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**DENTICETOPSIS, A NEW GENUS OF SOUTH AMERICAN
WHALE CATFISH (SILURIFORMES: CETOPSIDAE,
CETOPSINAE), WITH TWO NEW SPECIES**

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ABSTRACT: Two species of whale catfishes from southern Venezuela, representing a new genus of the Cetopsinae, are described. The name *Denticetopsis* is proposed for this taxon, which appears to have diverged early in the evolution of whale catfishes, as evidenced by the presence of most, but not all, characters previously thought to be diagnostic for the Cetopsinae. *Denticetopsis* is hypothesized to be monophyletic on the basis of the following series of derived whale-catfish characters: an obliquely truncate caudal fin that is joined by a membrane to the posterior margin of the anal fin, a cluster of prominent caniniform teeth at the symphysis of the dentary, a reduced lateral line canal system, and edentulous vomer.

Denticetopsis sauli is distinguished from *D. royeri* by having a more slender body, a smaller eye, a maxilla that projects at least one eye diameter posterior of the orbit, and a deep notch in the membrane that joins the anal and caudal fins.

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INTRODUCTION

Recent attention to the freshwater fish fauna of Venezuela has uncovered a number of new and interesting species. Two species of whale catfishes (Cetopsidae, Cetopsinae), representing a new genus, were among the interesting finds and are the subject of this paper.

The whale catfishes have been recognized as a distinct family-level taxon since the publication of Gill (1872) and have almost universally been referred to as the Cetopsidae since 1912 (Miranda Ribeiro 1912). After a long period of relative neglect, whale catfish systematics has undergone considerable investigation in recent years. Two unpublished theses (Oliveira 1988 and Milani de Arnal 1991) described the mor-

phology of selected taxa and examined the species of the family. Ferraris and Brown (1991) briefly discussed the various proposed schemes of classification of cetopsids in an effort to place their newly discovered species into an appropriate genus. Lundberg and Rapp Py-Daniel (1994) commented on the lack of explicit phylogenetic hypotheses available for the genera of whale catfishes. They observed that placement of newly discovered species into existing genera was problematic inasmuch as none of the genera are diagnosed on derived characters.

A first step toward a hypothesis of relationships of whale catfishes was provided by de Pinna and Vari (1995). Therein, the Neotropical family Helogenidae was proposed as the sister group to the whale catfish, and that the two

taxa be considered as subfamilies of an expanded Cetopsidae. The whale catfishes, now the Cetopsinae, were diagnosed on a suite of derived osteological and myological characters, as well as a number of external features that, in combination, are unique to that group. Although de Pinna and Vari did not examine relationships among whale catfishes, they did provide the framework for such a study.

The two undescribed species that are the subjects of this paper were examined in the light of the contribution of de Pinna and Vari. The species can be unambiguously assigned to the Cetopsidae. Further, they exhibit none of the derived characters of one of the two included clades: the Helogeninae, and possess most, but not all of the characters of the Cetopsinae. The two species share characters that are either unique within the Siluriformes, or are otherwise unknown within the Cetopsidae. On the basis of all of these observations, the two species are thought to represent a new genus of whale catfishes that diverged early in the evolution of the Cetopsinae.

MATERIALS AND METHODS

Standard length (SL) was measured with dial calipers, to 0.5 mm, and is the measurement given for specimens; other measurements were taken with an ocular micrometer on a Wild M-5 dissecting microscope, to 0.1 mm. All measurements represent the shortest straight-line distances between points. Head length (HL) is measured from the snout tip to the end of the fleshy gill cover. Anal fin-base length is measured to the last fin ray base and does not include the membrane extending from the last ray to the first procurent caudal-fin ray. Eye length is the horizontal diameter of the pigmented portion of the eye, as the eye is not bounded by a bony orbit. Interocular width is the shortest distance between the eyes. Vertebral counts include the single, autogenous first centrum, three for the complex centrum and count the ural complex as one.

Osteological details of *Denticetopsis* are available only for *Denticetopsis sauli*, because *D. royeri* is known only from the holotype. Therefore, statements about the relationships of *Denticetopsis* are based on the anatomy of *D. sauli*, which is designated as the type species.

Type specimens of these species are deposited at the following institutions: Academy of Natural Sciences, Philadelphia (ANSP); National Museum of Natural History, Washington (USNM); and Museo Biología, Universidad Central de Venezuela, Caracas (MBUCV). Comparative material was examined from the collections of the American Museum of Natural History (AMNH), the California Academy of Sciences (CAS or SU) and USNM.

DESCRIPTIONS

Denticetopsis n. gen.

TYPE SPECIES. — *Denticetopsis sauli* n. sp.

DIAGNOSIS. — A new genus of Cetopsinae with the following combination of characters (synapomorphic characters in italics): *Caudal fin obliquely truncate, with dorsalmost principal ray longest; anal fin joined by membrane to ventral margin of caudal fin; lateral line canal not extending posteriorly past abdomen; caniniform teeth in a cluster at the symphysis of dentary; vomer edentulous; dorsal fin with four segmented rays; gill opening not restricted, branchiostegal membranes joined only slightly to isthmus; swimbladder not encapsulated in bone by extension of Weberian complex; membranous attachment present between abdomen and basal one-third to one-quarter of innermost ray of pelvic fin.*

ETYMOLOGY. — From *dentis* Latin for tooth (Brown 1956), in reference to the elevated symphyseal teeth of the dentary; and *cetopsis* Latin for whale-like, a commonly used suffix for, and source of the common name of, whale catfishes; gender is feminine.

