

= Sinoceratops =

Sinoceratops / ˈsɪnoʊˈsɛrətɒps / is an extinct genus of ceratopsian dinosaur that lived approximately 72 to 66 million years ago during the latter part of the Cretaceous Period in what is now Shandong province in China . It was named in 2010 by Xu Xing et al. for three skulls from Zhucheng , China . The name of its type species *Sinoceratops zhuchengensis* means " Chinese horned face from Zhucheng " , after the location of its discovery .

Sinoceratops was a medium @-@ sized , averagely @-@ built , ground @-@ dwelling , quadrupedal herbivore . It could grow up to an estimated 6 m (19 @.@ 7 ft) length and 2 metres (6 @.@ 6 ft) height , and weigh up to 2 tonnes (2 @.@ 0 long tons ; 2 @.@ 2 short tons) . It was the first ceratopsid dinosaur discovered in China , and the only ceratopsid known from Asia . All other centrosaurines , and all chasmosaurines , are known from fossils discovered in North America , except for possibly *Turanoceratops* . *Sinoceratops* is also significant because it is one of the largest known centrosaurines , and is much larger than any other known basal members of this group .

Sinoceratops was discovered in the Xingezhuang Formation , which was deposited during the late Cretaceous . It lived alongside leptoceratopsids , saurolophines , and tyrannosaurines . The most common creature in the formation was *Shantungosaurus* , to which most of the material has been assigned . The animals living alongside *Sinoceratops* and *Shantungosaurus* were *Zhuchengceratops* , *Huaxiaosaurus* , and *Zhuchengtyrannus* .

= = Etymology = =

The genus name *Sinoceratops* means " Chinese horned face " , and is derived from the word Sino-referring to China from Latin Sina , the country of its discovery , and the Greek words keras (?????) meaning " horn " , and ops (??) meaning " face " . *Sinoceratops* was described and named by paleontologist Xu Xing and colleagues , in 2010 . The type species is *Sinoceratops zhuchengensis* . The specific name refers to the location of its discovery , the city of Zhucheng which also financed the excavations .

= = Description = =

Sinoceratops was a larger ceratopsian ornithischian , with an estimated length of about 6 metres (19 @.@ 7 ft) , weight of 2 tonnes (2 @.@ 0 long tons ; 2 @.@ 2 short tons) , and height of about 2 metres (6 @.@ 6 ft) . Thomas R. Holtz Jr. estimated its length at 7 metres (23 ft) and weight at 2 @.@ 3 tonnes (2 @.@ 3 long tons ; 2 @.@ 5 short tons) , the weight of a rhinoceros . It has a short , hooked horn on its nose (called a nasal horn) , no horns above its eyes (brow horns) , and a short neck frill with a series of forward @-@ curving hornlets that gave the frill a crown @-@ like appearance . Inside this row of hornlets there is a series of low knobs on the top of the frill , which are not seen in any other horned dinosaur . *Sinoceratops* is a member of the short @-@ frilled ceratopsids , the Centrosaurinae . Holotype specimen ZCDM V0010 consists of a partial skull with most elements of the skull roof and partial braincase . The skull of *Sinoceratops* is estimated to be 180 cm (5 @.@ 9 ft) long making it one of the largest known centrosaurine skulls .

= = = Distinguishing anatomical features = = =

Features that differentiate an animal from most or all others are called a diagnosis . Some , but not all , of the features in a diagnosis are also autapomorphies . An autapomorphy is a distinctive anatomical feature that is unique to a given organism .

According to Xu (2010) , *Sinoceratops* can be distinguished based on the following diagnostic characteristics : there are at least ten robust , strongly curved hornlike processes along the rear margin of the combined parietals , while at the same time at least four hornlike processes on the combined squamosals are present ; there is a large accessory fenestra in front of the antorbital fenestra (differing from all other known centrosaurines) ; the external margin of the parietals is only

weakly undulating (differing from all other known centrosaurines) ; and the presence of broad @-@ based epoccipitals (differing from all other known centrosaurines) .

= = Discovery = =

The holotype specimen ZCDM V0010 , consisting of a partial skull , including a braincase , was in the summer of 2008 recovered at the Xingezhuang Formation of the Wangshi Group in Shandong , China . The specimen was collected in fluvial sediments that were deposited during the Campanian @-@ Maastrichtian stages of the Cretaceous period , approximately 72 ? 66 million years ago . Two other specimens have been recovered from the same formation . Specimen ZCDM V0011 is a partial skull that consists of the skull roof and most of the braincase , and ZCDM V0012 represents a partial braincase .

The discovery was significant , because it represented the first ceratopsid known from China , and possibly the only ceratopsid from Asia . The only other possible Asian ceratopsid is *Turanoceratops* , but recently , its identification as a ceratopsid has been questioned .

= = Classification = =

Sinoceratops was assigned to the taxon Centrosaurinae , as a basal member by Xu et al . (2010) based on characteristics present in the skull . *Sinoceratops* bears several characteristics that resemble features in chasmosaurines , blurring the distinction between the Centrosaurinae and Chasmosaurinae . According to Xu e.a. the basal position of *Sinoceratops* indicates that ceratopids originated in Asia . *Sinoceratops* however , shares a number of features with advanced centrosaurines such as *Centrosaurus* and *Styracosaurus* that are not seen in primitive centrosaurines like *Diabloceratops* , including a well @-@ developed nose horn and reduced brow horns . The implication might be that this genus represents a lineage that invaded Asia from North America through Beringia .

The cladogram below follows the phylogenetic analysis performed by Sampson et al . (2013) , and the clade names within Centrosaurinae follow Fiorillo & Tykoski (2012) .

= = Paleoecology = =

Sinoceratops is known from the Xingezhuang Formation of southern China . It is known from skull material . Alongside it , in the formation , lived *Shantungosaurus* , a very common hadrosaurid to which most of the material has been assigned , *Zhuchengtyrannus* , an Asian tyrannosaurid related to *Tarbosaurus* , *Zhuchengceratops* , an Asian leptoceratopsid , and *Huaxiaosaurus* , a possible older individual of *Shantungosaurus* . Other possible remains have been assigned to *Zhuchengosaurus* , a probable junior synonym of *Shantungosaurus* , and material tentatively assigned to *Tyrannosaurus* .