A new *Cricosaurus* (Crocodilomorpha: Thalattosuchia) from the early Cretaceous (Valanginian) of Zapatoca, Colombia and its larger size compared to other thalattosuchians.

Daniel Felipe Macias Pardo

Director
Edwin Alberto Cadena Rueda

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Escuela de Ciencias e Ingeniería, Grupo de Paleontología Neotropical Tradicional y Molecular (PaleoNeo), Universidad del Rosario, Bogotá, Colombia
Corresponding Author:
Daniel Macias
Carrera 56a # 148-36, Bogotá, Cundinamarca, 111156, Colombia
Email address: dmacias1997@hotmail.com

Abstract
Thalattosuchia is a crocodylomorpha clade from the Mesozoic that was distributed worldwide. All these species were separated into two main groups: Metriorhynchidae and Teleosauridae, which have specimen with different sizes, some of the greatest: *Dakosaurus maximus* related to the Metriorhynchidae clade and *Machimosaurus rex* with Teleosauridae. Here we describe a new *Cricosaurus* specimen found in Zapatoca, Colombia. The specimen was taken to the Universidad del Rosario laboratories; as soon as it got there, it was added to a matrix. This one was used on the TNT program to get a phylogenetic tree. Finally, a linear regression equation was used to determine the body size using the skull length. A Phylogenetic analysis suggests that this specimen is part of the *Cricosaurus* clade and probably a new species. Also, the linear regression sees that this specimen is one of the greatest Thalattosuchia found until now.

Introduction

Thalattosuchians were a group of Mesozoic crocodylomorpha that lived between the Early Jurassic to the Early Cretaceous (Cowgill et al., 2022; Groh et al., 2022; Pierce et al., 2017; Wilberg et al., 2023, Young et al., 2024). The Thalattosuchian clade was distributed worldwide and has been found in China, Europe, Africa and America (Wilberg et al., 2023; Young et al., 2024, references therein).
This group appears abruptly in the fossil record, undergoing significant diversification (Aiglstorfer et al., 2020; Johnson et al., 2022). The abrupt appearance of this group has also

raised many questions about its origin and its phylogenetic relationships inside the large Crocodylomorpha clade. The most accepted explanation currently is that this group has a "ghost range" (Groh et al., 2022) - a gap in the fossil record during which no fossils of the group are found. Nevertheless, it is believed to have existed during that period. In the case of thalattosuchians, it is at the beginning of their fossil record. This may explain the sudden appearance of the clade in the fossil record and suggests that this group likely appeared earlier on Earth than the fossils found so far indicate, with the possibility of discovering more specimens from an earlier time; for instance, teleosauroids were discovered in Morocco which suggest an early appearance of this group than previously thought. (Young et al., 2024). Thalattosuchians are separated in two main clades: Teleosauridea and Metriorhynchoidea (Young et al., 2024). The teleosaurids were previously related as a marine analogue of gavialids but are now known to be far more diverse than previously supposed (Young et al., 2024). Teleosaurids exhibited characteristics that indicate a semi-aquatic lifestyle, including a strong tail for fast swimming, short limbs, and a hydrodynamic body (Groh et al., 2022; Johnson et al., 2015, 2020; Wilberg et al., 2023). Nevertheless, these characteristics are not exclusively restricted for life in the ocean but also fresh water, and it has been hypothesized as useful to move on land (Aiglstorfer et al., 2020; Young et al., 2024). On the other hand, the metriorhynchoids were pelagic forms, with adaptations for a fully marine life (Aiglstorfer et al., 2020; Cowgill et al., 2022, 2023; Wilberg et al., 2019, 2023; Young et al., 2024). Examples of these adaptations include paddle-like forelimbs, a hypocercal tail fin for propulsion (where the posterior side of the caudal vertebrae forms part of the caudal fin on the ventral side), and enlarged nasal salt glands that help these specimens excrete excess of salt from seawater (Aiglstorfer et al., 2020; Cowgill et al., 2022, 2023). Currently, metriorhynchoids have received more attention, but there is still much to learn about them, leading to numerous unsolved questions about them. One of the most important questions concerns the phylogenetic position of the group within the Crocodylomorpha clade. Presently, there are three possible hypotheses for the position of Thalattosuchian among Crocodylomorpha: 1) sister clade of crocodyliforms, 2) early diverging mesoeucrocodylians, and 3) sister clade of Tethysuchia (Wilberg et al., 2023). These problematic hypotheses are still under debate to clarify various aspects of this clade and other related questions due to the high number of autapomorphies exhibited by members of the Thalattosuchian. Many species within this group have unique features that distinguish them from other members of the clade and from other related species. These autapomorphies make it difficult to organize these species within the crocodylomorph phylogeny and sometimes even make it challenging to identify whether they belong to Teleosauridea or Metriorhincoidea, even with a phylogenetic analysis using an expanded dataset it is not possible to identify the position of the clade in the Crocodylomorpha group (Aiglstorfer et al., 2020; Johnson et al., 2022; Young et al., 2024).

The fossil record of talattosuchians in the Americas has not been thoroughly investigated and usually corresponds to fragmentary material. There are records in Mexico, Argentina, Chile, and Colombia (Aiglstorfer et al., 2020; Barrientos-Lara et al., 2016; Cortés et al., 2020; Wilberg et al., 2023). Some of the species found in these countries include *Cricosaurus araucanensis* (Herrera, Fernández, et al., 2013), *Dakosaurus andiniensis* (Fernández & Herrera, 2022), and *Torvoneustes mexicanus* (Barrientos-Lara et al., 2016). The only known record so far of thalattosuchians from northern South America corresponds to fragmentary remains of a teleosaurid, from the Lower Cretaceous (Barremian) of Colombia (Cortés et al., 2020).

The body size changes along the evolution of thalattosuchians is still insufficiently studied and understood. When comparing different specimens from this group, a wide variety of sizes can be observed. To illustrate, members of *Geosaurus* and *Dakosaurus* are estimated to have a length of around four meters (De Andrade et al., 2010). Another genus that demonstrates the wide range of sizes within Thalattosuchia is *Machimosaurus*. Species like *M. mosae* and *M. rex*, ranged from 6 to 8 meters, while fossils such as *M. hugii* reached up to 9 meters in length (De Andrade et al., 2010; Johnson et al., 2015, 2022). Another giant specimen is the fragmentary teleosauroid from Colombia, with an estimated body size of 9.6 meters (Cortés et al., 2020). Investigating the body size changes over time in thalattosuchians can have implications for better understanding their evolution, their paleobiology constraints and adaptations, and reconstruct food change interactions.

