

**THE GORGONOPSIAN GENUS, *HIPPOSAURUS*, AND THE FAMILY
ICTIDORHINIDAE***

by

Dr. L.D. Boonstra

Paleontologist, South African Museum, Cape Town

In 1928 I dug up the complete skeleton of a smallish gorgonopsian (SAM 8950) on the farm Klein-Koedoeskops in the Beaufort West district. The skull was described by Houghton in 1929 and is currently the type of *Hipposaurus boonstrai*.

In 1929 I dug up another closely related gorgonopsian on the same farm (SAM 9081). This specimen consists of distorted and weathered skull with a few pieces of the postcranial skeleton.

In 1932 Broom published two diagrams (Fig. A and B) with the title *Hipposaurus boonstrai*, these figures differ considerably of the one by Houghton of the one of the type, where Houghton gives the number of postcanine teeth as three, Broom says “the genus differs from all others described in having seven molars.”

In 1934 I described the postcranial skeleton of the type.

In 1940 Broom described a new type *Hipposaurus rubidgei*, from the Wellwood basin, Graaff-Reinet, and states the differences between Houghton’s and his own figures and says amongst other things, “Houghton considers there were only three molars, while I believe there are seven.”

* *Original Citation:* Boonstra, L. D. 1952. Die gorgonopsiër-geslag, *Hipposaurus*, en die familie, Ictidorhinidae. *Tydstrif vir Wetenskap en Kuns* 12:142-149 [In Afrikaans]. Translated by Christian Sidor and Bruce Rubidge, 2001.

In 1948 Broom described another new type *Hipposaurus kitchingi* from Ferndale, Graaff-Reinet but was not absolutely sure if it could be assigned to the genus *Hipposaurus*.

In 1949, in his description of a new related gorgonopsian *Lemurosaurus pricei*, with reference with *Hipposaurus boonstrai*, Broom said “also my restoration differs so markedly from Haughton’s that it is hard to believe that we have been examining the same skull.”

With the above state of matters I considered it worthwhile to study the skull myself as well as that of the undescribed specimen SAM 9081.

I compared Haughton’s description, sentence for sentence, with the type skull and found that in all essential points it is correct. The left edge of the maxilla, which was still unprepared, I ground down to expose the postcanine teeth

(START PAGE 143)

and found that, just as on the right hand side, there are three small pointed teeth and that they take up 16mm of the edge of the jaw, just as Haughton gives for the right hand teeth, but the diastema between them and the canine is 16mm on the left while on the right it is 11mm also as given by Haughton.

The accompanying photos (1 and 2) of the type skull illustrate that Haughton’s drawings represent the shape well and I find that the details of the composite skull bones are also justly drawn.

Broom’s two figures (particularly A) differ so much from that of Haughton that I am convinced that Broom --- where he says “... it is hard to believe that we have been examining the same skull.” Broom’s figures were certainly not grounded on the type (SAM 8950)! The only explanation appears to be that Broom drew another gorgonopsian skull and then accidentally attached the name *Hipposaurus boonstrai* to it.

Dr. A.S. Brink, under whose care the concerned specimens fall, informed me recently that Broom and Robinson, in 1948, in their “on some new types of small carnivorous mammal-like reptiles,” represented the skulls of *Aelurodraco microps* and *Whaitsia pricei* and the swapped the titles. It is possible that something similar happened with the figures of *Hipposaurus boonstrai*, but I could not establish with which other gorgonopsian the possible swappage of titles happened in this case.

HIPPOSAURUS MAJOR sp. nov. (photos 3 and 4)

Specimen SAM 9081, just as in the case of the type *Hipposaurus boonstrai*, consists of particularly hard calcareous nodules, from which it is partially eroded. The removal of the rest of the surrounding rock was very difficult and the result not very satisfactory. The exposed structures, are however sufficient to indicate that we are here also dealing with a *Hipposaurus* with the following characteristics: the snout is bent ventrally in relation to the fronto-parietal level, the orbits are large and the temporal opening small, the intertemporal width is great, the snout is narrow and deep, the pineal foramen penetrates a round raised knob on the parietal, the dentary is lightly built and the dental formula is $i\ 5?, c\ 1, pc\ 3$.

