

The morphology of the lungs of two reptilian species, *Varanus exanthematicus* and *Malacochersus tornieri*, have been studied on gross preparations, latex casts, and critical-point-dried tissues. The shape of these lungs was observed to conform with that of the body, the lung of the monitor lizard (*Varanus*) being long and ovoid while that of the pancake tortoise (*Malacochersus*) was rounded and laterally indented. With respect to the size distribution of the gas exchange compartments, the lungs were observed to be notably heterogenous. In both species these units were generally smaller in diameter in the cranial region of the lung while those in the caudal region were larger. The gas exchange compartments in the tortoise were more profusely compartmented with the primary, secondary, and tertiary septa being well developed while in the lizard only the primary and secondary septa were observed. The tertiary septa in the tortoise lung and the secondary septa in that of the monitor lizard defined the terminal gas exchange units, the faveoli. The cast impressions closely resembled the actual lung tissue and convincingly revealed the hierarchical design of the gas exchange compartments as they radiate from the air chambers and ducts, terminally giving rise to the faveoli. This stratification clearly increases the surface area available for gas exchange in these lungs. Disparate refinements of the basic reptilian lung design, as noted here, may lead to differing anatomic pulmonary diffusing capacities for oxygen to which characteristics like energetics and mode of respiration in this taxon may be attributed.