Recently, a nearly complete skull belonging to a thalatosuchian was discovered in rocks of the Carrizal Member, Rosa Blanca Formation, near the town of Zapatoca, Colombia by Dr. E.-A Cadena. This fossil has the potential to provide valuable insights into the diversity of Valanginian talattosuchians, possible different paleobiological adaptations, and contribute to a better understanding of the development of the Thalattosuchia clade during the Cretaceous period. Thus, the study of this new fossil will help us to better comprehend the paleoecology of northern South American marine ecosystems during the Valanginian.

Materials & Methods

The fossil skull (UR-CP-0235) was already prepared in the centro de investigaciones paleontologicas in Villa de Leyva by Fredy Parra and Juan de Dios Parra and is part of the paleontological collections at the Universidad del Rosario in Bogotá, Colombia. Most of its posterior region, mid-anterior part of the snout including both maxillae, part of both rami of the mandible, and some postcranial bones were discovered and collected.

A complete description of the specimen was done, and detailed measurements of the skull were taken to fully document its characteristics and anatomy. This will be complemented by taking photographs that were use during the analysis of the fossil and added in the thesis text.

Once these data were collected, the specimen was compared with holotypes and complete specimens of thalattosuchians housed in museums and collections in Europe and the USA to establish its taxonomic and systematic paleontology placement. Subsequently, a phylogenetic analysis was performed using and modifying the character-taxon matrix of Young et al (2024) included 254 specimens (a combination of extinct and current taxa) and 885 characters. In the TNT program where we made a traditional search to get the most parsimonious tree from a sampling of 100,000 and then made a bootstrap test in standard method combine with a Bremer support test to get the final tree.

A total length analyses, we escalate the fragments that we have been using to model the skull of one of the *Cricosaurus* closely related to URCP-0235, *Cricosaurus araucanensis.* Once the reconstruction was complete, the program imageJ was used to determine the possible skull length. This estimate was then applied to a linear regression formula made by Herrera et al 2015 to determine the body length, this equation was created specifically to determine the total body length using only the skull length. A manuscript will be prepared using AI (deepseek) to correct grammar and style refinement to ensure suitability for submission to an international journal, such as the Journal of Vertebrate Paleontology, incorporating all the information gathered.

Finally, with the guidance of my tutor, I will present and share the results of this project with the community of Zapatoca and the wider public through a press release and various outreach activities.

Results

Systematic Paleontology

Crocodylomorpha Walker 1970
Thalattosuchia Fraas 1902 (*sensu* Young & Andrade 2009)
Metriorhynchidae Fitzinger 1843 (*sensu* Young & Andrade 2009)
Cricosaurus Wagner 1858
(Figs 1-7)

Diagnosis

UR-CP-0235 corresponds to the genus *Cricosaurus* by prefrontal-lacrimal crest, anterior to orbit, bifurcation of the parietal immediately posterior to the intertemporal bar. It differs from other *Cricosaurus* and other metriorhynchid by the following unique combination of characters presence of a palatal surface ornamentation with a distinct grooved pattern; presence of small pits/ridge(ornamentation)in palatal surface; narial opening with a heart-shape; narial fossa noticeable posterodorsal retracted, almost level to the anterior margin of the maxilla; presence of a constriction at the premaxillae-maxillae suture; premaxillae-maxillae suture complex, with an anteriorly directed process from maxilla fitting the premaxilla; nasal posterior process extremely anteroposteriorly elongated; lacrimal can be observed in both dorsal and lateral view; nasals form part of the external antorbital fenestra; antorbital cavity close to the orbit, with lacrimal narrow between orbit and antorbital cavity; prefrontal anterior to the orbit elongated, oriented parallel to antero-posterior axis of the skull; anteromedial process of the frontal is noticeably posterior to the prefrontals; anteromedial process is mediolaterally broad; frontal anterolateral projections between nasals and prefrontals; premaxillae naso-oral fossa diamond-shaped; suborbital fenestra anterior border rounded, smooth; basioccipital tuberosities V-shaped or tear-drop shaped; mandibular glenoid fossa oriented dorsally; absence of a longitudinal anteroposteriorly oriented crest on the retroarticular process; retroarticular process narrower than the glenoid fossa; maxillary tooth row does not reach the anterior-most border of the suborbital fenestra; dentary symphyseal alveolus 2 in line with alveoli 3-4, as close as these to the medial line; presence of a postacetabular process; distinct ilium and ischium peduncles separated by an acetabular incision or depression.

Description

A

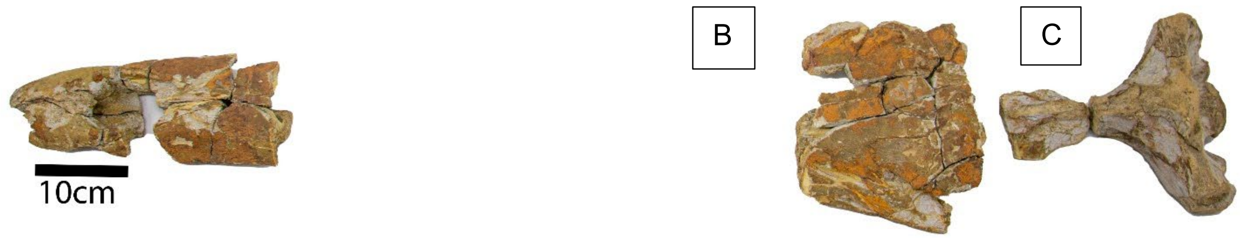

Figure 1. Dorsal picture of the skull with the three main structures, (A) anterior region, (B) middle region and (C) posterior region, in a

General morphology. The fossil UR_CP-0235 corresponds to a skull divided into three main sections: anterior, middle, and posterior. The anterior portion includes the premaxilla, which articulates with the maxilla along a suture positioned at the third alveolus. The external naris (nostril) is located medially between the premaxilla and maxilla, positioned far from the anterior margin of this section. In ventral view, the premaxilla-maxilla suture is more clearly visible. Dental alveoli are present but having only the three most posterior teeth of the dentary in a bat condition. The right side of the skull retains alveoli 1–8, while the left side preserves six alveoli (2–4 and 7–9).

The middle portion exhibits multiple articulated bones. In dorsal view, the nasal, prefrontal, frontal, maxilla, and jugal are identifiable. The nasal bone is bifurcated, forming a U-shaped posterior margin. The frontal bone extends an anterior process between the nasal bones.

