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Systematics of the Genus *Otothyris* Myers 1927, with Comments on Geographic Distribution (Siluriformes: Loricariidae: Hypoptopomatinae)

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ABSTRACT

A revision of the genus *Otothyris* Myers, 1927, is presented on the basis of collections from the coastal river systems of southeastern Brazil. *Otothyris* is diagnosed among genera of the loricariid subfamily Hypoptopomatinae on the basis of autapomorphies of the cranial skeleton and caudal fin. Three new species are described and compared with the three nominal species of *Otothyris,* which are herein redescribed: *Rhinelepis lophophanes* Eigenmann and Eigenmann, 1889, is transferred to *Otothyris* under a new combination; *Otocinclus cephalacanthus* Ribeiro, 1911, and *Otothyris canaliferus* Myers, 1927, are junior synonyms of *Otothyris lophophanes*; we designate a lectotype from among the type series of *O. canaliferus. Otothyris juquiae,* n. sp. is described from the Juquiá River of the Ribeira de Iguape basin, São Paulo State; *Otothyris rostrata,* n. sp. is described from the coast of Rio Grande do Sul State; *Otothyris travassosi,* n. sp. is described from the isolated coastal rivers of Espírito Santo State. The species are compared by multivariate statistical analysis of morphometric characters, which distinguishes *O. lophophanes* and *O. juquiae* from *O. rostrata* and *O. travassosi* on the basis of variables with highest loadings on head depth, head width, and orbit diameter. We offer comments on the endemic distribution of the genus *Otothyris* in southeastern Brazil.

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RESUMO

A revisão do gênero *Otothyris* Myers, 1927, é apresentada com base em coleções dos rios costeiros do sudeste e sul do Brasil. *Otothyris* é diagnosticado entre os gêneros do subfamília Hypoptopomatinae tendo por base autapomorfias do esqueleto, do crânio e nadadeira caudal. Três espécies novas são aqui descritas, sendo comparadas com as três espécies nominais do gênero *Otothyris: Rhinelepis lophophanes* Eigenmann and Eigenmann, 1889, é mantida em combinação nova; *Otocinclus cephalacanthus* Ribeiro, 1911, e *Otothyris canaliferus* Myers, 1927, são considerados sinônimos juniores de *Otothyris lophophanes*; um lectótipo foi designado entre os exemplares da série típica de *Otothyris canaliferus. Otothyris juquiae,* sp. n. é descrita do rio Juquiá, bacia do rio Ribeira de Iguape, São Paulo; *Otothyris rostrata,* sp. n. é descrita dos rios da costa leste do Rio Grande do Sul; *Otothyris travassosi,* sp. n. é descrita procedente dos rios isolados da costa do Espírito Santo e Bahia. Os caracteres morfométricos das espécies são comparados através de análise estatística multivariada, que distingue *O. lophophanes* e. *O. juquiae* de *O. rostrata* e *O. travassosi* com base em variáveis com maior carga em profundidade da cabeça, largura da cabeça, e diâmetro da órbita. O endemismo do gênero *Otothyris* e a distribuição das espécies nos rios costeiros do sudeste e sul do Brasil são discutidos.

INTRODUCTION

The genus *Otothyris* was established by Myers (1927) for his new species *Otothyris canaliferus,* which was diagnosed by the presence of enlarged pterotic fenestrae and pronounced dorsolateral crests of the supraoccipital and pterotic bones. According to Myers (1975: 8), these characters distinguish *Otothyris* from *Otocinclus* Cope, 1872, and *Microlepidogaster* Eigenmann and Eigenmann, 1889. The nomenclatural history of *Otothyris* involves species originally assigned to four separate genera. We regard the type species, *O. canaliferus,* along with *O. cephalacanthus* Ribeiro, 1911—two species considered valid by Myers (1975)—to be junior synonyms of *O. lophophanes,* a species originally described by Eigenmann and Eigenmann (1889) in the genus *Rhinelepis* Spix, 1829. Recognition of *R. lophophanes* by Eigenmann and Eigenmann (1889) was apparently based on the presence of three odontode crests on the supraoccipital bone, large nasal depressions bordered by odontode ridges, the lower surface of the head bordered by a series of strong recurved odontodes, and the coracoid and scapula granular. Except for the presence of supraoccipital crests, this short description can generally be applied to all species of the loricariid subfamily Hypoptopomatinae and no further explanation was given by Eienmann and Eigenmann (1889) for the placement of this species in *Rhinelepis.* Regan (1904: 269) transferred *R. lophophanes* to *Otocinclus,* whereas Eigenmann (1910: 413) later transferred the species to *Microlepidogaster.*

Ribeiro (1911) described *Otocinclus cephalacanthus* for cascudinhos having three odontode crests on the pterotic bone and presence of strong odontodes arranged in rows on the head and trunk. This species has subsequently been recognized as a species of *Otothyris* by Gomes (1955), Myers (1975), and Schaefer (1997). Our examination of the holotype of *Rhinelepis lophophanes* and primary types of *Otothyris canaliferus* at ANSP, MCZ, and USNM and *Otocinclus cephalacanthus* at MNRJ confirms their conspecific status and generic placement in *Otothyris.* Myers (1927) provided a diagnosis for the genus *Otothyris* based on the presence of three odontode crests on the head (supraoccipital), which distinguishes this genus from all other Hypoptopomatinae except *Pseudotothyris* Britski and Garavello, 1984. Among hypoptopomatines, both *Otothyris* and *Pseudotothyris* uniquely share the presence of three supraoccipital crests and supraoccipital bone forming the dorsal wall of the swimbladder capsule. However, *Pseudotothyris* lacks the characters we regard as diagnostic of *Otothyris* (Schaefer, 1991).

