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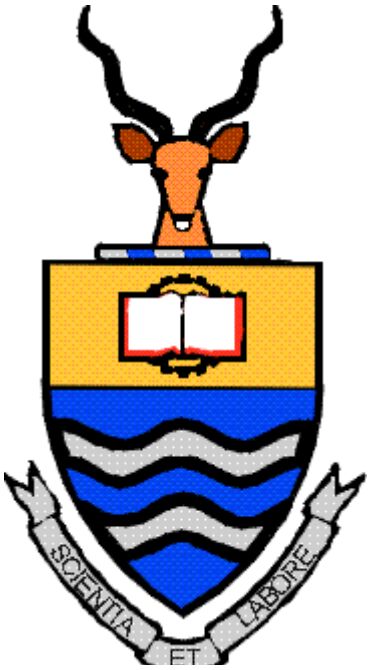
ANATOMY OF THE BRAIN OF THE AFRICAN WILD DOG (*LYCAON PICTUS*)



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ABSTRACT

The African wild dog is an interesting species for the study of potential specializations of the brain owing to an array of seemingly species-specific features, such as complex sociality, conspecific reproductive suppression, allo-parenting, variegated individual specific pelage, and the widest vocal repertoire of all canid species. Thus, this species inhabits a complex social setting within a complex environment – leading to the obvious question of how do their brains manage to cope with or permit this complexity? The aim of this study therefore, was to initiate a detailed description of the brain of the African wild dog, first by providing an overview of their brain and contextualizing this in their phylogenetic setting, followed by detailed analyses of the olfactory, auditory and visual sensory systems to determine whether the complexity experienced by the African wild dog in their natural habitat is achieved through sensory specialization, or whether we need to look further at the cognitive and affective regions of the brain to understand this unique African mammal. In order to achieve this, we took a qualitative and a quantitative approach, employing magnetic resonance imaging, stereological analyses, and a range of basic and immunohistochemical staining techniques to reveal the precise anatomy of portions of the brain of the African wild dog. In brief, we observed that the brain of the African wild dog is large for its body size, but that this does not appear to be an adaptive enlargement, rather it is the result of an evolutionary reduction in body mass. The overall structure of the brain, and the specific sensory systems examined appear to be very similar to that observed in other carnivores, especially the closely related canids. Notably, the African wild dog appears to be able to detect up to 1700 different odorants, and has a semiochemical detection system that hints at complex processing of pheromonal signals. Despite these potential olfactory specializations, no specific specializations of the other sensory systems were noted, when compared in a phylogenetically relevant context. This leads to the conclusion that the complex behavioural

repertoire of the African wild dog is the result of higher-order cognitive or affective neuronal processes, and it is in the analysis of these higher-order regions that will allow us to develop a stronger understanding of the behaviour of this species.