

AMEGHINIANA (Rev. Asoc. Paleontol. Argent.)
24 (1-2): 89-94, Buenos Aires, 1987

A NEW LAGOSUCHIDAE (THECODONTIA-PSEUDOSUCHIA)
FROM THE LOS CHAÑARES FAUNA (CHAÑARIAN
REPTILE AGE, MIDDLE TRIASSIC), LA RIOJA, ARGENTINA *

Andrea ARCUCCI

INTRODUCTION

The present note brings to light a new form of thecodont, pertaining to the Suborder Pseudosuchia (*sensu* Bonaparte, 1982), which adds to the genera known from the Los Chañares fauna, of Chañarian age (Middle Triassic), from Provincia de La Rioja (Romer, 1971, 1972; Bonaparte, 1975, 1982b).

This local Los Chañares fauna, described in general terms by Romer, is very important for our knowledge of thecodonts, as much from a systematic as an evolutionary point of view. This association includes eight genera of thecodonts, in addition to that described here, pertaining to at least six different families. Due to this diversity, this combination is the largest known for the Middle Triassic worldwide, since the records from Europe, East Africa and Brazil are considerably poorer.

The recovery of this new lagosuchid brings new anatomical information about the development of the advanced mesotarsal-type tarsus, whose origin is under discussion (Brinkman, 1981; Chatterjee, 1982) and whose more ancient appearance in the fossil record occurs in various Los Chañares thecodonts (Lagosuchidae, Lagerpetonidae). This information has not been considered until now in general schemes of ankle evolution of the group (Charig, 1972; Tarsitano, 1983 and others); it could help clarify existing relationships between more advanced thecodonts and more primitive Triassic saurischians.

The anatomical characteristics of this new thecodont justify its separation from *Lagosuchus* (Bonaparte, 1975) at the generic level. It is an advanced pseudosuchian in the

* Original citation: Arcucci, A. 1987. Un nuevo Lagosuchidae (Thecodontia-Pseudosuchia) de la fauna de Los Chañares (Edad Reptil Chañarense, Triasico Medio), La Rioja, Argentina. *Ameghiniana* 24(1-2):89-94. Translated by Matthew T. Carrano, University of Chicago, February 1997.

organization of its hind limb (femur shorter than tibia; mesotarsal tarsus) and pelvis (long pubis with short distal expansion). The anatomy of the astragalus, calcaneum and pubis indicate clear affinities with Ligosuchidae, since this form is considered within the range of variation of that family.

The analyzed material was collected under commission of the Universidad Nacional de Tucumán, Universidad Provincial de La Rioja and CONICET, during different expeditions made near the town of Rio Chañares, Departamento Lavalle, Provincia de La Rioja, by Dr. Bonaparte.

Four incomplete specimens were prepared, including fragments of hind limb (femur, tibia, fibula and proximal tarsals), isolated vertebral bodies, articulated caudal vertebrae and fragments of sacrum and pelvis.

ABBREVIATIONS USED:

PULR: Universidad Provincial de La Rioja.

PVL: Paleontología de Vertebrados, Instituto Miguel Lillo.

MACN: Museo Argentino de Ciencias Naturales "Bernardino Rivadavia".

SYSTEMATIC DESCRIPTION

Order **THECODONTIA**

Suborder **PSEUDOSUCHIA**

(*sensu* Bonaparte 1982)

Family **LAGOSUCHIDAE**

PSEUDOLAGOSUCHUS gen. nov.

Pseudolagosuchus major gen. et sp. nov.

HOLOTYPE (Fig. 1): PVL 4629: Complete, articulated left femur, tibia and fibula, with more poorly preserved astragalus and calcaneum. Complete pubis. Fragments of presacral vertebrae and ribs.

DERIVATION OF NAME: Due to the characteristic similarities to *Lagosuchus* and its larger size.

HORIZON AND LOCALITY: Beds of the Los Chañares Formation (equivalent to the lower part of the Ischichuca Formation), near the town of Rio Los Chañares, Departamento Lavalle, Provincia de La Rioja, Argentina.

AGE: Chañarian Reptile Age, Middle Triassic.

HYPODIGM: The holotype and the following specimens:

PVL 3454: Fragment of distal femur, distal two-thirds of tibia and fibula articulated with the astragalus, proximal portion of fibula, incomplete metatarsal, two poorly preserved sacral vertebrae connected to both ilia.

MACN 18954: Three disarticulated vertebrae, probably dorsals; 5 articulated caudal vertebrae; distal portion of femur; distal portions of articulated tibia and fibula; articulated astragalus and calcaneum.