Availability of collections of fishes from eastern and southeastern Brazil made during the last 10 years has given us the opportunity to revise the species of *Otothyris,* in connection with revisionary studies of other hypoptopomatine genera (e.g., *Parotocinclus*—

Garavello, 1977; *Otocinclus*—Schaefer, 1997; *Microlepidogaster*—Garavello, Britski, and Schaefer, in prep.), which we intend as steps toward a comprehensive reevaluation of the systematics of the subfamily Hypoptopomatinae.

METHODS

Ten meristic characters were obtained for each specimen. Tooth counts follow Garavello (1988) for the genus *Parotocinclus*. Premaxillary and mandibular tooth counts were taken for the left jaw element; gaps in the tooth row were included in the tooth count whenever gap width exceeded tooth width (i.e., gaps greater than average tooth width judged as tooth presence and included in the count). Lateral body plate counts were based on the canal-bearing median plate series and counted on the left side of the individual following Schaefer (1997) and including one or more terminal non-canal-bearing median series plates in the lateral line.

Standard length (SL) is used throughout. Ten morphometric characters were obtained following Garavello (1988) in addition to head width, taken at the opercle. Morphometric analyses were performed to evaluate the extent of divergence of body and head shape among species. Measurements were made with vernier calipers to the nearest 0.1 mm, transformed to common logarithms, and principal components (Bookstein et al., 1985) were computed from the covariance matrix using SYSTAT version 5.1 (Wilkinson, 1992).

Osteological comparisons were made on specimens cleared and counter-stained for bone and cartilage following Taylor and Van Dyke (1985). Illustrations were prepared with camera lucida and Zeiss SV8 stereomicroscope, and by scanning electron microscopy. In the listing of material examined, we follow Menezes and Weitzman (1990) and Reis (1996) in the style used in listing of geographic entities and locality names; all measurements are in millimeters, "cs" denotes cleared and stained. In the synonymies for each species, localities are presented as cited in the original descriptions; modern and corrected equivalents are provided in the listing of materials examined, following Higuchi (1992) for Thayer Expedition material.

Institutional abbreviations

AMNH	American Museum of Natural History, New York
ANSP	Academy of Natural Sciences of Philadelphia
MCN	Fundacão Zoobotanica do Rio Grande do Sul
MCP	Museu de Ciências da Pontificia Universidade Católica do Rio Grande do Sul
MCZ	Museum of Comparative Zoology, Harvard University
MNRJ	Museu Nacional do Rio de Janeiro
MZUSP	Museu de Zoologia da Universidade de São Paulo
UFPB	Universidade Federal da Paraiba
USNM	National Museum of Natural History, Smithsonian Institution, Washington, DC

SYSTEMATIC ACCOUNTS

Otothyris Myers, 1927

Otothyris Myers, 1927: 127; type species: *Otothyris canaliferus* Myers, 1927, by monotypy.

DIAGNOSIS: Diagnosed among fishes of the family Loricariidae, subfamily Hypoptopomatinae, by the following autapomorphies (Schaefer, 1991): Swimbladder capsule expanded posteriorly beyond joint between Weberian complex (fused centra 1–5) and sixth centrum, versus capsule not expanded beyond joint; 12 branched caudal-fin rays, versus 14; frontals, supraoccipital and compound pterotic-supracleithrum bones with odontodes arranged in conspicuous rows, versus odontodes irregularly arranged; sphenotic without portion of infraorbital laterosensory canal, versus canal present; preopercular canal absent from subocular cheek plate, versus canal present. Recognized externally by expanded swimbladder capsule with elongate pterotic-supracleithrum posterodorsal process forming dorsal margin of capsule lateral opening, head with odontodes arranged in longitudinal rows, supraoccipital with paired anterior odontode crests and posterior midline crest, single crest on pterotic-supracleitrum lateral margin.

DESCRIPTION: Orbit position almost completely lateral, iris diverticulum absent. Pre-

opercle exposed on lateral cheek; head and snout margin with enlarged odontodes arranged in dorsal and lateral series. Swimbladder capsule enlarged, pterotic-supracleithrum with elongate posterodorsal process forming dorsal margin of capsule lateral opening, lateral opening wider than deep. Bones of head sculptured by series of ridges bearing odontodes forming distinct crests; supraoccipital with paired anterior crests and median posterior crest extending to posterior supraoccipital tip, pterotic with lateral crest along dorsal margin of swimbladder capsule lateral opening. A deep depression on head along suture between sphenotic and pterotic-supracleithrum. No separate first infraorbital plate. Rostrum comprises 2–3 individual plates, not consolidated as single median rostral plate. Pectoral skeleton completely exposed ventrally and bearing strong odontodes; midline sutures between antimeres of the cleithrum and coracoid of equal length, respectively; first dorsal-fin spinelet present anterior to the defensive dorsal spine. Trunk plates with regular longitudinal series of odontodes; four prominent series forming the dorsal and ventral caudal peduncle corners, appearing quadrangular in cross section; adipose fin absent.