REMARKS. — *Denticetopsis* exhibits the osteological characters described in de Pinna and Vari (1995) that diagnose the Cetopsidae. For example, the anterior cartilage of the palatine is flared anteriorly and extended onto the mesial surface of the bone (Fig. 1); and the interopercle broadly contacts, and overlaps, the anteroventral margin of the opercle (Fig. 2). *Denticetopsis* further exhibits the external characters listed in de Pinna and Vari (1995) as useful for recognition of the cetopsids, including: an elongated anal fin base (Figs. 3, 4), the absence of nasal barbels, the orbital margin obscured by a

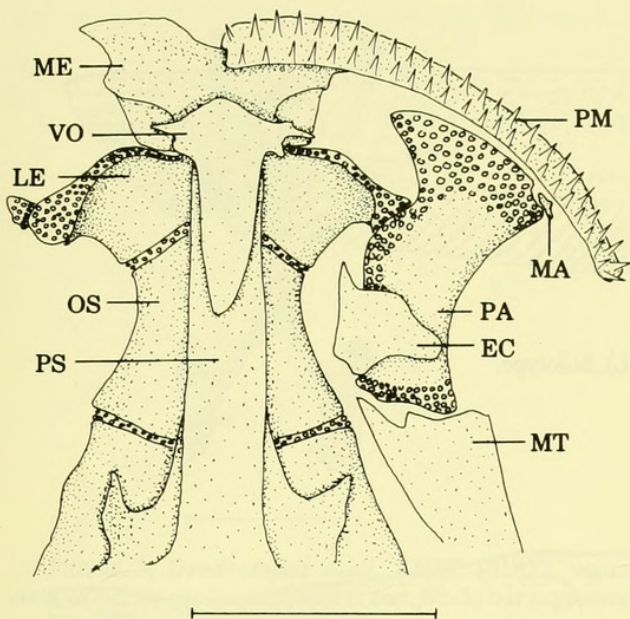


FIGURE 1. *Denticetopsis sauli*, ANSP 161432, ventral view of ethmoid region, anterior at top. Scale bar represents 1 mm. EC - ectopterygoid; LE - lateral ethmoid; MA - maxilla; ME - mesethmoid; MT - metapterygoid; OS - orbitosphenoid; PA - palatine; PM - premaxilla; PS - parasphenoid; VO - vomer.

thick epidermal layer, and slender, thread-like barbels.

None of the derived characters listed in de Pinna and Vari (1995) supporting the monophyly of the Helogeninae are found in *Denticetopsis*. Similarly, the external characters that are useful in the recognition of helogenines are not found in these fishes. In contrast, most of the characters that diagnose the whale catfish, the Cetopsinae, are found in *Denticetopsis*. The basipterygium exhibits an enlarged, ramified posterior cartilage (Fig. 5); the hyomandibula has a basal, laminar sheet extending anteriorly from the neurocranial articular head (Fig. 2); and hypertrophied levator arcus palatini and adductor mandibulae muscles (Fig. 6) extend onto the dorsal surface of the neurocranium, although the latter is in a somewhat modified form (see below). Two characters cited in de Pinna and Vari as either diagnostic of cetopsines, or valuable in their recognition, are not found in *Denticetopsis*. The anterior tip of the third epibranchial is not curved anteriorly, and it appears to contact the cartilages of both the third and fourth pharyngobranchial elements. This resembles the primitive catfish condition and not the derived cetopsine state. Similarly,

Denticetopsis lacks furrows in the skin into which the mental barbels fit. This, too, reflects the absence of a derived cetopsine character. Thus, it appears that while *Denticetopsis* can unambiguously be assigned to the Cetopsinae on the basis of some of the characters listed in de Pinna and Vari, the curved epibranchial and mental barbel furrows may be derived for a more restricted subgroup of that clade.

The monophyly of *Denticetopsis* is supported by several derived characters, all of which are listed in the diagnosis (above). Interpretation of some of these characters is not problematic, as they represent either unique features in catfishes (e.g., the enlarged symphyseal teeth on an expanded oral surface of the dentary) or features that are only rarely found in catfishes (e.g., obliquely truncate caudal fin, and the membranous attachment between the caudal fin and the anal fin) (Figs. 7, 8). Other features, such as the low number of dorsal fin rays, absence of teeth on the vomer, and the truncated lateral line canal system, are not rare in catfishes. They are, however, derived within the Cetopsidae and can be considered diagnostic for the genus. However, features such as these are cited in Weitzman and Vari (1988) as typical reductive features of miniature species and may be related to the small size of the species. A search for equivalent sized cetopsines for comparison uncovered two *Pseudocetopsis* specimens (USNM 226147, 17.6 mm; and SU 50456, 27 mm) from Surinam. These specimens have fully-developed vomerine tooth patches and lateral line canal systems as well as obvious

