B R E V I O R A

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CROCODILIANS FROM THE LATE TERTIARY OF NORTHWESTERN VENEZUELA: *MELANOSUCHUS FISHERI* SP. NOV.

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ABSTRACT: *Melanosuchus fisheri* n. sp., the first fossil record of this alligatorid genus, is based on two skulls from the Urumaco Formation of Huayquerian (Pliocene) age in the northern part of the State of Falcón, Venezuela. Relationships between *M. fisheri* and the living *M. niger* are uncertain. *M. fisheri* occurs together with five other crocodilian taxa of gigantic size. This assemblage and the numerous associated chelonians suggest that the Urumaco area in Huayquerian times may have borne some resemblance to the present Amazon basin.

RESUMEN: Se describe *Melanosuchus fisheri,* una nueva especie de un género aligatórido hasta ahora sin un registro fósil, basada sobre dos ejemplares coleccionados en la Formación Urumaco, de Edad Huayqueriense, en la parte norte del Estado Falcón, Venezuela.

During the summer of 1972, a paleontological expedition from the Museum of Comparative Zoology, in collaboration with the Escuela de Geología of the Universidad Central de Venezuela and the Ministerio de Minas e Hidrocarburos, worked in the vicinity of Urumaco, Distrito Democracia, Estado Falcón, northwestern Venezuela. A rather large number of vertebrate fossils, most of them reptiles, were collected in the Urumaco Formation, of Huayquerian age (Pascual and Diaz de Gamero, 1969; for a definition of Huayquerian, see Pascual and Odreman, 1973). Among the crocodilian materials are two skulls, representing two growth stages of a species of caiman, that have strikingly large orbits, extending as far forward as maxillary tooth 10, and a palatal exposure of the vomer. These features (and others) occur, among living crocodilians (Wer-

[1]Museo de Ciencias Naturales de Caracas

muth, 1953), only in the black caiman, *Melanosuchus niger* (Spix). The two specimens are beyond doubt referable to the genus, of which they constitute the first fossil record, and are specifically distinct from the living form.

Melanosuchus fisheri[1] sp. nov.

Type: Museo de Ciencias Naturales de Caracas No. 243, a skull lacking the pterygoids, parts of the ectopterygoids, palatines, jugals and premaxillaries, and parts of the left postfrontal and quadrate.

Hypodigm: The type and MCZ No. 4336, a skull — lacking the pterygoids, the left quadrate and quadratojugal, and parts of the basioccipital and left squamosal — and the posterior two-thirds of both rami of the mandible. Both specimens have suffered some distortion, and, as in much of the Urumaco material, the bone surfaces are poorly preserved.

Horizon: Upper part of the upper member of the Urumaco Formation in the "capa de huesos" or "tortugas" of the field geologists.

Localities: The type was found approximately ½ km northwest of Campo El Mamón, east of the El Jebe fault; MCZ No. 4336 about 4 km northeast of El Mamón, some 20 m west of the Chiguaje fault. Campo El Mamón is 2.5 km north of Urumaco.

Diagnosis: Differing from *M. niger* as follows: skull more robust; snout deeper, heavier; posterior portion of maxilla wider; interorbital bar more arched anteroposteriorly, not concave above, thicker dorsoventrally; preorbital ridges on snout faint rather than strong; central portion of posterior border of cranial table transverse, not curved; palatine fenestrae shorter; 12 maxillary teeth, not 13–14, posterior ones larger; mandible heavier, thicker; external mandibular foramen not as deep. (For measurements see Table 1.)

Discussion: I have examined six skulls of *M. niger*, five in the American Museum of Natural History and one in the Museum of Comparative Zoology. The skull of this species has been well described by Mook, (1921), Kälin (1933), and Medem (1963). The last two authors figure and discuss growth stages, Kälin on the basis of 22 specimens ranging in occiput-snout

[1]Named for Dr. Daniel C. Fisher, finder of both specimens. By an odd coincidence, the type was the first and MCZ 4336 the last specimen to be collected from the Urumaco Formation by the expedition.

length from 158.5 to 508 mm, Medem on 9 ranging from 99 to 466 mm. Kälin's series came from Isla Marajo, northeastern Brazil, Medem's from southern Colombia, thus nearly from opposite extremes of the species range.