It differs however from *Hipposaurus boonstrai* in a number of characters of specific value, and I suggest that it be regarded as the type of a new sort of the genus *Hipposaurus* under the *nomen triviale, major*. Presented in table form, are the points wherein the two kinds of *Hipposaurus* differ, as follows:

(START PAGE 144)

<i>Hipposaurus boonstrai</i>	<i>Hipposaurus major</i>
Skull moderately large	Skull large
Intertemporal region relatively wide	Intertemporal region relatively moderately wide
Preorbital hollow deep	Preorbital hollow shallow, weakly defined

Snout strongly bent downwards
Skull relatively wide
(Skull width 58% of skull length)

Snout less strongly bent downwards
Skull relatively narrower
(Skull width 52% of skull length)

	<i>Hipposaurus boonstrai</i>	<i>H. major</i>
Maximum skull length	174 mm.	210 mm.
Maximum skull width	101 mm.	110 mm.
Snout to edge of orbit	100 mm.	131 mm.
Snout to anterior edge of fronto-parietal level	131 mm.	151 mm.
Width between orbits	43 mm.	45 mm.
Width between temporal openings	80 mm.	86 mm.
Height of quadrate to fronto-parietal level	77 mm.	97 mm.
Diastema between canine and first molar	16 mm. left 11 mm right	18 mm. ?
Length of postcanine series	16 mm.	21 mm.

In 1932 Broom proposed that his genus, *Ictidorhinus*, represent a separate gorgonopsian family, the Ictidorhinidae and in 1940 he further proposed that the genus, *Hipposaurus* must be added to this family, in 1949 he added the genus *Lemurosaurus*.

Broom gave no diagnosis of the new family.

In order to clarify the whole position I hereunder provide a formal diagnosis for the family and its separate genera.

FAM. ICTIDORHINIDAE — DIAGNOSIS:

1. Gorgonopsians with clearly ventrally bending down snout, so that the dorsal upper surface of the snout makes an angle with the fronto-parietal level.
2. In lateral view it appears that from this bend, as if the temporal opening is situated very far ventrally. It is very obvious if the edge of the lower jaw is placed horizontally, but if the fronto-parietal level is set horizontally then it appears that the temporal opening makes up about the normal gorgonopsian ratio.

3. Temporal opening small.

(START PAGE 145)

4. Orbits large.

5. Intertemporal width very great.

6. Interorbital width moderate to very great.

7. Snout weak, high and narrow.

8. Pineal foramen moderate to large, penetrates round elevated knob on the parietal near the edge of the occiput.

9. Occiput vertical

10. Dentary lightly built.

11. Dental formula i4-5, c1, pc 3 to 8

Ictidorhinus is the typical genus and closest to it is *Lemurosaurus*. They are both from the *Cistecephalus*-zone. *Hipposaurus* is a genus from the *Tapinocephalus*-zone, but definitely belongs to the family and it is now obvious that the two forms of Broom, *rubidgei* and *kitchingi*, — both from the *Cistecephalus*-zone — do not belong to Houghton's genus *Hipposaurus*. For the kind, *rubidgei*, which is definitely an *Ictidorhinus*, I am proposing the new generic name *Hipposauroides* gen. nov., and for the kind, *kitchingi*, which with lots of doubt belongs to the family, I propose the new genus *Pseudohipposaurus*.

GEN. *ICTIDORHINUS* — DIAGNOSIS: (Fig. A).

1. Skull very small (length 84 mm)

2. Intertemporal width great (width 43 mm)

3. Interorbital very great (30 mm across the frontals and 55 mm across the postorbitals)

4. Supraorbital edge very thickened

5. Occiput, as seen from above, only shallowly concave.

6. Orbits large and temporal openings very small.

7. Preparietal large, narrow with converging sides towards the front, pineal foramen medium size
8. Dental formula i4, c1, pc 4 to 5
9. Cistecephalus-zone

Species: *Ictidorhinus martinsi*. Type AMNH 5526.

GEN. *LEMUROSAURUS* — DIAGNOSIS: (Fig. B):

1. Skull very small (length 86 mm)
2. Intertemporal width great (35? mm)
3. Interorbital width relatively large (28 mm)
4. Supraorbital edge very greatly thickened with thickenings on the postorbital arch
5. Occiput seen from above reasonably concave
6. Orbits very large and temporal openings very small.
7. Preparietal apparently large and forms a narrow triangular ridge, pineal foramen large.
8. Dental formula: i5, c1, pc 8. Posterior edge of canine and postcanine teeth have coarse serrations.
9. Cistecephalus-zone

Species: *Lemurosaurus pricei*. Type Bernard Price Institute.

GEN. *HIPPOSAURUS* — DIAGNOSIS: (Fig. C and D):

1. Skull medium size to large (174 to 210 mm)
2. Intertemporal width very great (80 to 86 mm)
3. Interorbital width medium (43 to 45 mm. and thus almost half of the intertemporal width)
4. Supraorbital edge slightly thickened.
5. Occiput, seen from above, deeply concave.
6. Orbits moderately large and temporal openings small.
7. Preparietal large, narrow, with parallel sides which at the anterior end run to a point, pineal foramen reasonably small.
8. Dental formula: i5, c1, pc 1

9. Preorbital hollow deep and sharply demarcated or shallow and poorly demarcated.
10. Tapinocephalus-zone.

Species: *Hipposaurus boonstrai*. Type SAM 8950 (Fig. C).