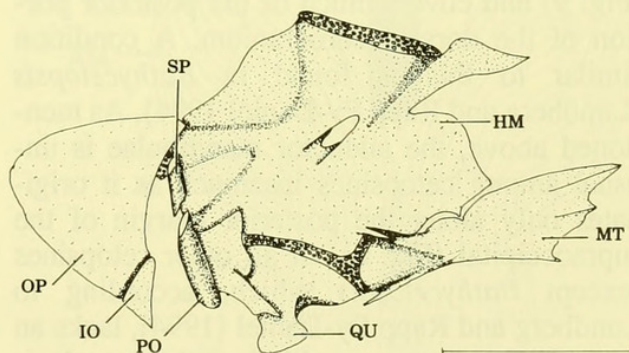


FIGURE 2. *Denticetopsis sauli*, ANSP 161432, suspensorium and related structures of right side, in lateral view. Anterior on right, dorsal at top. Scale bar = 1 mm. HM - hyomandibular; IO - interopercle; MT - metapterygoid; OP - opercle; PO - preopercle; QU - quadrate; SP - suprapreopercle.

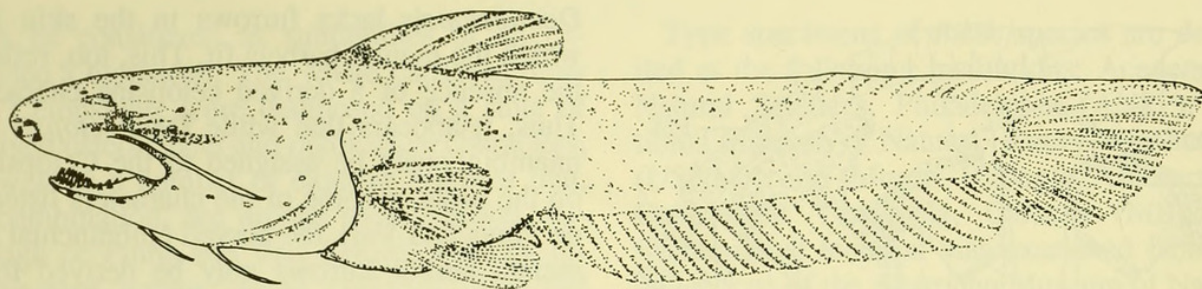


FIGURE 3. *Denticetopsis sauli*, MBUCV-V-20300 (20.5 mm SL), holotype.

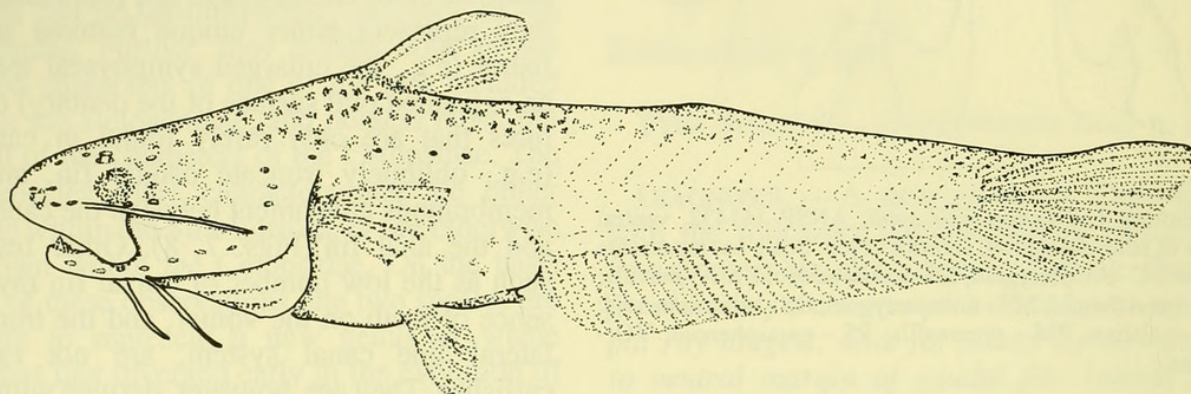


FIGURE 4. *Denticetopsis royeri*, MBUCV-V-26785 (18.7 mm SL), holotype.

furrows associated with the mental barbels. Thus, it appears that these features develop in comparably small individuals of related species and their absence need not be considered the result of paedomorphosis.

Several additional features that are not mentioned in the diagnosis are not easily interpreted in a phylogenetic context but are worth pointing out. The posterior fontanelle is greatly enlarged (Fig. 9) and covers much of the posterior portion of the dorsal neurocranium. A condition similar to this is found in *Bathycetopsis* (Lundberg and Rapp Py-Daniel 1994). As mentioned above, the adductor mandibulae is unusual among cetopsines inasmuch as it originates only along the posterior margin of the supraoccipital (Fig. 6). In all other cetopsines (except *Bathycetopsis* which, according to Lundberg and Rapp Py-Daniel [1994], lacks an expanded adductor mandibulae) the muscle is broadly attached over the posterior half of the dorsal midline of the neurocranium (de Pinna and Vari 1995). In *Cetopsis coecutiens* (CAS 78929), *Hemicetopsis candiru* (CAS 65902), and *Pseudocetopsis* sp. (SU 50456) the adduc-

tor mandibulae extends to the posterior margin of the supraoccipital as well (pers. obs.). The polarity of this variation among species, as well as the relationship of the enlarged fontanelle to this variation, must await a more thorough study.

