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The endocranium of the theropod dinosaur *Ceratosaurus* studied with computed tomography

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A well preserved specimen of the theropod *Ceratosaurus* from the Upper Jurassic Morrison Formation of western Colorado was recently described and given the name *C. magnicornis*. The systematics of the genus is outside the scope of the present study but, as a generally accepted basal tetanuran, the braincase was CT scanned to provide a description of the endocranium, inner ear, pneumatic, and venous sinus systems in a primitive member of this clade. Five major subregions of the theropod endocranium are distinguished for the purpose of simplifying cranial computed tomographic interpretation and to provide a systematic means of comparison to other endocrania. The skull morphology of *Ceratosaurus* influences the overall braincase morphology and the number and distribution of the major foramina. The low pontine angle and relatively unflexed braincase is considered a more primitive character. The orientation of the horizontal semicircular canal confirms a rather horizontal and unerect posture of the head and neck. As in birds, the narrower skull morphology of *Ceratosaurus* is associated with fewer cranial nerve foramina. Additionally, the maxillary dominated dentigerous upper jaw of *Ceratosaurus* is felt to share with the alligator a large rostrally directed maxillary division of the trigeminal nerve and a small ophthalmic branch. The upper bill of birds, being dominated by the premaxillary and lacking teeth, is innervated predominantly by the ophthalmic division of the trigeminal nerve. For this reason, avian-based cranial nerve reconstructions are felt to be inappropriate for basal theropods. *Ceratosaurus* skull pneumatization and possible evidence of olfactory conchal structures is on the other hand very avian in character. Based on computed tomography, *Ceratosaurus* is determined to have possessed a typical basal theropod endocranium and bipedal vestibular system similar to *Allosaurus*.

Key words: Theropoda, Ceratosaurus, endocranium, paleoneurology, cranial pneumatic systems, computed tomogra– phy, virtual rendering.

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