DISTRIBUTION: Coastal rivers of southeastern Brazil, from southern Bahia to Rio Grande do Sul States (fig. 1).

ONTOGENY: Immature specimens of *Otothyris* species, as in most species of the Hypoptopomatinae, exhibit salient crests or ridges of enlarged odontodes on the posterodorsal region of the supraoccipital and pterotic-supracleithrum bones. In *O. lophophanes, O. juquiae,* n. sp., and *O. rostrata,* n. sp., these odontode crests are retained in adults and the regions of the head between crests form deep depressions with growth. Variation in numbers of teeth and arrangement of abdominal plates were found in ontogenetic series of *Otothyris.* Examination of large series is therefore required for correct identification of immatures. Abdominal plates of adults are generally arranged in a paired lateral series, with regular to irregular arrangements of smaller plates medially. Smaller and presumably younger specimens have the median aspect of the abdomen completely unplated, or plated to a lesser degree than in adults.

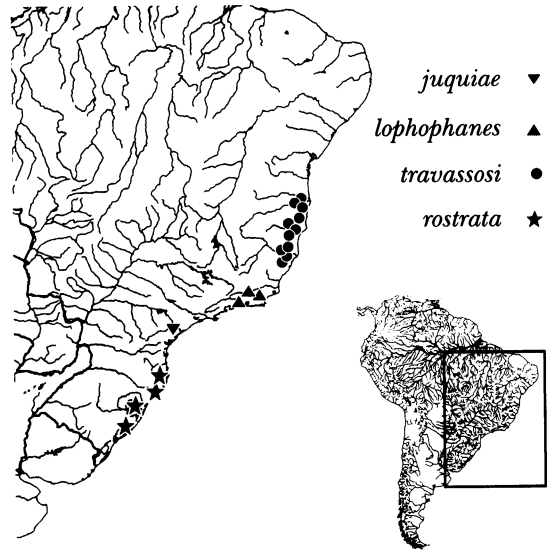

Fig. 1. Drainage map of southeastern Brazil showing distribution of *Otothyris* species. Some symbols represent more than one collecting locality.

KEY TO SPECIES OF *OTOTHYRIS*

1A. Single series of ventrally downturned odontodes along ventral rostral margin, the series dorsal to it formed by dorsally upturned odontodes and separated from ventral series by conspicuous discontinuity lacking odontodes and extending laterally to level of anterior nares (fig. 2A); an azygous platelet in front of anus, preceded by two or more anterior to azygous plate . . . . . *O. lophophanes*
Coastal rivers of Rio de Janeiro State

1B. Two or more series of ventrally downturned odontodes along rostrum, without conspicuous discontinuity between dorsal and ventral odontode series (fig. 2B); a pair of platelets in front of anus preceded by an additional pair of platelets 2

2A. 10–16 premaxillary teeth, 9–12 dentary teeth . . . . . *O. juquiae,* new species
Ribeira de Iguape basin

2B. 14–30 premaxillary teeth, 12–22 dentary teeth 3

3A. Lateral margin of nares anterior to orbit with very broad and salient crest; orbit diameter greater than infraorbital depth; 25–26 lateral plates . . . . . *O. rostrata* new species