Denticetopsis sauli n. sp.
(Figs. 3, 10, 11)

HOLOTYPE. — MBUCV-V-20300 (20.5 mm) Venezuela: Estado Amazonas, outflow stream from series of morichales, ca. 5.0 km from mouth of Río Pamoni, 2°48'N, 65°53'W, 18 Mar 1987, B. Chernoff et al.

PARATYPES. — (all taken with holotype) MBUCV-V-20301 (2, 20.0–21.0 mm); ANSP 161432 (4:2 as prepared skeletons in glycerine, 16.5–21.0 mm).

DIAGNOSIS. — A relatively slender species of *Denticetopsis* in which the body depth at the point of insertion of the epaxial musculature is less than 20% SL. The eye is less than 11% SL. The fleshy maxilla extends approximately one eye diameter past the posterior margin of

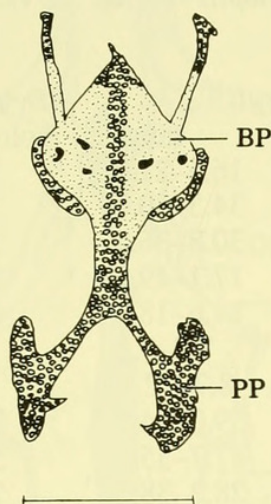


FIGURE 5. *Denticetopsis sauli*, ANSP 161432, ventral view of pelvic girdle, anterior at top. Scale bar represents 1 mm. BP - basipterygium; PP - posterior process of basipterygium.

the eye, and the membrane that joins the caudal fin to the anal fin is distinctly incised.

DESCRIPTION. — Selected measurements for the type specimens are given in Table 1.

Body terete, deepest at dorsal fin base; dorsal profile of head and body nearly straight, with only a slight elevation in the vicinity of the dorsal spine; body depth at supraoccipital spine less than 20% SL; in cross section, body rounded at abdomen, becoming compressed posteriorly; body depth in caudal region decreasing uniformly posteriorly.

Head large, depressed anteriorly; head length one-third of SL, depth at eyes approximately 40% HL; dorsal profile of head convex, especially in region of enlarged adductor mandibulae; snout bluntly rounded, extending beyond anterior margin of dentary; anterior naris a short, anteriorly directed, tube at snout margin, posterior naris a short broad tube situated above anterior half of eye, directed posterodorsally; eye small, lateral, diameter of pigmented portion approximately one-tenth HL and between one-third and one-half snout length; eye covered with thick epidermal layer, not bounded by bony orbit; maxillary barbel originates in fleshy groove between upper jaw and middle of eye, barbel tip not reaching opercular margin; mental barbels not lying in grooves, medial mental barbel originates anterior to equally long lateral mental; mental barbels not extending to posterior opercular margin; post-

orbital region of head dominated by massive adductor mandibulae that originates near to, but not contacting, dorsal midline of neurocranium; branchiostegal rays 10–12, opercular membranes joined to isthmus anteriorly, not extending to tip of first branchiostegal ray, gill openings not restricted, extending from above origin of pectoral fin to vertical line at anterior margin of eye.

Mouth large, subterminal; gape extends posterior of eye by at least one eye diameter; upper jaw teeth small, conical, uniform in size; in two rows from symphysis to below middle of eye; dentary with single row of small conical teeth from base of coronoid process midway to symphysis; more anteriorly, a second row lateral to primary row; at symphysis, oral surface of dentary expanded medially with irregular patch of large conical teeth, smaller teeth of primary row continue to symphysis anterior to enlarged teeth; teeth absent from palate. Seven or eight rakers on outer surface of lower limb of first gill arch, none on upper limb. Rakers increase in size posteriorly, anterior ones smaller than interval between successive rakers, posterior ones longer than interval.

Cephalic lateral-line canal system with indis-

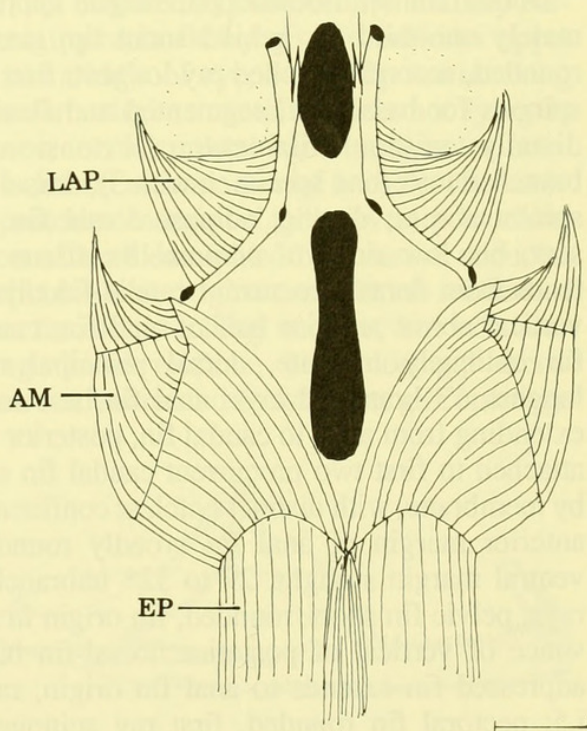


FIGURE 6. *Denticetopsis sauli*, MBUCV-V-20301, dorsal view of posterior portion of head showing superficial muscles, anterior at top. Scale bar represents 1 mm. AM - adductor mandibulae; EP - epaxialis; LAP - levator arcus palatini.

