributions, professional seminars and invited presentations to the public.

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THE PURPOSE OF THIS ARTICLE IS TO PROVIDE A BROAD INTRODUCTION to the major features of gross reptilian pulmonary anatomy. It addresses the overall layout and classification of the reptilian pulmonary systems and compares major differences in broad taxonomic categories. The author discusses a comparison of lung structure and ventilation as these distinctions relate to taxonomy, behavior and ecology of various groups of reptiles.

The respiratory tract of most reptiles is anatomically and physiologically very different from that of mammals. Reptiles lack a bronchial tree and possess distinct air exchange surfaces (ediculi and faveoli) that are structurally different from alveoli of mammals. Ediculi and faveoli are small crypts in the parenchyma rather than terminal alveolar sacs.

Air passes from the nares (external choanae) to the internal choanae, then flows through the glottis, trachea and bronchi from which it enters the lungs. In most reptiles, the secondary palate (hard and/or soft palate portions) is absent or poorly developed, so food and air passages join almost immediately within the buccal cavity. Some turtles have a partially developed secondary palate in the rostral-most part of the mouth. Crocodylians have a virtually complete secondary palate, but lizards and snakes lack a secondary palate of any kind.

The structure of the supporting airways and the form and extent of the lung can be clinically important. An understanding of the normal anatomy is important for basic physical assessment of normal versus pathologic conditions and for designing treatment options.

In all reptiles, the trachea is composed of cartilaginous rings. These structures support the trachea and prevent collapse of the tracheal lumen. The rings are complete in turtles and many snakes, but are incomplete (C-shaped) in most lizards. The trachea of most snakes does not bifurcate into two distinct bronchi except in boas and pythons. Turtles have a long, flexible trachea that bifurcates into two bronchi near the heart. Each bronchus turns laterally to enter the lung.

The bronchial anatomy in reptiles typically follows one of two patterns. The bronchus enters the cranial pole of the lung from which it either