It can be stated with confidence that the diagnostic characters of *M. fisheri* do not fall within the limits of individual or geographic variation or of ontogenetic change in *M. niger*. The degree of arching of the interorobital bar in the type (MCZ 4336 is crushed down in this region) is not approached even in the youngest specimen in Medem's series, and the depth of the bar evidently does not increase, relatively, with age in the living species. The concavity in the dorsal surface of this bar in *M. niger* tends to become shallow, although not to the point of disappearance, in large individuals, but in those comparable in size to the two specimens of *M. fisheri* it is very well defined. All specimens of the living species have very prominent ridges on the snout (even the youngest shows some traces of them), a conspicuous difference from the extinct form in which they are very feebly expressed. The two last differences are associated; the ridges on the snout of *M. niger* that run posteromedially from the vicinity of maxillary tooth 4 merge with the sides of the interorbital bar and contribute to its concavity. The posterior border of the cranial table is quite or nearly transverse in the youngest specimens of *M. niger* figured by Kälin and by Medem, but it rapidly becomes curved anteriorly with advancing age, clearly differing from that of *M. fisheri*. In both specimens of the extinct species the number of maxillary teeth can be seen to be 12 in number, one or two less than in the living form, with the posterior ones being larger. The skull of *M. fisheri* is more robust than that of its relative, as is shown by the more massive snout and posterior portion of the maxilla, the heavier mandible, and the more solidly constructed interorbital and ectopterygoid bars. The external mandibular foramen is as long as that of *M. niger* but is decidedly shallower, with the surangular in consequence being deeper. This feature and the smaller size of the palatine fenestra are probably also associated with the greater robustness of the skull of *M. fisheri*. For the rest, the skulls of the two species are similar, the suture patterns, to the extent that these can be determined in the fossils, being essentially identical. The palatal portions of the vomers are clearly visible in MCZ No. 4336 as small, irregularly rhomboidal figures. The largest skull of *M. niger* recorded by Kalin is 508 mm in length. Whether or not *M. fisheri* attained to comparable size, or exceeded it, is of course uncertain.

Relationships between the two species must remain speculative for the present. As indicated above, nearly every character in which they differ is associated with the more robust skull of *M. fisheri.* If evolution within *Melanosuchus* proceeded in the direction of a lightening of the skull (in which case the more prominent ridges on the snout of *M. niger* could be interpreted as remnants of a previously more robust structure remaining along lines of stress) then an ancestor-descendant relationship would be likely. If not, the ancestor of the living species has yet to be found.

Melanosuchus fisheri occurs together with five other crocodilian species in the Urumaco Formation: *Dinosuchus terror* Gervais, *Mourasuchus amazonensis* Price, *Gryposuchus jessei* Gürich, *Ikanogavialis gameroi* Sill, and *Balanerodus?* sp. (Bryan Patterson, personal communication). *Ikanogavialis* is so far known only from the Urumaco. Of the others, none of which has hitherto been found in Venezuela, *Balanerodus* is known from the Miocene (Friasian) of Colombia (Langston, 1965) and the rest from the late Tertiary (Huayquerian?) of western Brazil. All are of very large to gigantic size. Compared to any of them *Melanosuchus fisheri,* even if it reached the dimensions of *M. niger,* was a pygmy. This crocodilian assemblage and the numerous chelonians associated with it suggest that the Urumaco area may at the time have had some resemblance to the Amazon basin, and bring some support to Wood and de Gamero's views (1971) concerning late Cenozoic geomorphologic changes in northwestern Venezuela.