The orbits are laterally positioned, with their anterior borders formed by the prefrontal (dorsally), lacrimal (anteriorly), and jugal (ventrally). In ventral view, the left side is largely absent, preserving only dorsal elements. The maxilla, jugal, and palatine are discernible, though most internal cavities collapse or are damaged.

The posterior portion is the best-preserved section. Dorsal elements are heavily eroded, with only partial remnants of the parietal and squamosal identifiable. In posterior view, the foramen magnum is visible superior to the occipital condyle, accompanied by the foramina for cranial nerves IX–XI. In lateral view, the prootic and laterosphenoid are well-preserved. Ventrally, a basioccipital process is present, and the quadrate bone is clearly identifiable.

Skull Openings

Narial opening. The nasal opening is largely complete, but it lacks the left mid-border (Figs 1, 4). On the dorsal surface, it exhibits a heart-shaped outline. The nasal fossa contacts the premaxilla and maxilla ventrally (visible in dorsal view).

The external nares are anterodorsally oriented and heart-shaped, positioned posterior to the first premaxillary alveolus. In anterior view, the narial aperture appears subcircular to B-shaped. A pronounced posterodorsal retraction is present, with the posterior margin extending between the third and fifth maxillary alveoli. The internarial bar is formed exclusively by the premaxilla.

Orbits. The orbit is partially preserved, with only the anterior half remaining (Fig 5). In lateral view, it exhibits an oval morphology. The anterior orbital margin articulates with the lacrimal, jugal, and prefrontal bones, as visible in this perspective. The orbit is positioned entirely laterally, with its complete morphology discernible only in lateral view. The ventral orbital margin exhibits either a concave or sub-linear profile. The prefrontal constitutes most of the anterior orbital margin, while the lacrimal is excluded from both the anterodorsal and anteroventral margins. Notably, the anterior process of the jugal does not contribute to the anterior orbital margin, although the jugal does participate in forming the ventral margin.

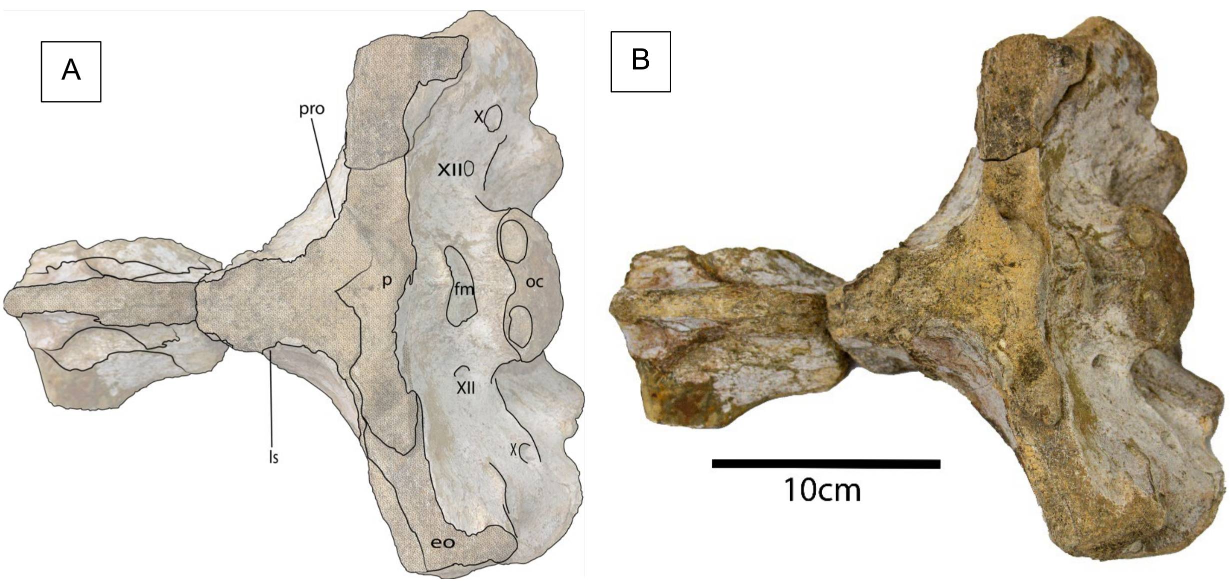

Figure 2. (A) dorsal drawing of the posterior region and (B) dorsal picture of the posterior region. *Abbreviations*: p, parietal; fm, foramen magnum; IX-XII, nerves cavities IX-XII; oc, occipitan condyle; eo, exoccipital; pro, prootic; ls, laterosphenoid.

Supratemporal fenestra. The supratemporal fenestra is partially preserved, with only the posteromedial region remaining intact (Fig 2). In dorsal view, the fenestra exhibits a circular morphology and articulates with the parietal, quadrate, and exoccipital bones. The preserved portion indicates that the fenestra was approximately twice the size of the orbit.