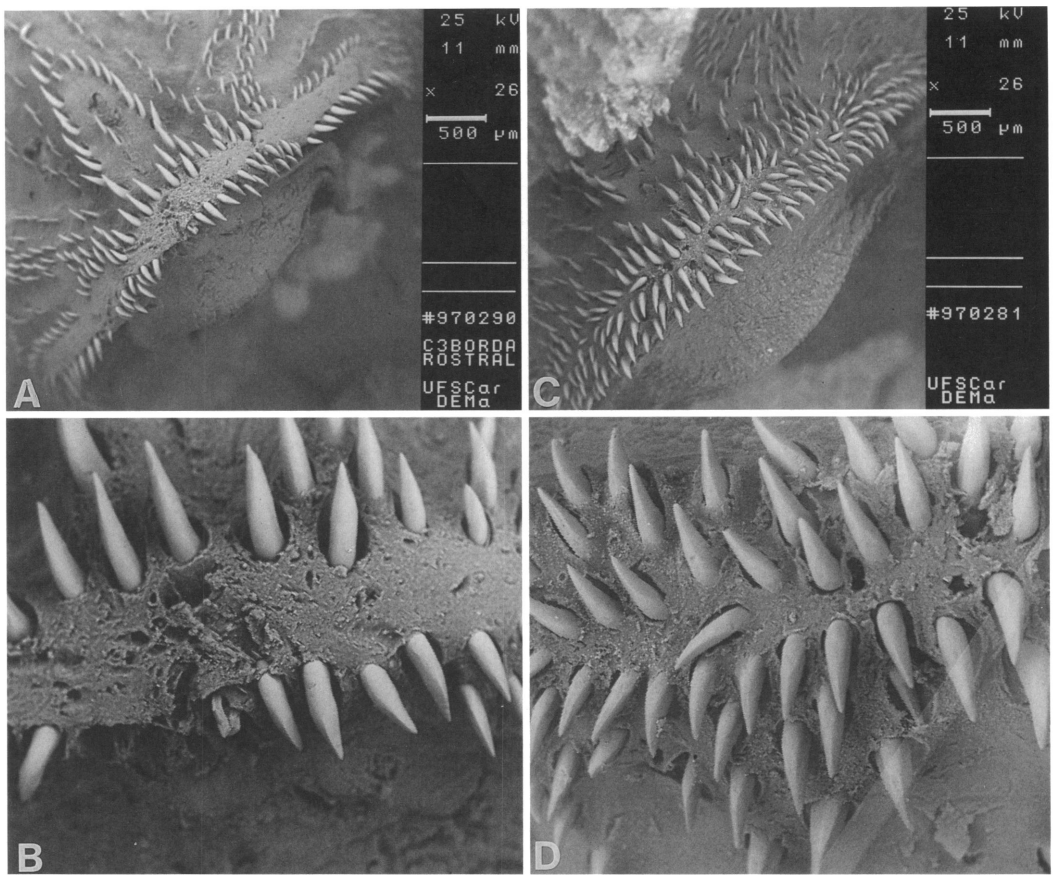

Fig. 2. Scanning electron micrographs of the rostral odontodes of *Otothyris,* frontal view, dorsal toward top left corner in A, C; dorsal toward top in B, D. **A, B,** *O. lophophanes,* MZUSP 8726, 27 mm SL, 26× and 50× magnification; **C, D,** *O. travassosi,* MZUSP 39095, 26 mm SL, 26× and 50× magnification.

Coastal rivers of Santa Catarina and Rio Grande do Sul States

3B. Lateral margin of nares anterior to orbit with narrow crest; orbit diameter less than infraorbital depth; 21–23 lateral plates .... *O. travassosi,* new species
Coastal rivers of Espírito Santo and Bahia States

Otothyris lophophanes (Eigenmann and Eigenmann, 1889)

Figures 2A, B, 3

Rhinelepis lophophanes Eigenmann and Eigenmann, 1889: 42 (type locality: Santa Cruz, Brazil); Eigenmann and Eigenmann, 1890: 416 (types).

Otocinclus lophophanes Regan, 1904: 269 (one specimen, holotype of *Rhinelepis lophophanes*).

Microlepidogaster lophophanes Eigenmann, 1910: 413 (reference); Ribeiro, 1911: 90 (Portuguese translation of Eigenmann and Eigenmann, 1890); Gosline, 1945: 101 (reference); Fowler, 1954: 166 (reference).

Otocinclus cephalacanthus Ribeiro, 1911: 93 (type locality: Brasil); Gosline, 1945: 100 (reference); Fowler, 1954: 129 (reference).

Otothyris cephalacanthus Gomes, 1955: 221 (reference); Myers, 1975: 8 (diagnosis for *Otothyris*).

Otothyris canaliferus Myers, 1927: 128 (type locality: Brazil: hills vicinity Rio de Janeiro); Gosline, 1945: 100 (reference); Fowler, 1954: 133 (reference); Myers, 1975: 8 (diagnosis of species).

DIAGNOSIS: A species of *Otothyris* distinguished from its congeners by the following combination of characters: one series of