Notes on the measurements (Table 1): Kälin's system of measuring (1931, fig. 1A) has been followed, but additional measurements, those of Medem and those that illustrate certain diagnostic features, are also given. Wherever possible Kälin's indices (1931: 536–8, 663–679) have been calculated. With one exception, these fall within or very close to his ranges for *M. niger* based on specimens 200 mm and over in skull length, the size at which adult proportions appear to be attained. The exception is snout length × 100/skull length (Kälin's No. 3), which is 51.21 in the type and 52.34 in MCZ 4336, well below the range, 57.20[1] to 68.80 (n 13) for the Brazilian sample of

[1]Kälin lists an index of 47.70 for a skull 356.5 mm in length. Either this specimen is decidedly anomalous (with a snout relatively shorter than Medem's 99.0 mm long skull) or a printer's error has occurred; I suspect the latter.

M. niger. This is too great a difference to be attributable to the distortion of the fossils; the snout is shorter relative to skull length in *M. fisheri*. However, calculations of the index from Medem's measurements of specimens 200 mm and over show the Colombian sample (n 6) to range from 51.35 to 58.5 — thus on the whole shorter-snouted than the Brazilian — with the two fossils falling either just below or just within this.

I also give measurements of MCZ 4043, the skull of *M. niger* described by Mook, a specimen that has the advantage, from a comparative standpoint, of being close to MCZ 4336 in size. It was obtained by Louis Agassiz from "the Rio Madeira" (perhaps not far from its junction with the Amazon).

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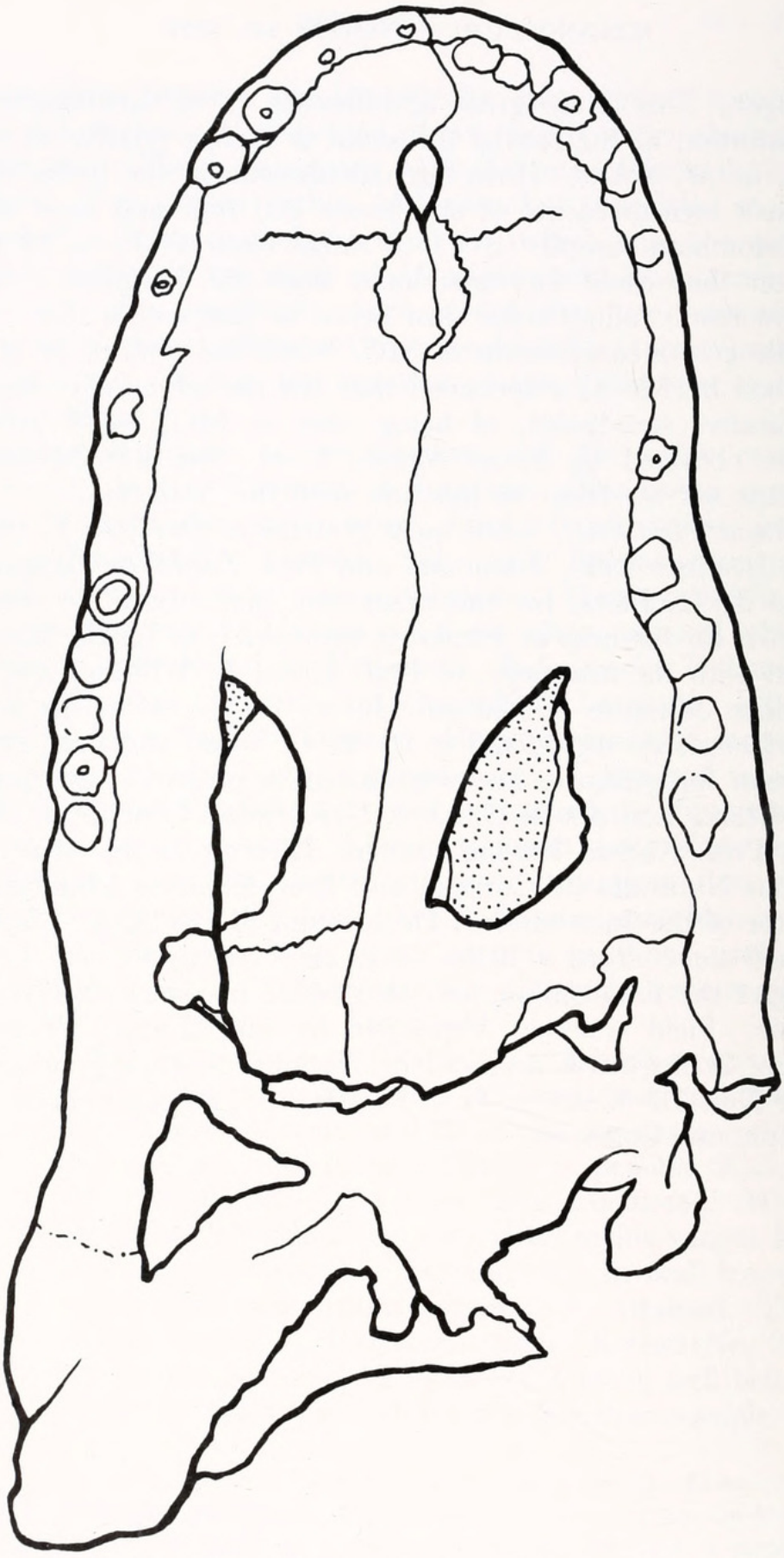