TABLE 1. Selected measurements for *Denticetopsis sauli* and *Denticetopsis royeri*. All values represent percentages. Mean and range values are for the entire type series.

| | <i>Denticetopsis sauli</i> | | | <i>D. royeri</i> |
|--------------------------------------|----------------------------|-------|-----------|------------------|
| | holotype | mean | range | holotype |
| Standard length (mm) | 20.5 | | 16.5–21.0 | 18.5 |
| Predorsal length (in SL) | 38.5 | 38.35 | 34.3–40.6 | 37.4 |
| Head length (in SL) | 34.6 | 33.17 | 30.8–36.4 | 32.1 |
| Body depth at epaxial origin (in SL) | 19.0 | 18.94 | 17.1–19.5 | 23.5 |
| Body depth at anus (in SL) | 14.6 | 16.34 | 14.6–18.2 | 18.2 |
| Depth at caudal peduncle (in SL) | 8.3 | 8.28 | 7.2–9.1 | 7.5 |
| Body width at anus (in SL) | 8.8 | 10.42 | 8.7–12.7 | 9.1 |
| Anal fin base length (in SL) | 39.0 | 41.89 | 39.0–44.9 | 39.0 |
| Preal length (in SL) | 54.2 | 51.91 | 47.7–55.0 | 50.3 |
| Interorbit width (in HL) | 28.2 | 32.90 | 28.2–38.3 | 28.3 |
| Head width (in HL) | 54.9 | 58.25 | 53.3–62.1 | 58.3 |
| Snout length (in HL) | 26.8 | 25.80 | 23.3–30.0 | 26.7 |
| Eye (in HL) | 8.5 | 9.70 | 8.5–10.6 | 11.7 |

tinct pores along mandibular, infraorbital, and supraorbital series; canals deep beneath skin and visible only in skeletal preparations; canals on body consist of one or two disjunct segments bordered by one pore at each end; canals restricted to abdomen and only visible after removing superficial mucus.

Dorsal fin well-developed, origin approximately one-third SL behind snout tip; margin rounded, second branched ray longest; first ray spinous for basal half, segmented and flexible distally, without filamentous extension; 4 branched rays (one specimen with 3); dorsal-fin spinlet absent; distinct adipose-dorsal fin absent, but low ridge of adipose-like tissue extends from dorsal procurrent caudal-fin rays to vertical above anterior half of anal fin; caudal fin obliquely truncate, dorsal principal rays longest, 13 branched rays; anal fin-base long, extending from anus to caudal fin, posterior ray attached to first two procurrent caudal fin rays by membrane, with distinct notch at confluence; anterior margin of anal fin broadly rounded, ventral margin straight, 29 to 32* unbranched rays; pelvic fin short, rounded, fin origin in advance of vertical of posterior dorsal-fin base, adpressed fin extends to anal fin origin, rays: i,5; pectoral fin rounded, first ray spinous to just past middle of ray, flexible distally; spinous portion of first ray without serrations; adpressed fin extends to vertical through anus, but not reaching anal-fin origin; rays: I,6 or I,7*.

(NOTE. — The count for the holotype is indicated by an asterisk *.)

PIGMENTATION IN ALCOHOL. — Pigmentation primarily from scattered brown stellate chromatophores approximately one eye diameter in size when fully expanded on head and lateral abdominal wall; caudal chromatophores noticeably smaller; body appears light brown when chromatophores are fully expanded, or creamy white with fine brown flecks when contracted.

Chromatophores evenly distributed over most of caudal region except for denser concentration on dorsal midline and at caudal-fin base; chromatophores more sparse on anterior caudal region and lateral abdominal walls; chromatophores concentrated in diffuse triangular blotch in humeral region, extending for length of adpressed pectoral fin; dorsal and lateral surface of nape, snout, and head (to level of eyes) with few scattered chromatophores; cheek ventral of eye, operculum, ventral surface of head and abdomen without, or with few widely-scattered chromatophores. Barbels without pigment or with one or two spots basally. Dorsal fin with spot covering base of first two rays, spot no larger than eye. Pectoral, pelvic, and anal fins immaculate; caudal fin dusky, small chromatophores scattered irregularly along dorsal and ventral margins of rays.