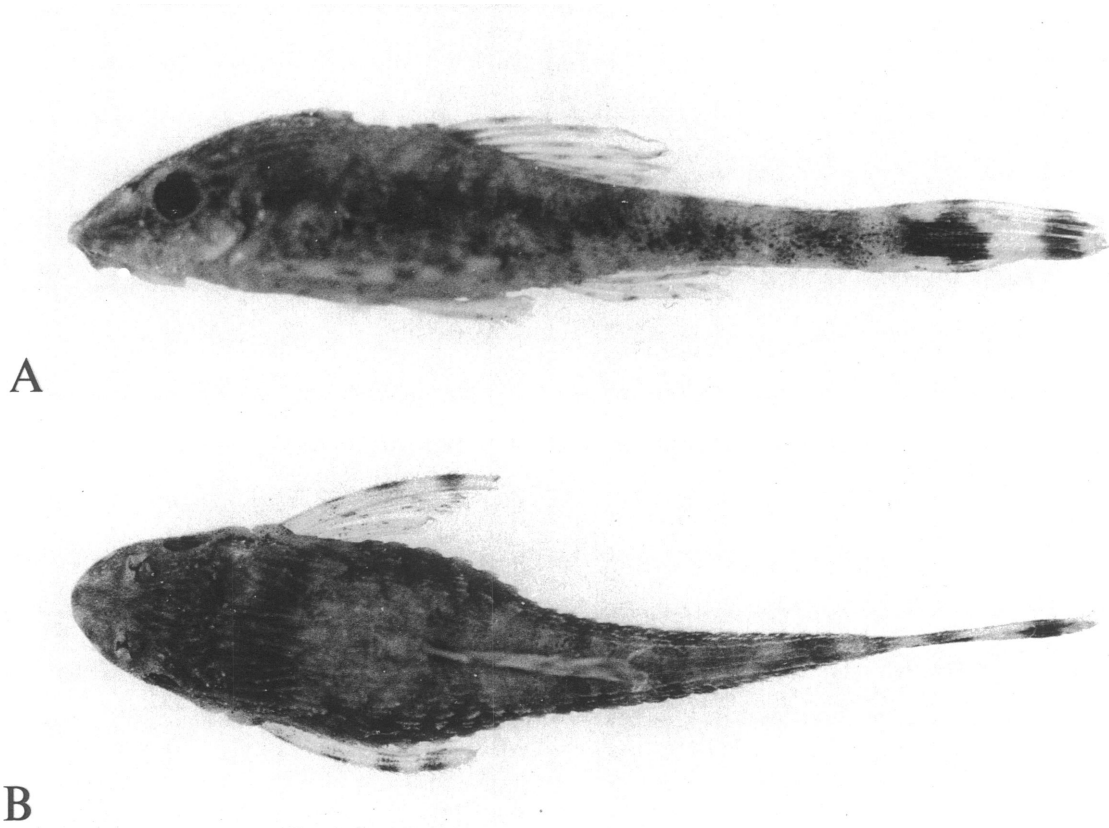

Fig. 3. *Otothyris lophophanes,* paratype, MZUSP 8718, 22.5 mm SL, Brazil: creek on road Rio de Janeiro to Santa Cruz, km 52, near Jardim dos Palmares. **A**, lateral view; **B**, dorsal view.

downturned odontodes along ventral rostral margin; series dorsal to it formed by dorsally upturned odontodes, separated by conspicuous discontinuity without odontodes extending laterally to level of anterior nares; head and snout region deep; three conspicuous crests of large odontodes on posterodorsal region of supraoccipital bone and one on each pterotic-supracleithrum; 14–20 premaxillary teeth and 12–18 dentary teeth; abdomen with 1–3 paired lateral plates, an azygous platelet anterior to anus occasionally preceded by a pair of small plates; 23–25 lateral body plates.

DESCRIPTION: Dorsal profile of head convex from snout tip to supraoccipital odontode crest. Head very deep, typically 18–26% SL, sculptured by series of bony ridges or crests bearing odontodes, with intervening depressions; region of nares and junction of pterotic and sphenotic slightly depressed; head width 17–24% SL. Dorsal orbit margin salient; orbit diameter 24–33% head length (HL), 29–40% interorbit length. Posterior region of head above pterotic-supracleithrum expanded; swimbladder capsule opening large, its greatest depth approximately equal to nares diameter. Dorsal profile of trunk nearly straight from dorsal-fin origin to caudal fin. Body width uniform between pectoral-fin origin and dorsal fin, gradually tapering posteriorly to caudal fin. Nuchal plate elevated.

Head with pair of anterior crests on snout converging to single crest behind nares; large crest with 4 or 5 odontode series laterally on snout from nares to anterior margin of orbit, passing above dorsal orbit margin, terminating near origin of pterotic-supracleithrum crest. One or two odontode series between nares, continuing posteriorly to frontal bone.

Infraorbital region surrounded by odontode series continuing posteriorly to pterotic-supracleithrum bone. Rostral margin of snout salient, snout tip bearing single series of large and ventrally downturned odontodes on ventral margin and one or two series of dorsally upturned odontodes on dorsal margin, with a discontinuity lacking odontodes extending laterally to nares between dorsal and ventral odontode series (fig. 2A, B). Irregular arrangement of odontodes between rostral margin and the ventral orbit region; 3 or 4 longitudinal series of small odontodes anteriorly, 10–12 series posteriorly, 4 or 5 series laterally and confluent with paired supraoccipital crest. Posterior region of supraoccipital with tall median crest between paired lateral crests; additional odontode crest on pterotic-supracleithrum above swimbladder capsule opening; 2 to 4 series of small odontodes extending along pterotic-supracleithrum between lateral crest and supraoccipital crest.

Longitudinal series of odontodes running posteriorly along trunk; 4–5 series on dorsum, 5 series on lateral caudal peduncle; odontodes of dorsal and ventral series larger than surrounding odontodes, yielding quadrangular aspect to peduncle. Scapular bridge completely exposed and covered with small odontodes. Abdomen in adults generally with single, occasionally two large plates behind coracoid laterally, one azygous plate anterior to anus; remainder of abdomen unplated. Total lateral plates 23–25.

Maxillary barbels thin and elongate, longer than 0.5 orbit diameter. Premaxillary teeth 14–20, mandibular teeth 12–18.

Dorsal fin i,7; origin slightly behind vertical through pelvic-fin origin. Pectoral fin i,6; first unbranched ray long, when depressed reaching from middle to end of pelvic fin. Pelvic fin i,5; posterior border semicircular, not reaching first unbranched anal-fin ray in females; reaching or surpassing anal origin in males. Anal fin i,5; truncate. Caudal-fin i,12,i; slightly notched, lobes equal, posterior margin not pointed.