Figure 1. *Melanosuchus fisheri* sp. nov. MCZ 4336, ventral view of skull showing the vomers. × ½.

Figure 2. *Melanosuchus fisheri* sp. nov. MCZ 4336, ventral view of skull. × ½. The apparently small size of the premaxillary foramen may be due in part to some overlap of the two sides of the specimen in this area.

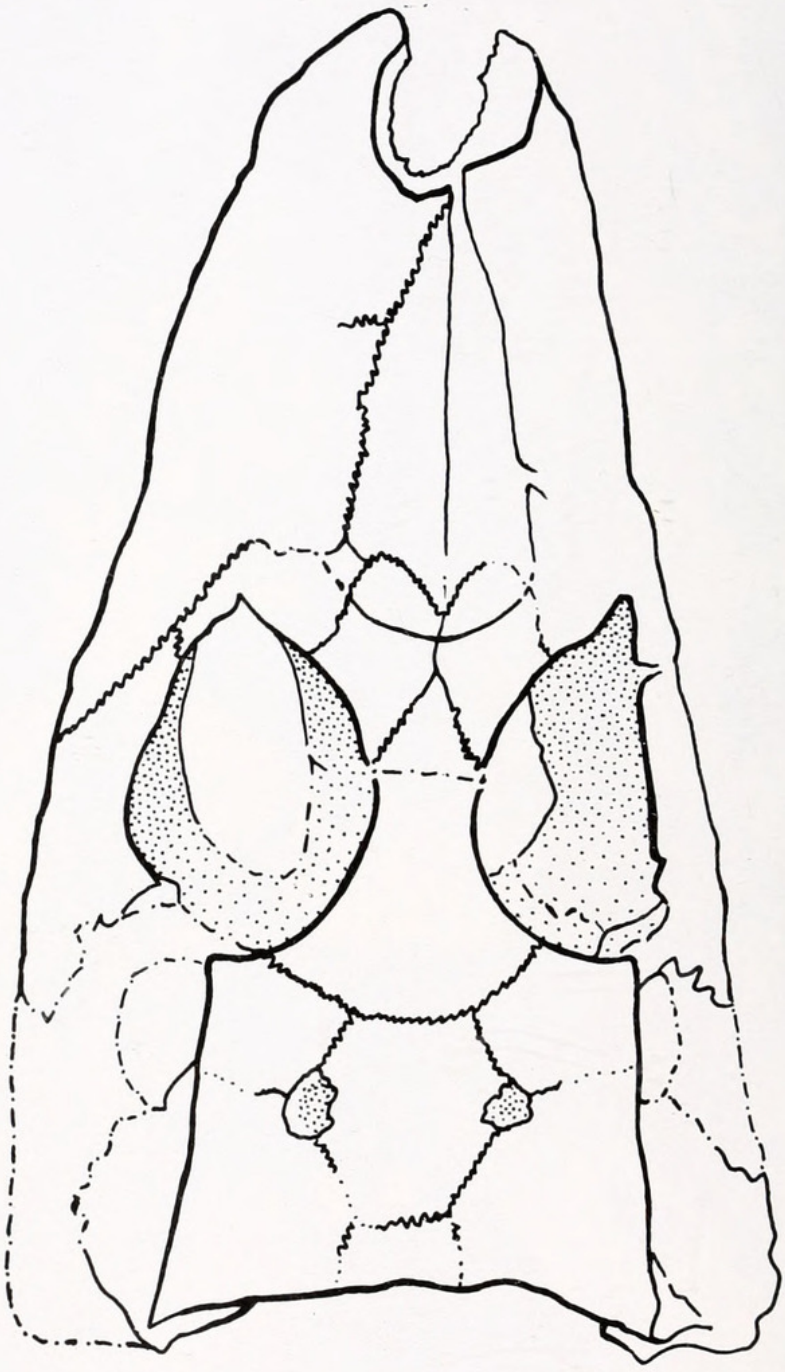

Figure 3. *Melanosuchus fisheri* sp. nov. Type, MCNC 243, dorsal view. × ½.