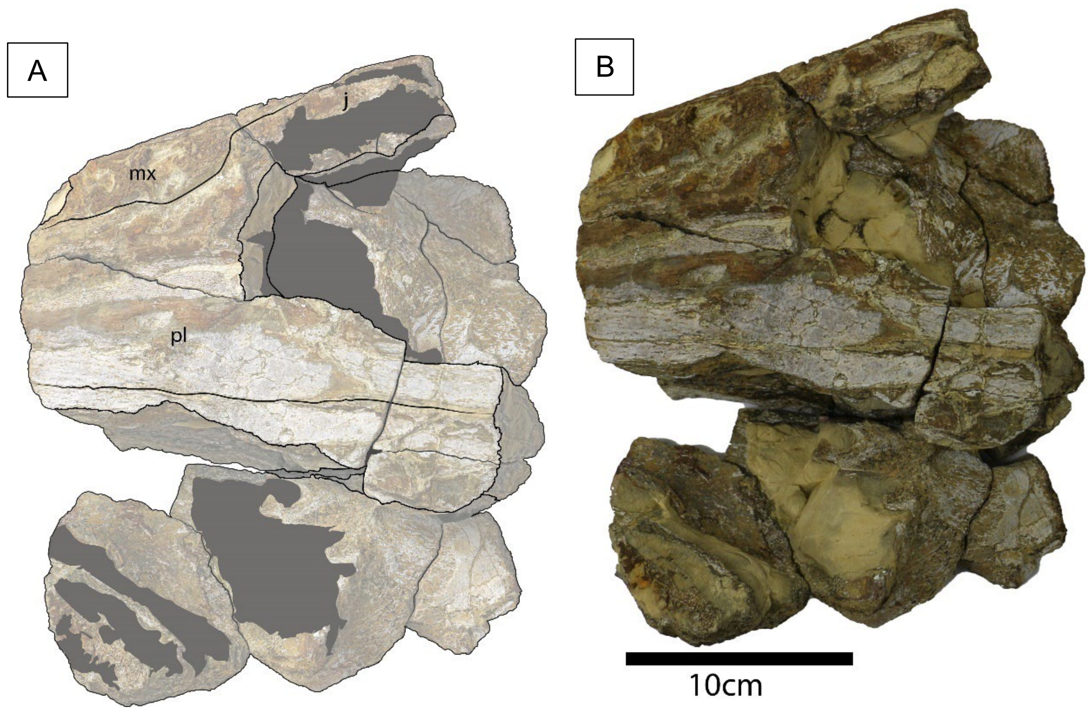

Figure 3. (A) ventral drawing of the middle of the skull and (B) ventral picture of the middle of the skull. *Abbreviations*: mx, maxilla; j, jugal; pl, palatine.

Palatine (suborbital) fenestra. The suborbital fenestra is partially preserved, retaining only the anterior and medial borders of the left fenestra; the right fenestra was not preserved (Fig 3). In ventral view, the fenestra exhibits a semi-rectangular anterior border that expands medially to form a wider central region. It articulates with both the jugal and maxilla along its anterior and medial margins, while contacting the palatal bones along the opposing medial margin. With dimensions exceeding those of the orbit, the suborbital fenestra exhibits rounded contours and smooth marginal morphology.

Skull bones

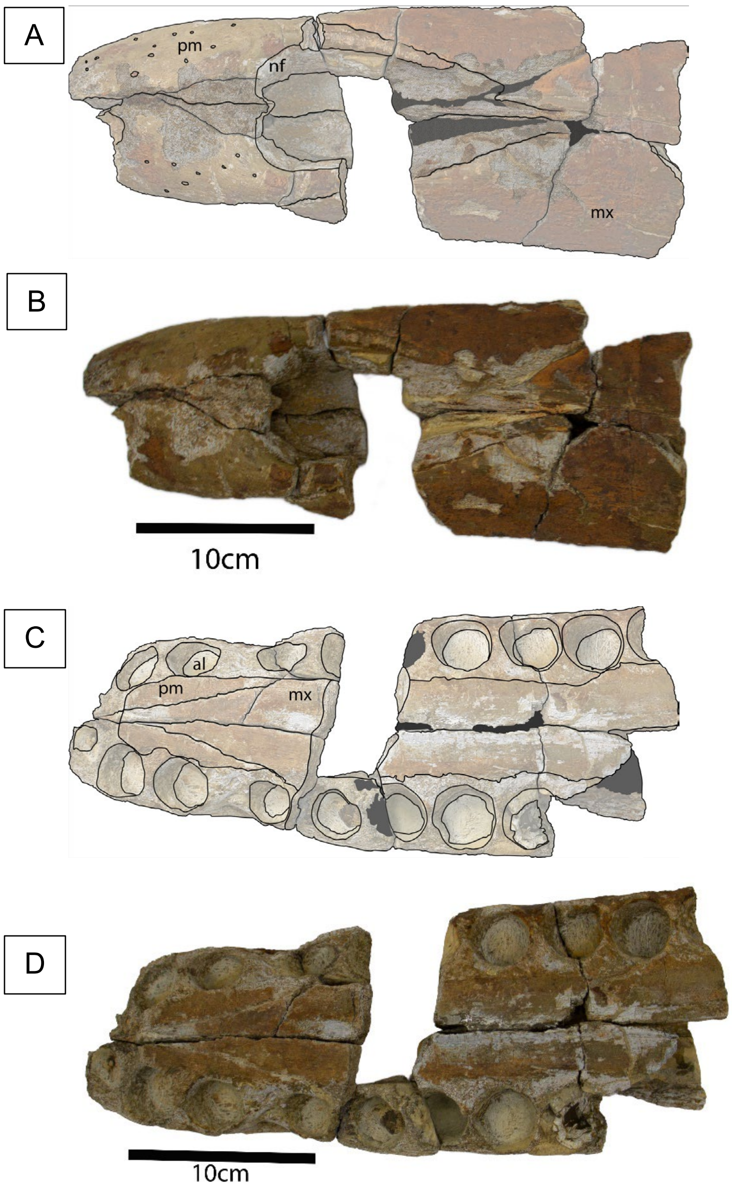

Figure 4. (A, C) dorsal and ventral drawing of the anterior area of the skull, (B, D) dorsal and ventral picture of the anterior area of the skull. *Abbreviations:* pm, premaxilla; nf, nasal fossa; mx, maxilla; fn, nasal fossa; al, alveolus.

Premaxillae. The premaxilla is nearly complete, lacking only the left anterior section (Figs 1, 4). In dorsal view, it exhibits a teardrop-shaped morphology that transitions to a V-shaped configuration in ventral view. In dorsal view, the premaxilla articulates with both the narial opening dorsally and the maxilla posteriorly. The bone displays several distinctive features: an anterodorsally projecting margin anterior to the external nares; an elongate form measuring three times longer than wide; and non-subvertical anterolateral margins that lack ventral extension. A pronounced notch separates the premaxillary and maxillary alveolar margins, with the premaxilla terminating anterior to the posterior border of the external nares. Vertical premaxillary processes form robust sutures with the maxilla, while the posterodorsal process extends to both the posterior margin of the external naris and a point posterior to the fourth maxillary alveolus. The premaxilla-maxilla suture exhibits a V-shaped morphology, and the overall rounded-to-triangular profile of the premaxilla integrates smoothly with the rostral contours.

Maxillae. The maxilla is largely incomplete, preserving only the anterior border and left posterior section (Figs 1, 3, 4). In dorsal view, the anterior portion displays a V-shaped morphology, whereas in lateral view the posterior region appears as a large semi-oval form in the posterior region. Dorsal observations demonstrate the maxilla's anterior contact with both the premaxilla and narial opening, and posterior articulation with the jugal. The maxilla is excluded from the orbital margin by lacrimal-jugal contact. Additional features include a straight ventral maxillary margin and a position anterior to the postorbital bar.