PIGMENTATION: Ground color of head and trunk light brown; lighter areas present anterior to dorsal fin, at dorsal region of caudal peduncle, and on entire ventral region. A dark brown band extends from tip of snout across orbit and extending onto trunk; band conspicuous on snout, its width equal to orbit diameter; wider along anterior trunk, narrowing toward caudal fin; caudal-fin base with dark brown blotch. Four transverse brown bars on dorsum; first crossing anterior to dorsal fin, second posterior to dorsal-fin base, third posterior to anal-fin origin, fourth at caudal-fin base. Fin rays (excluding caudal fin) with 3–5 brown blotches, sometimes comprising bars on fins. Caudal fin pigmentation variable, a brown blotch at base and including fin membranes, a dark horizontal bar on median fin rays and sometimes confluent with brown blotch at base, a vertical bar along distal fin margin.

DISTRIBUTION: Known from the Atlantic coastal streams of Rio de Janeiro State, Brazil (fig. 1).

REMARKS: Myers (1927) described *Otothyris canaliferis,* a species we consider to be a junior synonym of *O. lophophanes,* on the basis of 88 specimens collected by R. Brocca in the vicinity of Rio de Janeiro. The type series consists of 87 specimens in Myers' personal collection plus a specimen deposited as MCZ 31577. Syntypes from Myers' personal collection were subsequently disseminated to several other institutions soon after publication, however, our survey of the holdings of the major ichthyological repositories of Neotropical freshwater fishes accounted for only a small number of these specimens. For the purposes of nomenclatural stability, we designate MCZ 31577 as the lectotype; all other specimens in the type series become paralectotypes.

MATERIAL EXAMINED: Brazil, Rio de Janeiro State: 45 specimens, 18.0–28.2 mm SL.

MCZ 8164 (18 mm SL holotype of *Rhinelepis lophophanes*) Santa Cruz, rio Grande [rio Grande (Arroio Fundo), within urban area of Rio de Janeiro, at the Emperor Pedro II's Fazenda Santa Cruz], Thayer 114, Dom Pedro II and D. Bourget, 1865; MNRJ 1050, (18.0 mm SL holotype of *Otocinclus cephalacanthus*) Brazil; MCZ 31577 (17.9 mm SL lectotype of *Otothyris canaliferus*), ANSP 84381 (16.6 mm SL paralectotype of *O. canaliferus*), USNM 92974 (3: 19.2–28.2 paralectotypes of *O. canaliferus*) hills vicinity Rio de Janeiro, R. Brocca, 1924; MCZ 47770 (2:21.9, 26.8) Jardim Palmares, 52 km

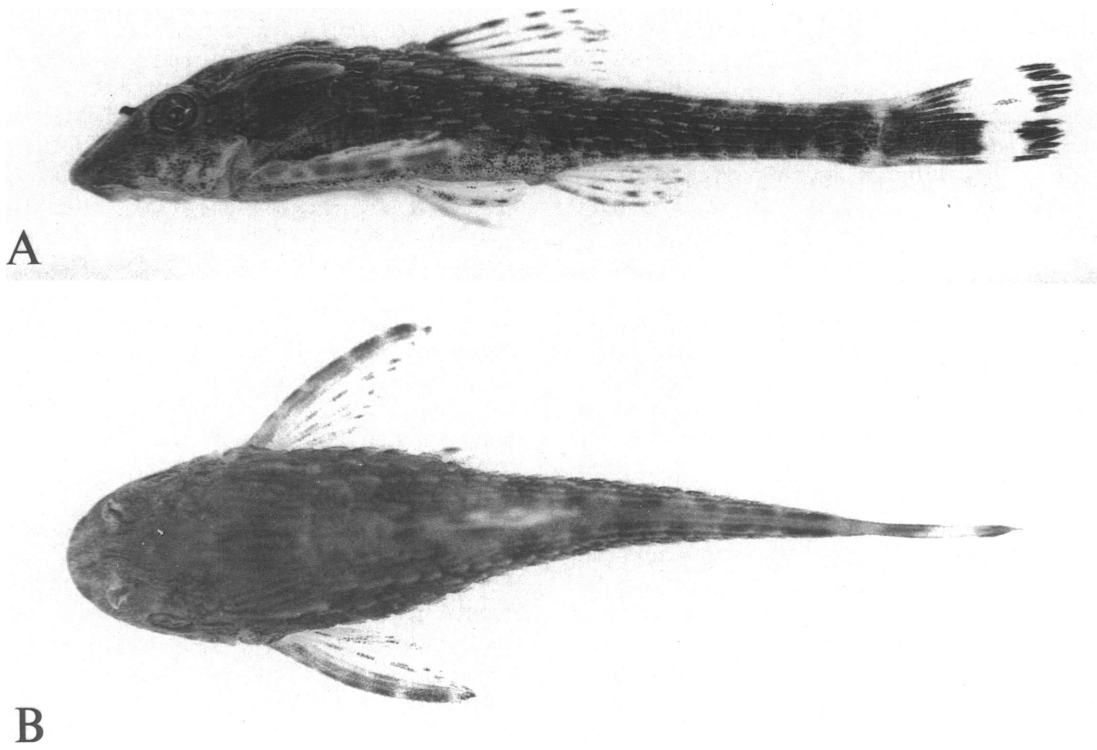

Fig. 4. *Otothyris juquiae,* paratype, MZUSP 51286, 31.5 mm SL, Brazil: Juquia River, Pontal da Volta pool. **A**, lateral view; **B**, dorsal view.