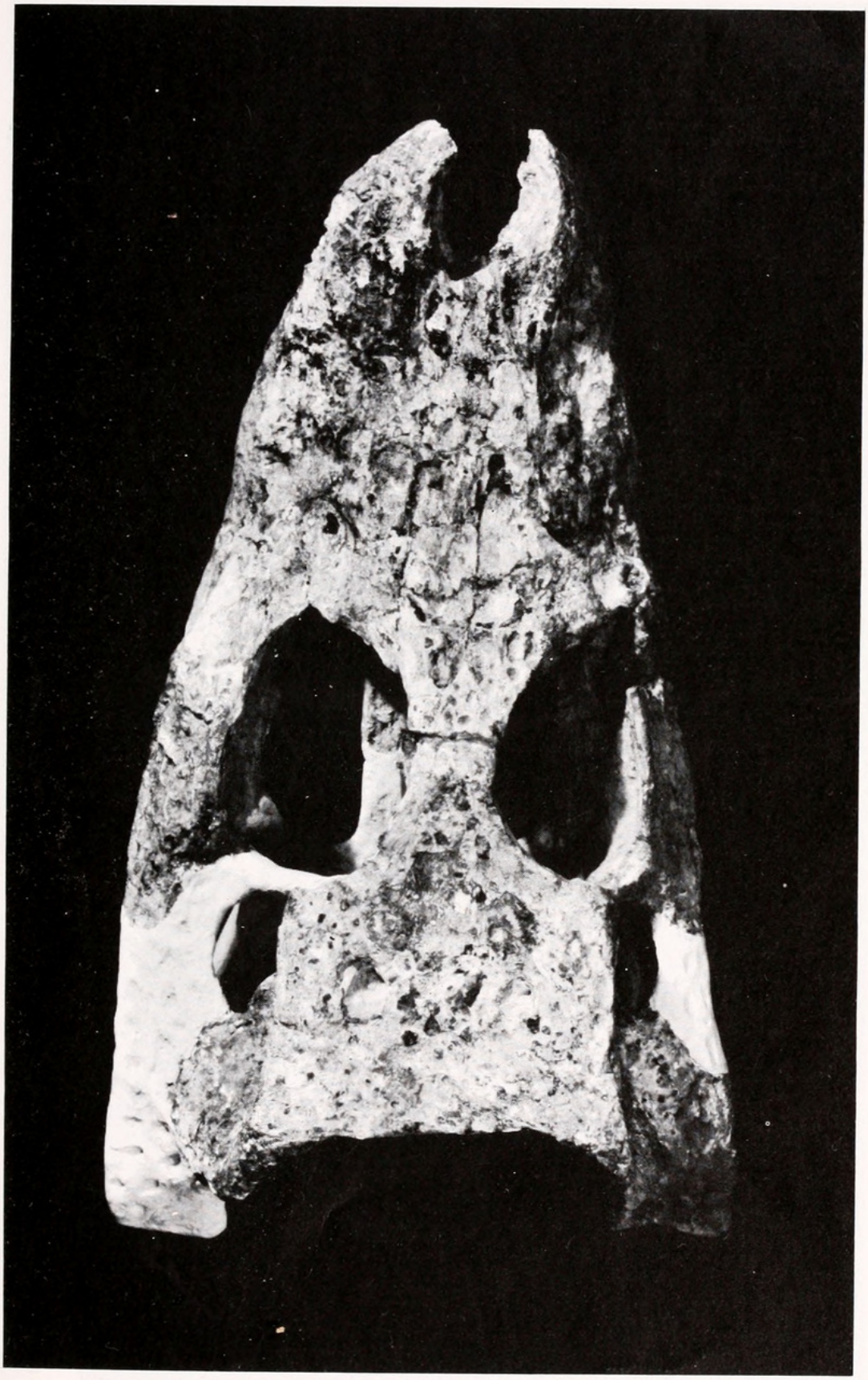

Figure 4. *Melanosuchus fisheri* sp. nov. Type, MCNC 243, dorsal view. × ½.

Figure 5. *Melanosuchus fisheri* sp. nov. Type, MCNC 243, left lateral view. × ½.