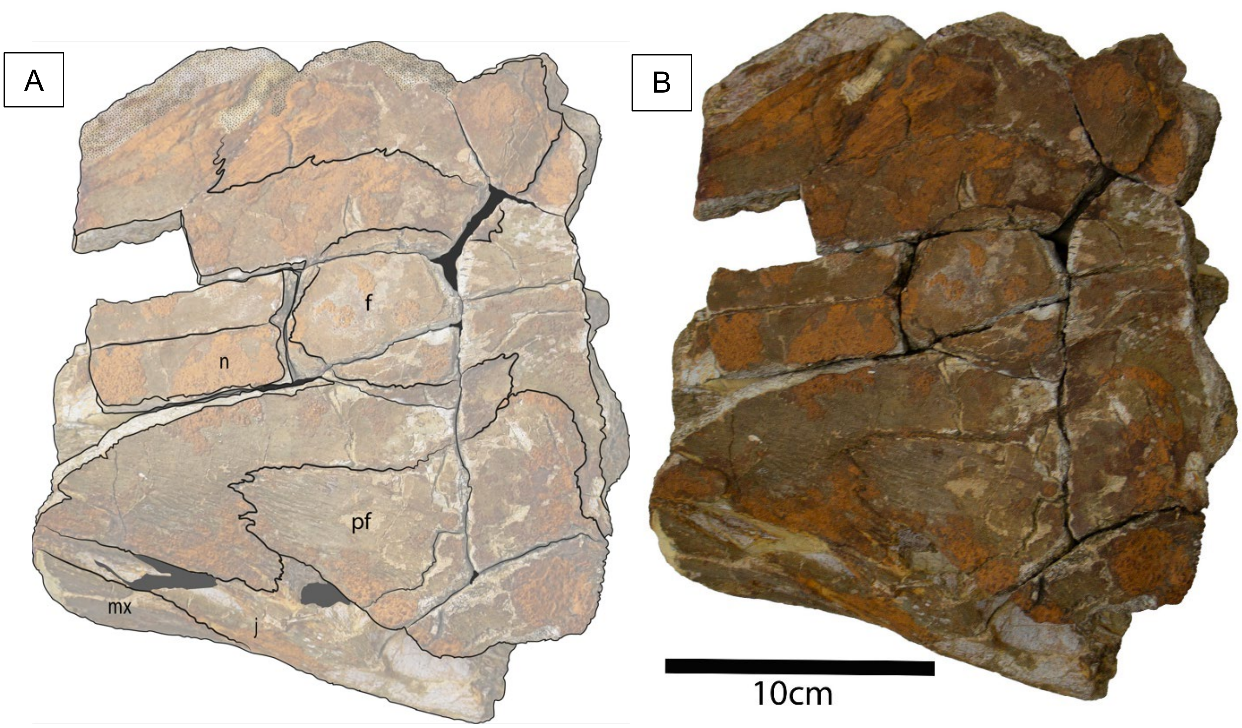

Figure 5. (A) dorsal drawing of the middle of the skull and (B) dorsal picture of the middle of the skull. n, nasal; f, frontal; pf, prefrontal; j, jugal; mx, maxilla.

Nasals. The nasal bone is nearly complete, lacking only the most anterior section and part of the right side (Figs 1, 5). In dorsal view, it exhibits a U-shaped morphology in its posterior region. The nasal articulates laterally with the maxilla and jugal, while contacting the prefrontal and frontal bones posteriorly. Notably, the nasal does not contribute to the external nares margin, with its anterior border positioned posterior to the third maxillary alveolus. The bone displays several distinctive features: a dome-like overall structure; a well-developed lateroposterior process; and an extremely elongated anteroposterior posterior process. The unfused nasal bone displays a deeply trenched dorsal surface at its posterior end, where it forms a distinct nasal-prefrontal contact.

Prefrontals. The prefrontal is largely complete, with the left element exceptionally well-preserved, while approximately half of the right prefrontal is missing (Figs 1, 5). In dorsal view, the bone exhibits a teardrop-shaped morphology. The prefrontal articulates with the nasal along its anterolateral border and contacts the frontal posteriorly, as visible in dorsal view. This element extends laterally beyond the orbital margin by more than 15% of its width. Key morphological features include a continuously convex lateral border; an elongated form (length exceeding width); anterior elongation parallel to the skull's anteroposterior axis; and a distinct ventromedial process.

Lacrimals. The lacrimal is completely preserved on the left side of the skull, though partially obscured by matrix, while being entirely absent on the right side (Figs 1, 5). In lateral view, the element exhibits a rectangular morphology. The lacrimal articulates with three bones: the jugal ventrally, the nasal anteriorly, and the prefrontal dorsally. The nasal specifically contacts the anterior margin of the lacrimal, with the nasal-lacrimal suture being notably shorter than the nasal-prefrontal suture. The lacrimal is exclusively visible in lateral view, where it lies flush with the orbital rim. Its dorsoventral dimension measures less than 40% of the orbital height.

Jugals. The jugal is partially preserved, consisting only of the anterior portion (Figs 1, 3, 5). This element exhibits a cylindrical morphology with an anterior process that terminates in a spine-like projection. In lateral view, the jugal articulates with both the nasal and maxilla via its anterior process, while contacting the lacrimal along its lateral margin. The bone displays several distinctive features: a rod-like ramus; moderate participation in rostral formation, extending clearly beyond the anterior orbital border; anterior elongation surpassing the prefrontal;

involvement in rostral composition; and ventral continuity between the jugal and maxillary borders.

Frontal. The frontal is partially preserved, retaining only the anterior region (Figs 1, 5). It displays a semicircular morphology in dorsal view, where it articulates with the nasal along its anterior border and contacts both prefrontals laterally. The completely fused frontal presents a flat profile with lateral margins flush against the skull surface. Notable features include: an elongated process extending anterior to the orbital margin; an anteromedial process positioned posterior to the prefrontals that separates the posterior margins of the paired nasals; mediolateral broadening of the anteromedial process; and distinct anterolateral projections situated between the nasals and prefrontals.