from Rio de Janeiro on the Rio de Janeiro to Santa Cruz highway, H. A. Britski and J. C. Garavello, 9 Nov. 1969; MZUSP 1049 (5) rio Prata, Estação de Jacutinga, A. L. Carvalho, 1935; MZUSP 8718–8728 (11:18.2–27.3) creek on road Rio de Janeiro to Santa Cruz, km 52, near Jardim dos Palmares, H. A. Britski and J. C. Garavello, 9 Nov. 1969; MZUSP 8729–8735 (7:18.0–20.7) Córrego Lagoa Nova on road from Itaguai to Raiz da Serra, km 7, H. A. Britski and J. C. Garavello, 8 Nov. 1969; MZUSP 8736 (1:22.0) Córrego da Ponte do Teixeira, on road Itaguai to Raiz da Serra, km 5, H. A. Britski and J. C. Garavello, 8 Nov. 1969; MZUSP 23786 (1:25.4) road from Itaguaí to Raiz da Serra, H. A. Britski and J. C. Garavello, 8 Nov. 1969; MNRJ 6386 (4) old road to Petrópolis, 1–2 km from new road, Petrópolis to Raiz da Serra, G. S. Myers, H. Travassos and M. Ribeiro, 28 Sept. 1942; MNRJ 8570 (6) Recreio dos Bandeirantes, B. Lutz and G. S. Myers, Nov. 1943; MNRJ 9989 (1) Guapimirim, 1944.

Otothyris juquiae, new species

Figure 4

DIAGNOSIS: A species of the genus *Otothyris* distinguished from congeners by the following combination of characters: 10–16 premaxillary and 9–12 dentary teeth on each jaw element, 21–23 lateral plates, and caudal-fin rays with a large and elongate dark brown blotch on the base, followed by two transverse brown bars. With the exception of *O. lophophanes,* other *Otothyris* species have more premaxillary (14–30) and dentary (12–22) teeth. *Otothyris juquiae* can be further distinguished from *O. lophophanes* by presence of two or more series of ventrally downturned odontodes on the anteroventral

rostral margin (versus a single series) and presence of pair of platelets in front of anus preceded by two or more platelets (versus azygous preanal plate); from *O. travassosi* by orbital diameter greater than infraorbital distance (versus orbit diameter less than infraorbital distance).

DESCRIPTION: Dorsal profile of head smoothly convex from snout tip to median supraoccipital odontode crest, somewhat depressed in narial region and at median odontode crest origin. Nuchal plate elevated anterior to defensive dorsal-fin spine. Head very deep and marked by regular, conspicuous odontode series between prominent odontode crests; head depth 25% SL; head width 17–20% SL. Orbit large, dorsal bony margin salient; orbit diameter 25–30% HL, 40–50% interorbit distance, greater than horizontal diameter of swimbladder capsule opening; depth of swimbladder capsule opening equal to nares diameter.

Dorsal profile of body nearly straight from dorsal-fin origin to caudal-fin base. Body width uniform from pectoral-fin origin to dorsal-fin origin, tapering abruptly, posteriorly from this point to level of anal-fin origin, tapering gradually between anal and caudal fins.

Head with pair of anterior crests running from mid-snout, uniting posterior to internarial region. A large crest of several odontode rows running laterally on snout, passing through anterior orbit region and dorsal to dorsal orbit margin, terminating at pterotic-supracleithrum bone. One to three series of odontodes between median and lateral snout crests. One series of odontodes sometimes divided posteriorly along medial nares margin. Ventral orbital region surrounded by short series of odontodes, continuing posteriorly to pterotic-supracleithrum bone. Rostrum salient, ventral margin with 2 or 3 series of large ventrally downturned odontodes; single odontode series between rostral and lateral crests on snout, lateral crest subdivided into 3 or more series posteriorly. Several irregular odontode series in interorbital region. Anterior region of supraoccipital with pair of large and salient crests, posterior supraoccipital region with large median crest of enlarged odontodes between anterior pair and extending posteriorly to form raised tuft at posterior supraoccipital tip. Large odontode crest across pterotic-supracleithrum laterally from anterior swimbladder capsule margin to posterior process; region between lateral supraoccipital and pterotic-supracleithrum crests with 5–7 odontode series. Region dorsal to swimbladder capsule opening with depressed areas between lateral and supraoccipital crests, yielding exaggerated ridges and valley appearance.

Trunk with several longitudinal odontode series to caudal peduncle; 5 prominent odontode series on caudal peduncle posteriorly, dorsal and ventral series comprising enlarged odontodes, yielding quadrangular aspect to caudal peduncle in cross section.

Pectoral skeleton exposed ventrally, with regular distribution of small odontodes. Abdomen of adults covered by paired series of 2–4 large lateral plates; median abdominal region with 2–3 series of smaller plates, a pair of preanal platelets preceded by 2 or more additional platelets. Total lateral plates 21–23.