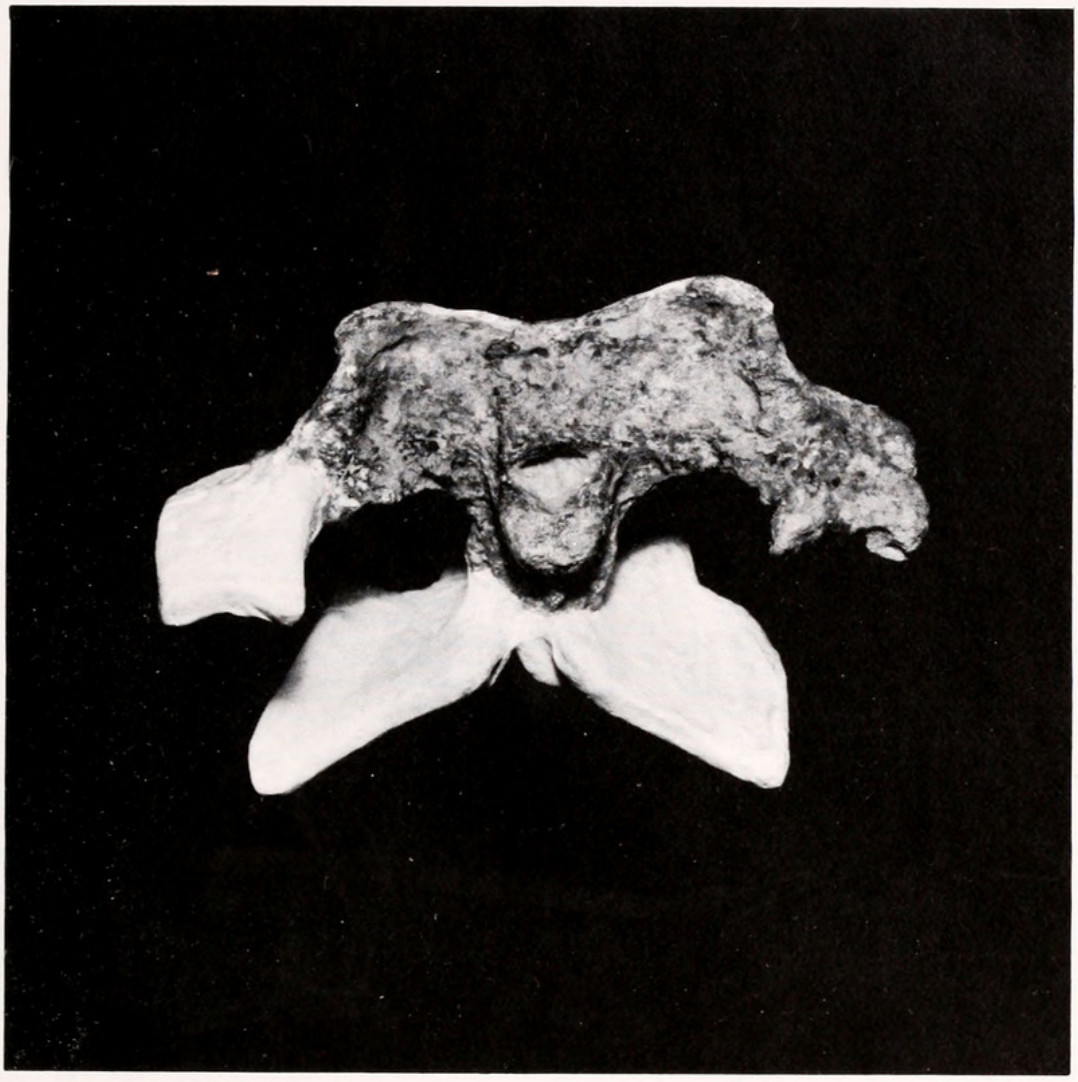

Figure 6. *Melanosuchus fisheri* sp. nov. Type, MCNC 243, occipital view. × ½.

TABLE 1

Measurements in mm.

	M. fisheri		*M. niger*
	MCNC 243	MCZ 4336	MCZ 4043
Skull			
Length from condyle to tip of pmx.	240.0ca	——	347.0
Length from post. margin of cranial table to tip of pmx.	243.0ca	306.0	348.0
Length of ant. margin of orbit to tip of pmx.	127.0ca	157.0ca	194.0
Length of orbit	67.3	91.3	93.4
Length of palatine fenestra	——	56.5ca	81.3
Length of anterior narial aperture	——	37.0ca	35.9
Length of cranial table	48.3	54.9	55.0
Width of cranial table ant.	72.2	85.0	91.9
Width of cranial table post.	85.0	99.0ca	100.5
Width across quadratojugals	135.0ca	198.0ca	185.0
Width at level of postorbital bars	129.0ca	——	160.0
Width at level of ant. margins of orbits	——	——	153.0
Width at level of mx 4	95.0ca	131.0ca	129.3
Width at level of pmx 4	66.3	94.0ca	81.9
Width of palatine bar at center	——	31.0	27.1
Width of maxilla at palatal fenestra	26.2	35.1	24.9
Width of ectopterygoid bar	——	15.2	11.0
Length of ectopterygoid bar	——	24.5	21.1
Depth of snout between pmx. 3 and 4	——	37.0	30.2
Depth of snout between mx. 3 and 4	——	48.7	34.0

TABLE 1 (cont.)

Depth of interorbital bar	19.8	25.0	17.4
Width of interorbital bar	19.2	27.4	20.8
Width of condyle	21.4	—	24.8
Depth of condyle	14.4	—	18.0
Length of pmx. 4	7.6	12.0	11.1
Length of mx. 4	8.2	—	12.6
Length of mx. 9	7.8	12.0	11.0
Length of mx. 10	9.4	—	9.6
Length of mx. 11	9.0	15.0	8.3
Length of mx. 12	7.1	10.0	7.7
Mandible			
Width at ant. end of ext. mandibular foramen	—	31.0	22.4
Width of surangular above foramen	—	17.1	11.9
Depth of surangular above foramen	—	27.9	18.0
Width of angular below foramen	—	30.0	20.8
Length of external mandibular foramen	—	61.0ca	66.6
Depth of external mandibular foramen	—	28.6	33.3

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