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The inner ear lateral semicircular canal and head posture in ungulate mammals

Content

The orientation of the lateral semicircular canal of the bony labyrinth is habitually used to infer head posture of modern and extinct animals (mammals, birds, archosaurs and early “reptiles”). By placing the plane of the lateral semicircular canal parallel to the horizontal, the ‘spontaneous’, neutral position of the head would be revealed. It is believed to be influenced by ecology, diet and behaviour (e.g. browsers would hold their head higher than grazers). Though widespread in the literature, this assumption has not been tested on a large sample of mammals, whereas it has been challenged in archosaurs and humans. Using direct field observations of living animals and CT scanning on almost 200 dry skulls representing some 130 ungulate species, the aim of this project is to investigate the orientation of the plane of the lateral semicircular canal and its reliability for the reconstruction of neutral head posture in modern ungulates. Preliminary results indicate that the orientation of the lateral semicircular canal and that of the head are weakly, yet significantly correlated. The lateral canal would be tilted anteriorly 15° in average when the head is held in its “neutral” position. Factors other than head posture may also account for the orientation of the lateral semicircular canal, such as head-butting, body mass and phylogeny.

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