DISTRIBUTION. — The species is known from the Río Pamoni, a north-flowing river at the

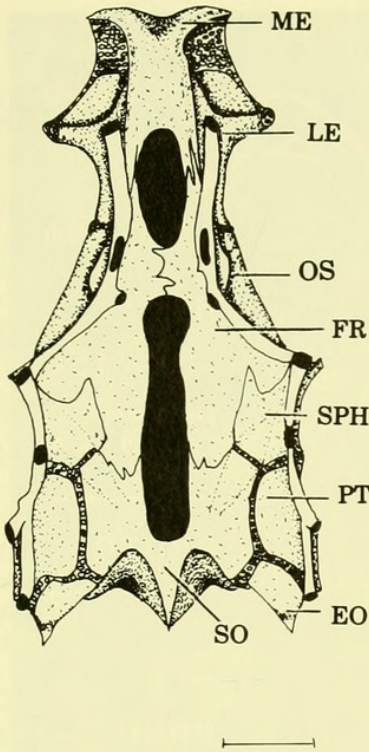


FIGURE 7. *Denticetopsis sauli*, ANSP 161432, dorsal view of neurocranium and associated structures, anterior at top. Scale bar represents 1 mm. EO - epioccipital; FR - frontal; LE - lateral ethmoid; ME - mesethmoid; OS - orbitosphenoid; PT - pterotic; SO - supraoccipital; SPH - sphenotic.

northeastern end of Brazo Casiquiare, in southern Venezuela.

ETYMOLOGY. — I take great pleasure in naming this fish for William G. Saul, collection manager of the Ichthyology Department of the Academy of Natural Sciences, Philadelphia, who participated in the collection of the type series of this species and who brought these fishes to my attention.

SIZE. — The largest individual examined, 21 mm SL., possessed mature testes. It is presumed, therefore, that the species does not grow substantially larger than this, making it the smallest species of whale catfishes.

Denticetopsis royeri n. sp.
(Figs. 4, 10, 12)

HOLOTYPE. — MBUCV-V-26785 (formerly USNM 268643) (1, 18.5 mm), Venezuela: Estado Amazonas, Caño Chola at crossing of San Carlos de Río Negro to Solano road, 1°58'N, 67°00'W, 5 Dec 1984, R. P. Vari, C. J. Ferraris, and A. Machado-Allison.

DIAGNOSIS. — A species of *Denticetopsis* in

which the maxilla extends only slightly past the posterior margin of the eye; the eye is almost 12% HL; the body depth at the supraoccipital spine is 23% SL; and the membranous connection between the anal fin and the caudal fin is without a distinct notch.

DESCRIPTION. — Selected measurements for the holotype are given in Table 1.

Body terete, deepest at dorsal fin base; dorsal profile of head and body distinctly flexed at dorsal fin origin; in cross section, body rounded at abdomen, becoming compressed posteriorly; abdomen globose; body depth in caudal region decreasing uniformly posteriorly.

Head large, slightly depressed anteriorly; depth at eyes approximately 40% HL; head depth and width nearly equal at opercle; head length one-third of SL; dorsal profile of head straight to dorsal-fin origin, except for slight notch at juncture of adductor mandibulae and epaxialis; snout bluntly rounded, extending beyond anterior margin of dentary; anterior naris a short anteriorly directed tube at snout tip, posterior naris a short tube above anterior half of eye directed dorsolaterally; eye small, lateral, greater than 11% HL and less than one-half snout length; eye covered with thick epidermal layer, not bounded by bony orbit; maxillary barbel originates in fleshy groove between upper jaw and middle of eye, barbel tip not reaching opercular margin; mental barbels not lying in grooves, medial mental barbel originates anterior to lateral mental; mental barbels not reaching posterior margin of gill cover; postorbital region of head dominated by massive adductor mandibulae that originate on dorsal surface of neurocranium, reaching near to, but not contacting dorsal midline; branchiostegal membranes not connected to isthmus, gill openings

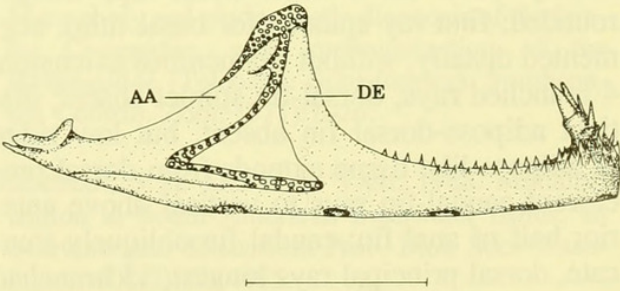


FIGURE 8. *Denticetopsis sauli*, ANSP 161432, lateral view of right dentary, anterior to right, dorsal at top. Scale bar represents 1 mm. AA - anguloarticular; DE - dentary.