Hipposaurus major. Nov. sp. SAM 9081 (Fig. D).

Text figures A—F. Outline diagrams of five ictidorhinids to indicate the most important family character—the turned down snout. *Pseudohipposaurus* (F) does not show this character.

Diagrams by I.V. Boonstra.

- A. *Ictidorhinus martinsi*. X1 After Boonstra.
- B. *Lemurosaurus pricei*. X1. After Broom.
- C. *Hipposaurus boonstra*. X 1/2+. After Haughton.
- D. *Hipposaurus major*. X 1/3. Original.
- E. *Hipposauroides rubidgei*. X 2/3 After Broom.
- F. *Pseudohipposaurus kitchingi*. X 1/3. After Broom.

(START PAGE 148)

GEN. *HIPPOSAUROIDES* GEN. NOV.—DIAGNOSIS: (Fig. E):

1. Skull small (155 mm)
2. Intertemporal width great (58 mm)
3. Interorbital width reasonably great (37 mm)
4. Supraorbital edge slightly thickened
5. Occiput, seen from above, concave
6. Orbits large and temporal openings reasonably small
7. Preparietal reasonably small, narrow and pointed to the front. Pineal foramen large.
8. Dental formula: i4 or 4, c1, pc 6 or 7.
9. No preorbital hollow.
10. Cistecephalus-zone

Species: *Hipposauroides rubidgei*. Type Rubidge Coll.

GEN. *PSEUDOHIPPOSAURUS* GEN. NOV.— DIAGNOSIS: (Fig. F):

Broom, in 1948, wrote of his new species *Hipposaurus kitchingi*: “This new species may not belong to the same species as either *Hipposaurus boonstrai* or *Hipposaurus ribidgei*, but as it is at least allied, it may be placed in the same genus till better specimens are discovered.” This species belongs, according to Broom’s description apparently not to the genus *Hipposaurus* and according to my opinion (supported the diagnosis hereunder), cannot even be considered in the family *Ictidorhinidae*, as defined above.

1. Skull without clearly ventrally turning snout
2. Through the absence of any turning down it does not appear as if the temporal opening is far ventrally located
3. Temporal opening reasonably large
4. Orbits not large
5. Intertemporal width great (96 mm), almost a third of the skull length (245 mm)
6. Interorbital width medium (73 mm)
7. Snout reasonably high and narrow
8. Pineal foramen moderate penetrating a knob, near to the edge of the occiput
9. Occiput vertical and reasonably flat
10. Dentary strong with sloping therocephalian-type mentum
11. Supraorbital edge not thickened
12. No preorbital hollow
13. Dental formula: i5, c1, pc 6 or 7.
14. Cistecephalus-zone

Species: *Pseudohipposaurus kitchingi*. Type: Rubidge Coll.

(START PAGE 149)

A LIFE RECONSTRUCTION OF *HIPPOSAURUS*:

In our research on the vertebrates of the Karoo we focus in the first case on the comparative morphology of the skeleton, so doing determine the relationships of the animals and

the evolutionary development directions. But here we may not stop! The material which we study, is not an inorganic geological sample but indeed the remains of earlier living forms and, after the osteological study, it is our duty to try to determine what the animal looked like in life and under which life circumstances the animal community of the past undertook the battle of living. With this paleobiological principle I, after the osteology, also undertook a study of the myology. After the determination of the large skeletal muscles, it is possible to cover the skeleton with flesh and in so doing get a life portrait of the animals. I publish herewith as an addition a few photos of the life size reconstruction of *Hipposaurus boonstrai* which I made for exhibit in the South African Museum.

REFERENCES TO PUBLICATIONS

- 1913. Broom R. Bull Am. Mus. Nat. Hist. 32, 37, b. 560.
- 1914. Broom R. Phil. Trans. Roy. Soc. Lond. b. 46.
- 1929. Haughton S.H. Ann. S. Afr. Mus. 28, b. 75.
- 1932. Broom R. Mammal-like reptiles. b. 135 en 136.
- 1934. Boonstra L.D. Ann. S. Afr. Mus. 31, b. 147.
- 1935. Boonstra L.D. Am. Mus. Novitates. 772, b. 11.
- 1940. Broom R. Ann. Trans. Mus. 20, b. 77.
- 1948. Broom R. Ann. Trans. Mus. 21, b. 189.