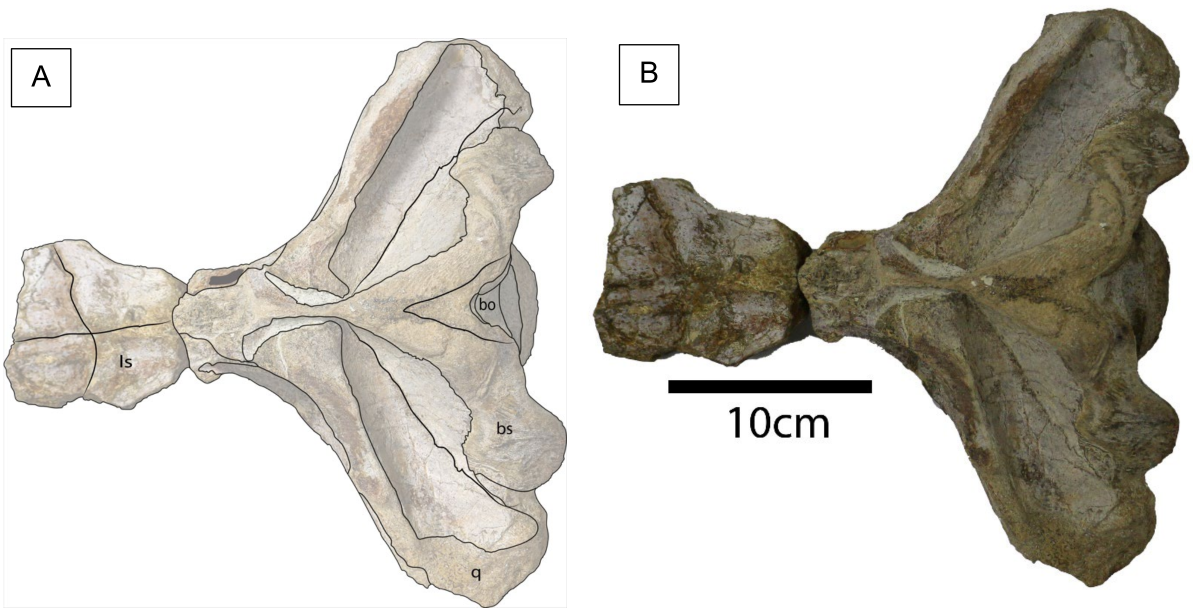

Figure 6. (A) ventral drawing of the ventroposterior skull and (B) ventral picture of the ventroposterior skull. ls, laterosphenoid; bo, bosioccipital; bs, basisphenoid; q, quadrate.

Quadrates. The quadrates are nearly complete, lacking only portions of the dorsal surface (Figs 6, 7). Although the overall morphology remains indistinct, the quadrate maintains three key articulations: with the exoccipital along its posterior margin (visible in dorsal view) with the prootic anteriorly; and with the basioccipital ventrally (observable in ventral view). This element exhibits approximately 45° of posterior inclination and maintains additional contact with the prootic.

Prootic. The prootic is completely preserved bilaterally, exhibiting an oval morphology (Fig 2). In lateral view, it articulates posteriorly with the quadrate and ventrally with the laterosphenoid. Dorsally, the prootic is exposed through the supratemporal fossa, permitting observation of its surface.

Laterosphenoid. The laterosphenoid is nearly complete, missing only its anterior section (Figs 2). While this element lacks a clearly defined morphology, it articulates with the prootic, as observable in lateral view. A pseudotemporalis fossa is present on its dorsal surface.

Supraoccipital. The supraoccipital is nearly complete, missing only a section in the dorsoposterior region (Fig 7). This element exhibits a semi-rectangular morphology and maintains three key articulations: with the parietal along its dorsal margin, with the exoccipital at mid-height, and with the basioccipital ventrally, all visible in posterior view. The supraoccipital persists as a distinct ossification, displaying either a flat posterior wall that is either flat or slightly projecting distally.

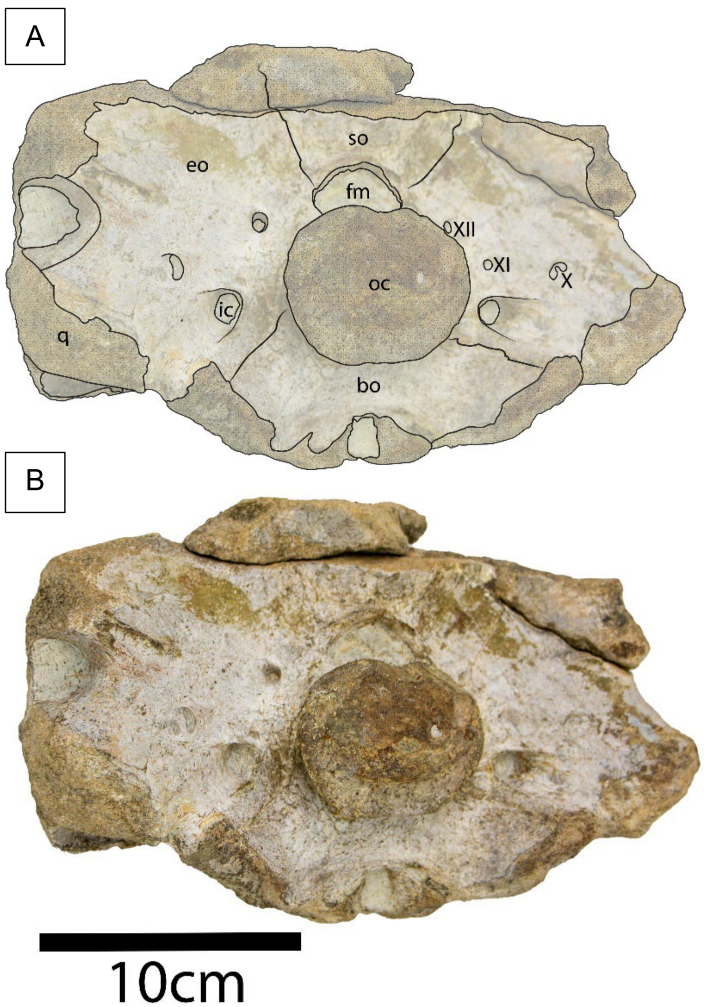

Figure 7. (A) posterior drawing of the posterior skull and (B) posterior picture of the posterior skull. so, supraoccipital; eo, exoccipital; fm, foramen magnum; X-XII, cranial nerve X-XII; oc, occipital condyle; ic, internal carotids; bo, basioccipital.

Exoccipital (Otoccipital). The exoccipital is largely complete, missing only the dorsolateral surface of the right element and a portion of the dorsal section on the left side (Fig 7). This bone exhibits a rectangular morphology visible in posterior view. It articulates with the supraoccipital along its lingual margin; the quadrate both ventrally and anteriorly; and the skull table dorsally. Key features include a metopic foramen transmitting cranial nerve IX; termination dorsal to the basioccipital tubera; formation (with the quadrate) of both the carotid canal and passages for cranial nerves IX-XI; a substantial ventrolateral section positioned ventral to the paroccipital process; and exclusion in the occipital condyle.