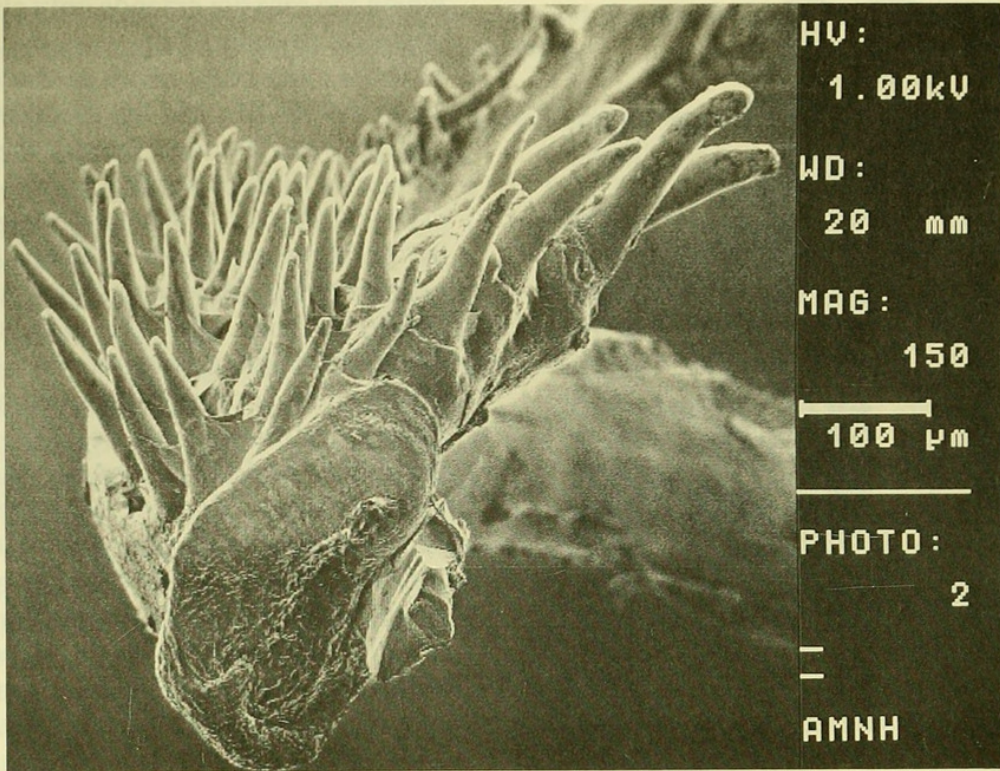


FIGURE 9. *Denticetopsis sauli*, ANSP 161432, scanning electron micrograph of mesial view of symphysis of right dentary, anterior to left, dorsal at top.

extend from above origin of pectoral fin to vertical line through anterior margin of eye.

Mouth large, subterminal; gape does not extend beyond posterior margin of eye; teeth on both jaws small, conical; symphysis of lower jaw with posteriorly expanded oral surface covered by somewhat larger teeth.

Cephalic lateral-line canal system with indistinct pores along mandibular, infraorbital, and supraorbital series; canals not visible; one pair of pores connected by slender canal observed midlaterally on body slightly posterior to vertical through posterior extent of dorsal fin base.

Dorsal fin well-developed, origin approximately 40% SL behind snout tip, margin rounded; first ray spinous for basal third, segmented distally, without filamentous extension; 4 branched rays; dorsal-fin spinlet absent; distinct adipose-dorsal fin absent, but low ridge of adipose-like tissue extends from dorsal procurrent caudal-fin rays to vertical above anterior half of anal fin; caudal fin obliquely truncate, dorsal principal rays longest, 13 branched rays; anal fin-base long, extending from anus to caudal fin, membranous extension from posterior ray broadly attached to caudal fin, without distinct notch at confluence; anterior margin

of anal fin broadly rounded, ventral margin straight, 31 unbranched rays; pelvic fin short, rounded, fin origin anterior to vertical of posterior dorsal-fin base, adpressed fin extends to anal fin origin, rays: i,5; pectoral fin rounded, first ray not spinous, but slightly stiffened, visibly segmented and flexible distally; spinous portion of first ray without serrations; adpressed fin not reaching vertical through anus, but not reaching anal-fin origin; rays: I,7.

PIGMENTATION IN ALCOHOL. — Pigmentation primarily from scattered brown stellate chromatophores approximately one-half eye diameter or less in size when fully expanded on head and lateral abdominal wall; caudal chromatophores noticeably smaller; body creamy white with fine brown flecks.

Chromatophores evenly distributed over most of caudal region except for denser pattern on, and along side of, dorsal midline; single row of chromatophores dorsal to anal fin base; dorsal and lateral surface of nape, snout, and head (to level of eyes) with few scattered chromatophores; cheek ventral of eye, operculum, ventral surface of head and abdomen without, or with few widely scattered chromatophores. Barbels without pigment or with one or two spots

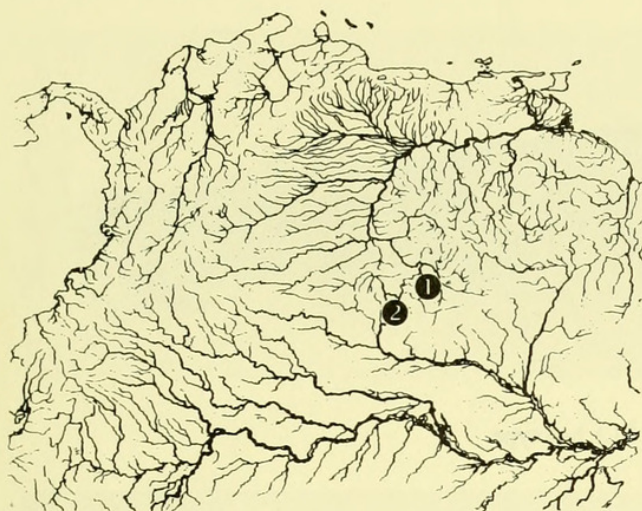


FIGURE 10. Drainage map of northern South America from the Amazon River northwards, with the type localities of *Denticetopsis sauli* (1) and *D. royeri* (2) indicated. Scale 1 cm equals approximately 210 km.

basally. Dorsal fin with diffuse spot covering base of first two rays, spot no larger than eye. Pectoral, pelvic, and anal fin rays and membranes immaculate; caudal fin with small chromatophores scattered irregularly along dorsal and ventral margins of each ray.