PULR 53: Distal fragments of tibia and fibula; proximal tarsals, and various articulated caudal vertebrae.

DIAGNOSIS: Moderately sized lagosuchid (femur 11.5 cm long); with axially elongated presacral, sacral and caudal vertebrae, much longer than in *Lagosuchus*, the last with tall neural spines. Pubis as long as the femur, with symphysis more extended longitudinally than in *Lagosuchus*, and with strong process for the *ambiens*. Femur robust and somewhat shorter than the tibia. Femur-tibia ratio 0.94, greater than in *Lagosuchus*. Distal articulation of the tibia of quadrangular shape, lacking the posterior descending process observed in *Lagosuchus*. Fibula extended anteroposteriorly and reduced relative to the tibia. Tibia with fossa or recess in its distolateral portion, more marked than in *Lagosuchus*. Mesotarsal tarsus, with quadrangular astragalus, with marked ascending process and a more developed posterior tuberosity on the lateral border of this bone than in *Lagosuchus*. Reduced calcaneum, conical in shape and with vestiges of the tubercle, which is inclined laterally and posteriorly, as in *Lagosuchus*.

DESCRIPTION

VERTEBRAE

Dorsals: Only two vertebrae (MACN 18954) can be assigned to this genus. They appear to be dorsals based on the position of the para- and diapophyses, which become united to form a backwards-inclined crest at the base of the prezygapophyses. One of these has an anteroposteriorly short vertebral body of large diameter, and could correspond to an anterior

dorsal. The other vertebra has a more elongate vertebral body with a smaller diameter, with wide-based anteriorly projecting prezygapophyses, and could be a posterior dorsal.

Sacrals: In the holotype and specimen PVL 3454 only the ventral parts of the vertebral bodies can be seen, which lack a keel and are axially elongated, being as long as the aforementioned posterior dorsal vertebra. Only two of the sacral vertebrae observed have lateral projections that can be interpreted as processes for the articulation of sacral ribs.

Caudals: They have an elongate body, markedly laterally compressed and anteroposteriorly expanded (Fig. 2). The prezygapophyses are well developed and project away from the vertebral body, over the adjacent vertebra. The postzygapophyses are shorter and do not surpass the edge of the body. The transverse processes have a wide base and project from the superior border of the body. The neural spines are tall and longer than the vertebral body; they are narrower at their base distally, and become posteriorly-inclined.

HIND LIMB: It is incomplete, since only one metatarsal, probably the third, has been recorded. It is a robust hind limb, with the femur somewhat shorter than the tibia (94%), and the tibia and fibula elongated, reduced in thickness and somewhat laterally compressed.

Femur: It has a sigmoid aspect, and a well-ossified head that projects anteriorly (fig. 1), in contrast to *Lagosuchus* where it is anteromedial, although this could be the result of deformation. In the upper third it has a well developed, aliform fourth trochanter, projecting medially on the posterior border of the medial face. Distally it is anteroposteriorly expanded, with the tibial and fibular condyles delimited by a shallow depression on the anterior face and another, more marked, on the posterior face. The internal tibial condyle is the more extensive on the surface, while that for the fibula becomes somewhat laterally projected.

Tibia and fibula (see Figs. 1 and 4): They are of similar length, anteroposteriorly expanded at their proximal ends, and laterally compressed. The distal end of the tibia has a quadrangular shape, while that of the fibula is extended axially like the proximal end. On its distolateral face the tibia has a fossa that continues ventrally as a canal or recess, which coincides with the ascending process of the astragalus. The diameter of the fibula is notably smaller than that of the tibia.

Tarsus: It is of advanced mesotarsal type (Brinkman, 1981; Chatterjee, 1982) (fig. 3).

Astragalus: In dorsal view it has a quadrangular shape and is transversely extended, being wider in this direction than dorsoventrally. The anterior face is flat and slightly concave transversely. The posterior face is concave and has a round tubercle or process on its upper and lateral end, delimited ventrally by a depression, which is not observed in astragali from other thecodonts. The ventral face is planar, ending towards the lateral border. On the dorsal face, note the facets for the tibia and part of the fibula, separated by the dorsal or ascending process. The tibial facet is quadrangular and shallower. The fibular facet is incomplete, but is planar and in part formed by the posterior process of the astragalus, which prolongs it posteriorly. The dorsal process has a conical shape and is less developed relative to the proportions of the astragalar body. There is a rounded process on the lateral face that articulates as a condyle with the concave medial facet of the calcaneum.