Basisphenoids. The basisphenoid is completely preserved in the ventral cranial region (Fig 6). This element exhibits a triangular, shark tooth-shaped morphology. In ventral view, it articulates with three bones: the quadrate anteriorly, the basioccipital posteriorly, and the pterygoid ventrally. The basisphenoid is at least as long as, or exceeds, the basioccipital in length. Its posterior termination aligns approximately with the anterior extent of the quadrate.

Basioccipital. The basioccipital is completely preserved on the anterior and ventral surfaces of the skull (Figs 6, 7). Its posterior region displays a rectangular morphology and bears a triangular ventral process. In posterior view, it articulates with the supraoccipital dorsally, the exoccipital and quadrate at mid-height, and the basisphenoid along its ventral margin. The occipital condyle exhibits a rounded morphology, while the basioccipital bears large, pendulous tuberosities with either a V-shaped or teardrop-shaped configuration. The ventral region of the basioccipital is vertically oriented and prominently visible in occipital view.

Mandibular Bones

Dentary. The dentary is largely incomplete, preserving only a small anterior portion of the right element and a part of the left posterior region. The fragmentary preservation precludes determination of its overall morphology. The dentary contacts the splenial lingually and exhibits small, variably numbered dentary foramina. The interalveolar spaces are nearly uniform in dimensions, with the following specific characteristics: separation between the first and second alveoli (D1 and D2 being subequal in size); misalignment of alveolus 1 with alveoli 3-4; alignment of alveolus 2 with alveoli 3-4, positioned close to the medial line; and a longer alveolar span between D2-D3 compared to D1-D2.

Splenial. The splenial is partially preserved, consisting only of a posterior section. Owing to its fragmentary state, the overall morphology cannot be determined. The preserved portion contacts the dentary labially and does not contribute to the formation of the posterior mandibular alveoli.

Surangular. The surangular is partially preserved, consisting only of its posterior section. In labial view, this element exhibits a flattened, triangular morphology with an expanded profile. The preserved portion articulates with the articular lingually and the angular ventrally. The articular maintains a flush contact surface with the surangular.

Angular. The angular is partially preserved, represented only by its most posterior section. In labial view, the element displays a boomerang-shaped morphology. The preserved portion articulates ventrolingually with the articular and dorsally with the the surangular. The angular displays a distinct curvature, characterized by gradual dorsal convexity, with its posterodorsal extension reaching to the level of the retroarticular process.

Articular. The articular is nearly complete, missing only a small anterior structure portion. In lingual view, this element exhibits a W-shaped morphology when viewed lingually. In anterior view, the articular contacts the angular and surangular labially. The articular-surangular suture displays a simple configuration, and the articular notably lacks a medial process.

Postcranial Bones

Illium. The ilium is nearly complete, missing only a small portion. This element exhibits a triangular morphology characterized by a short, robust anterior process; subequal anterior and posterior processes; and a convex dorsal margin in lateral view. The iliac blade is narrow relative to the main body and features a distinct postacetabular process. The elongated dorsal border contributes significantly to the acetabular margin. Notably, the iliac and ischial peduncles remain separated by the acetabular depression.

Phylogenetic Results

This analysis was developed using one of the most recent matrix of Young (Young et al., 2024), for this experiment it was added URCP-0235 to the matrix which already included 254 specimens a combination of extinct and current taxa and 885 characters that gadder bones and structures of all the body of the crocodylomorph clade. A phylogenetic tree was then generated using the program TNT by making a bootstrap analysis.

After having completed all this process, I obtained the consensus tree shown in Figure 8, it was selected from 100,000 different replicas made in TNT and then selected from the consensus as the tenth tree. The specimen is positioned within the Metriorhynchidea clade, specifically within the *Cricosaurus,* as the sister clade of *Cricosaurus rauhuti, Cricosaurus vignaudi, Cricosaurus lithograficus* and *Cricosaurus araucanensis* (Frey et al., 2002; Herrera et al., 2021; Herrera, Gasparini, et al., 2013; Osi et al., 2018; Young et al., 2010). Some of the characters that place it in the *Cricosaurus* clade were the presence of a prefrontal-lacrimal crest and a bifurcation of the parietal posterior to the intertemporal bar. Based on its placement in the phylogenetic tree and the presence of autapomorphies, for example a narial fossa posterodorsaly retracted or the basioccipital tuberosities been with a tear-drop shaped, is very highly likely that this specimen represents a new species.