DISTRIBUTION. — The species is known only from the Río Negro drainage of southern Venezuela.

ETYMOLOGY. — The new species is named for Ramiro Royero, a Venezuelan ichthyologist, who accompanied me on all of my field work in Venezuela.

SIZE. — This species is known from the 18.7 mm holotype. The sex and state of maturation for this specimen are unknown.

ACKNOWLEDGMENTS

The holotype of *Denticetopsis royeri* was collected with Richard Vari during fieldwork that was supported by funding from the International Environmental Sciences Program (IESP), Neotropical Lowland Research Program of the Smithsonian Institution. The specimens of *Denticetopsis sauli* were studied with the permission of Barry Chernoff and Scott Schaefer. This study was initiated while I was at AMNH and completed at CAS. Access to the collections and equipment at these institu-

tions was provided by Gareth Nelson, C. Lavett Smith, Tomio Iwamoto, and William Eschmeyer. Photographs of the holotypes were taken by Susan Middleton and Dong Lin at CAS. The manuscript was reviewed by Mário de Pinna and John Lundberg. The assistance of these individuals and organizations is appreciated.

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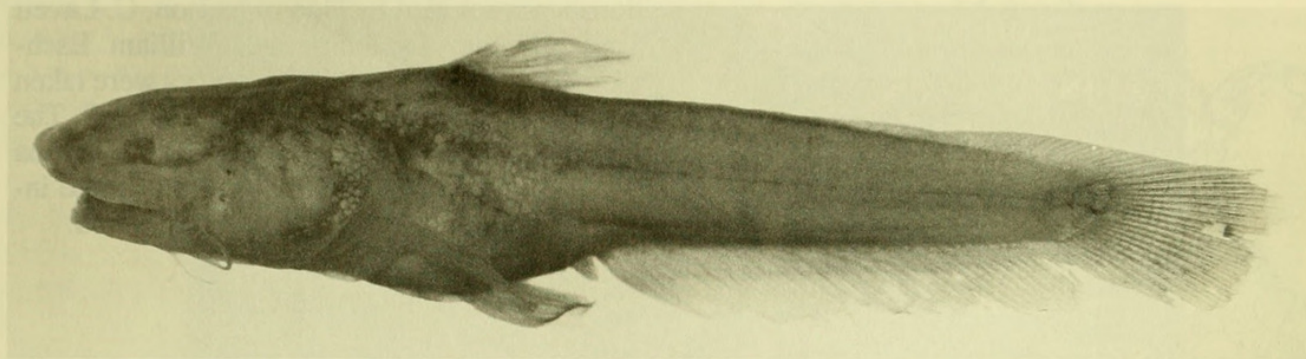


FIGURE 11. *Denticetopsis sauli*, MBUCV-V-20300 (20.5 mm SL), holotype.

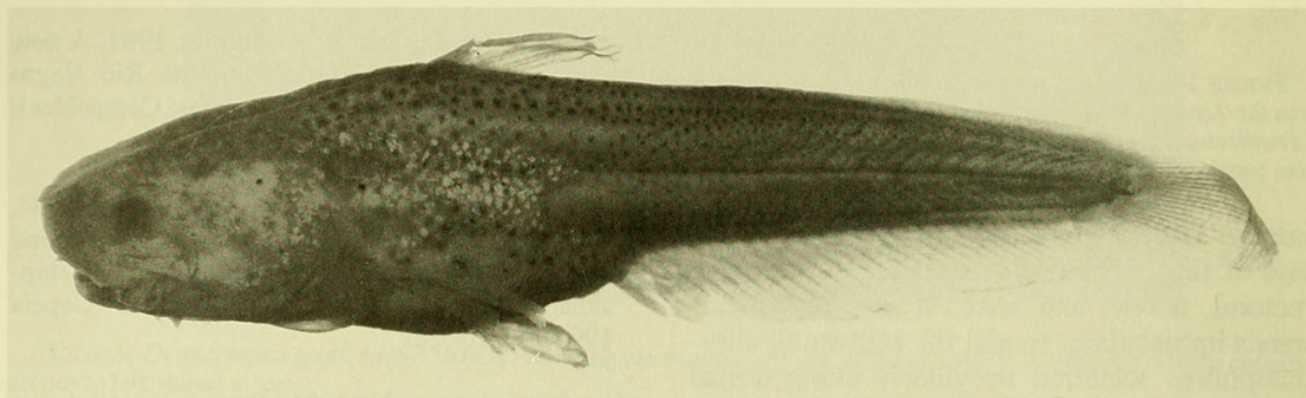


FIGURE 12. *Denticetopsis royeri*, MBUCV-V-26785 (18.7 mm SL), holotype.

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