

The morphology of the respiratory organs of the African air-breathing catfish (*Clarias mossambicus*): A light, electron and scanning microscopic study, with morphometric observations

Maina, JN; Maloiy, GMO

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Abstract:

The morphology of the gas exchange organs of the African air-breathing catfish (*Clarias mossambicus*) (Peters) have been examined grossly, and by light, electron and scanning microscopes. The respiratory organs in *Clarias* comprise a gill system and accessory organs which include the labyrinthine organ and the suprabranchial chamber membrane. The similarity in the morphology of the marginal channels and the transverse capillaries (the terminal respiratory components) in the three respiratory organs suggested a strong developmental relationship between the gills and the accessory respiratory organs. Morphometric analysis of the respiratory organs revealed that the mean weight specific surface area of the gills (17.30 mm²/g) exceeded that of the labyrinthine organs (4.65 mm²/g) and the suprabranchial chamber membrane (7.79 mm²/g). However, due to the relatively thick water-blood barrier, the mean harmonic mean thickness of the gills being 1.97 μm compared with a mean value of 0.30 μm in the accessory respiratory organs, the gills contribute only 15% of the total morphometric diffusing capacity of the respiratory organs, the labyrinthine organs contribute 50% and the suprabranchial chamber membrane 35%. The accessory respiratory organs thus contribute 85% of the overall diffusing capacity. This may explain why *C. mossambicus* is an obligate air-breather, for the gills may not provide enough oxygen even in well-aerated water.