Calcaneum: It shows a marked reduction, since it is smaller than the astragalus, approximately half its size. It has a conical shape, with the vertex directed posterolaterally. The anterior face is flat and somewhat convex. The posterior face has a lateral process projecting posteriorly and a medial fossa that delimits it. The markedly concave astragalar facet is located on the medial face. On the dorsal face, note that the fibular facet is convex and poorly defined.

PELVIS

Pubis: The only material that is available (fig. 1) is partially enclosed in matrix, and can only be observed in anterolateral view. Proximally it is anteroposteriorly expanded, and shows an articular edge with the wider pubic peduncle of the ilium. A strong process for the insertion of the *ambiens* muscle is located proximal to a slight ventral curvature. This process presents a strongly rugose surface that projects laterally. From this neck, the pubis extends ventrally in a large symphysis, which is elongated almost to the distal border of the femur. The distal portion is somewhat axially expanded, in a manner similar to *Lagosuchus* (Bonaparte, 1975).

COMPARISON AND COMMENTS

The characteristics of the femur (development of the femoral head and fourth trochanter), tibia and fibula (orientation and expansion of the epiphyses), and above all the proximal tarsals (transverse extension of the astragalus, position of the ascending process, reduction and position of the calcaneal tubercle) suggest great affinities between *Pseudolagosuchus* and *Lagosuchus*. Another character is the pneumaticity observed in the long bones, seen in both forms despite the disparity in size among specimens. By displaying this number of characters derived in common,

Pseudolagosuchus is easily assigned to the family Ligosuchidae. On the other hand, separation of *Pseudolagosuchus* and *Lagosuchus* at the generic level is clearly indicated by the differences in length and robustness of the femur and pubis, and by the long neural spines and projecting prezygapophyses of the caudal vertebrae.

Both for the construction of the tarsus, and for the configuration of the articular face of the tibia and for the pubis, thecodonts of the family Ligosuchidae approach a level of anatomical organization similar to that of certain primitive saurischians, contemporaneous or somewhat later, such as *Staurikosaurus* and *Herrerasaurus* (Bonaparte, 1975; Galton, 1977; Novas, pers. comm.).

As for the cited differences between these two genera, they support the idea that within the family Ligosuchidae the mesotarsal condition shows variations that suggest intrafamilial diversification. If to this is added the evidence of the mesotarsal tarsus of *Lagerpeton*, with a very different structure than that of ligo-suchids (fig. 3), it can be seen that this anatomical advance had an important presence in the thecodonts of Los Chañares, with notable structural modifications. These variations refer above all to the transverse extension of the astragalus and calcaneum, the position and development of the ascending process of the astragalus and the ventral process of the tibia, and the development and position of the calcaneal tubercle.

Ligosuchidae is considered to be the most likely ancestral group to saurischians (Bonaparte, 1975), or at least for the group of theropods. Extending the range of variation of the family also extends the phylogenetic potential of this pseudosuchian group. With the contribution of new anatomical information, the relationships between the groups transitional from thecodonts to saurischians can be evaluated with more clarity.

ACKNOWLEDGMENTS

To Lic. Amanda Giordano and Prof. José Pumares (Universidad Provincial de La Rioja), for permission to review and prepare part of the material. To the Instituto Miguel Lillo, for access to materials deposited there. To Dr. José F. Bonaparte, for critical review of the manuscript. At Sr. Enrique Guanuco, for creating some of the figures included in this work.

FIGURES

Fig. 1. - ***Pseudolagosuchus major*** gen. et. sp. nov. PVL 4629 (holotype). Left lateral view. Abbreviations: CO, ribs; VP, presacral vertebrae; PU, pubis; FE, femur; FI, fibula; TI, tibia; TA, proximal tarsals.

Fig. 2. - ***Pseudolagosuchus major*** gen. et. sp. nov. MACN 18954. Articulated caudal vertebrae in lateral view. Abbreviations: E, neural spine; Pt, transverse process; Prz, prezygapophysis.

Fig. 3. - Comparison of articulated astragali and calcanea of: 1, ***Lagerpeton chanarensis***; 2, ***Pseudolagosuchus major***; 3, ***Lagosuchus talampayensis***. A) anterior view; B) dorsal view; C) ventral view. Abbreviations: ff,

fibular facet; ft, tibial facet; pa, ascending process; tc, calcaneal tubercle; pp, posterior process of astragalus. Scale 0.5 cm.

Fig. 4. - **Pseudolagosuchus major** nov. MACN 18954. Distal portion of right tibia. 1, lateral view; 2, posterior view; 3, ventral view. Abbreviations: es = fossa for placement of the ascending process of the astragalus. Scale 1 cm.