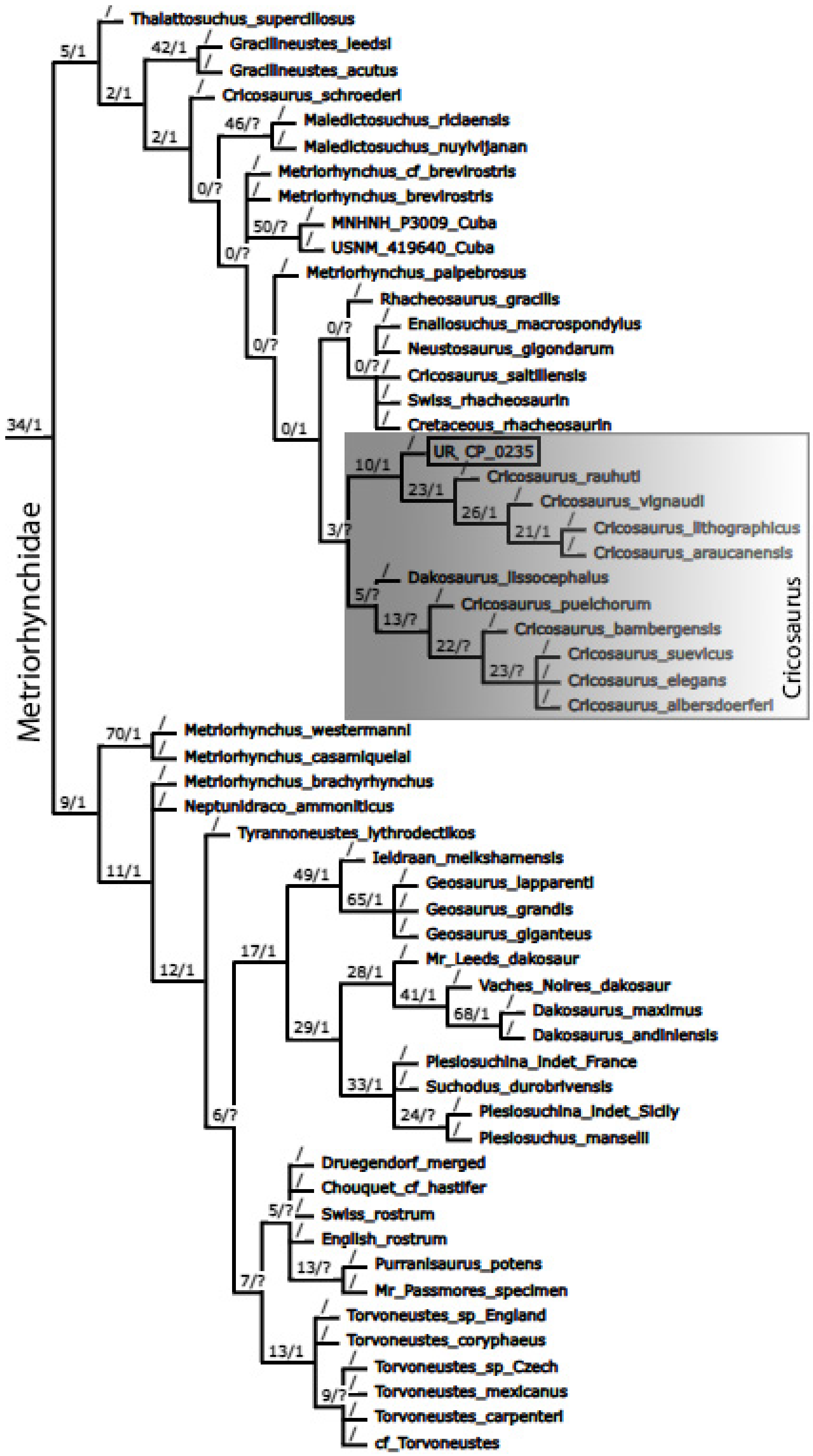

Figure 8. Phylogenetic obtained from the analysis using TNT program by making a bootstrap test with the strict consensus of the tree No 10 and a Bremer support test to verify the solidity of the Metriorhynchidae clade. UR-CP0235 is in the *Cricosaurus* clade.

Total Length

Total Length (m)=Skull Length (cm)×8.2±0.9

The result of the linear regression was 13.37m±0.9, surpassing by far some of the longest known Metriorhynchidae, including *Dakosaurus maximus, Dakosaurus andiniensis, Cricosaurus araucanensis* and *Torvoneustes carpenteri* (Herrera et al., 2015; Wilberg et al., 2019; Young et al., 2011), As is shown in the table 1 bellow. It was also made another comparisons with other specimens related to the teleosauroid clade that has been recognized as some of the biggest talattosuchian now, been *Machimosaurus* hugii (Martin & Vincent, 2013) with 9.5m, *Machimosaurus* rex (Fanti et al., 2016) with 7.5m and the teleosauroid decribed by Cortes et al 2020 with 9.6m, been the specimen of Cortes really important taking in account that it was found in Villa de Leyva. As the result of the comparison, we can notice that UR-CP0235 surpass by far the total length of the three specimens.

Species	Skull lenght, cm	body lenght, m +/- 0.9
Dakosaurus maximus	80	6.5
Cricosaurus araucanensis	60	4.9
Dakosaurus andiniensis	75	6.1
UR-CP0235	163	13.37

Table 1. List of four Metriorhynchidae that shows their skull length, and the body length obtain by using the linear regression of Herrera (2015).

Discussion

Relationships inside Thalattosuchia

UR-CP0235 was determined as a *Cricosaurus* by the analysis made in the phylogeny, it shares key characteristics with this clade like for example: prefrontal-lacrimal crest, anterior to orbit, a character that chares with *Cricosaurus rauhuti*, *Cricosaurus araucanensis* and *Cricosaurus* suevicus or bifurcation of the parietal immediately posterior to the intertemporal bar, a character related with many of the species related to the *Cricosaurius* clade. But also having a lot of autapomorphies that includes: a posterodorsal retraction of the narial fossa, almost level to the anterior margin of the maxilla, that is a character that shares with *Cricosaurus saltillensis*, an specimen that even if it was describe as a *Cricosaurus* it was not part of the clade or presence of a postacetabular process and distinct ilium and ischium peduncles separated by an acetabular incision or depression, that are characters more related to teleosauroids (Young et al., 2024).

All these different characteristics make UR-CP0235 a unique specimen that differs from his closest related species: *Cricosaurus lithograficus, Cricosaurus rauhuti, Cricosaurus araucanensis, Cricosaurus vignaudi* (Frey et al., 2002; Herrera et al., 2021; Herrera, Gasparini, et al., 2013; Osi et al., 2018; Young et al., 2010). Based on the phylogenetic analysis is possible to see that the *Cricosaurus* clade is clearly defined as the Metriorhynchidae, having only a couple of polytomies. The phylogeny maintains a very similar structure with other trees published recently having fewer changes more related to the number of species used in this study (Girard et al., 2023; Herrera et al., 2021; Young et al., 2024).

Body Size Insights.

UR-CP0235 is one of the biggest thalattosuchians discovered to date. By using the linear regression purpose by Herrera (2021) it was achievable to estimate the body size of around 13.37m±0.9. comparing this result with some of the biggest specimens in the Thalattosuchia clade (*Machimosaurus rex:* 9.5m*, Machimosaurus hugii:* 7.5m and *Dakosaurus maximus:* 5-6m) it can be determined that this fossil is the largest member of the Metriorhynchidae to date and most probably the largest of all Thalattosuchia by surpassing the specimen found in Villa de Leyva described by Cortes et al 2020 that was the largest found until the development of this work having a total length of 9.6m (Fanti et al., 2016; Wilberg et al., 2019; Young et al., 2011, 2012). It is important to note that, due to the fragmentary condition of this specimen, this analysis required scaling the skull of UR-CP0235 against the holotype of *Cricosaurus araucanensis* to obtain an estimation of the skull length.

Conclusions

UR-CP0235 belongs to the *Cricosaurus* clade, confirming that this fossil is part of the Metriorhynchidae. It is notable for the large number of autapomorphies it exhibits, which may indicate that the specimen represents a new species: however, further investigation is to be done to confirm it. Also a CT scan is recommended in further investigations to analyze internal structures. Furthermore, this specimen represents one of the largest known individuals of this group, and possibly of all Thalattosuchia. Given the incomplete state of the skull and the absence of the postcranial skeleton, additional research - ideally incorporating more complete specimens - is recommended to obtain information that could not be determined in this investigation.

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Annex

Annex A: Matrix Young 2024 with UR_CP 0235 included

Matrix thesis.nex