Oral disk ovoid, papillose; maxillary barbels short, length approximately 0.5 orbit diameter. Premaxillary teeth 10–16, dentary teeth 9–12.

Dorsal fin i,7; origin slightly behind pelvic-fin origin. Pectoral fin i,6; spine very long, when depressed reaching to posterior third of pelvic fin. Pelvic fin i,5; its margin almost semicircular, not reaching anal-fin origin in females, reaching beyond anal-fin origin in males. Anal fin, i,5; truncate. Caudal fin i,12,i; its margin slightly notched, lobes equal and slightly pointed.

PIGMENTATION: Ground color of head and trunk light brown, lighter areas anterior to dorsal fin, dorsal region, and nearly entire ventral region of body. Longitudinal dark brown band running along orbit from snout tip to caudal fin, its width at snout region less than orbit diameter, approximately 1.5 orbit diameters at lateral trunk, narrowing posteriorly to caudal fin. Dorsum of head and trunk with 4 thin and inconspicuous transverse brown saddles: first anterior to dorsal fin, second posterior to dorsal-fin base, third posterior to anal-fin base, fourth at caudal peduncle. Conspicuous linear marking between nares and lateral rostral margin. All fins except caudal almost hyaline, fin rays with dark

brown bands interrupted by light spaces. Caudal fin pigmentation variable, large black blotch at base and including fin membranes, horizontal brown bar on median fin rays, confluent with brown blotch at base; occasionally an additional vertical black bar along posterior fin margin.

DISTRIBUTION: Known from tributaries of the Ribeira de Iguape river basin, São Paulo State, Brazil (fig. 1).

ETYMOLOGY: The specific name, *juquiae,* from Juquiá, a small town on the rio Juquiá, São Paulo State, refers to the type locality and is derived from the name of a group of indigenous Amazonian people and their word for a small fishing device used in shallow water; treated as a noun in apposition.

MATERIAL EXAMINED: Brazil, São Paulo State: 41 specimens, 11.0–31.5 mm SL.

Holotype: MZUSP 10309 (22.0 mm SL) Juquiá, creek at the Cantagalo farm, H. A. Britski and J. C. Garavello, 5 Nov. 1969.

Paratypes: MZUSP 8383–8400 (15:20–28.0) Juquiá, Poço Grande farm, W. Bockermann and W. Schultz, 7 June 1953; MZUSP 38616 (3:11.0–18.4) creek Poço Grande at road SP-79, 8 km from Juquiá city, MZUSP expedition, 29 March 1987; MZUSP 41877 (1:25.2) Registro, floods of Quilombo River, near Osuki farm, J. Damato and O. T. Oyakawa, 17 Feb. 1990; MZUSP 38122 (1cs) Poço Grande farm, Juquiá, W. Bockermann and W. Schultz, 7 June 1993; MZUSP 51285 (1:28.2) Juquiá, Poço Grande creek at the Poço Grande farm, A. S. Abe and J. C. Garavello, 12 Oct. 1974; MZUSP 51286 (14:19.0–31.5) Juquiá, Pontal da Volta pool, Juquiá River, J. C. Garavello and J. G. da Silva, 1–5 Sept. 1980; MZUSP 51284 (2:21.0, 22.0), Juquiá, Palhau creek, tributary of Juquiá River, A. S. Abe and J. C. Garavello, 13 Oct. 1974.

Otothyris rostrata, new species

Figure 5

DIAGNOSIS: A species of the genus *Otothyris* distinguished from congeners by the following combination of characters: 17–20 premaxillary and 14–16 dentary teeth on each jaw element, 25–26 lateral plates, presence of two or more series of ventrally downturned odontodes on anteroventral rostral margin, head and snout deeply sculptured, 3 large and conspicuous odontode crests on supraoccipital: median crest with 3–4 series, lateral crests with 2 series of large odontodes, fourth infraorbital very large and broadly convex, presence of pair of preanal platelets preceded by 2 or more platelets.

DESCRIPTION: Dorsal profile of head smoothly convex from snout tip to dorsal-fin origin; narial and supraoccipital regions elevated. Nuchal plate elevated anterior to defensive dorsal-fin spine. Head sculptured by conspicuous odontode series forming strong bony ridges and deep depressions; head and snout slender, head depth 15–17% SL, head width 22–25% SL. Orbit small, dorsal bony margin salient; orbit diameter 20–25% HL, 30–40% interorbit width, less than horizontal diameter of swimbladder capsule opening; depth of swimbladder capsule opening greater than nares diameter.

Dorsal profile of body nearly straight from rostrum to dorsal-fin origin; slightly concave between dorsal and caudal fins. Body width tapering slightly between pectoral and pelvic fins, nearly straight between pelvic fin and caudal peduncle.

Snout with 3–4 median odontode series, large nude area anterior to nares. Several series of small odontodes running laterally on snout along fourth infraorbital to orbit. Internarial and interorbital regions with short series of small odontodes, generally continuing back to pterotic-supracleithrum. Rostrum slightly upturned, ventral margin with 3–4 series of small ventrally downturned odontodes, dorsal margin with 3 series of dorsally upturned odontodes. Supraoccipital with three crests of large odontodes: paired lateral crests anteriorly, not joining median crest at midline; median crest posteriorly formed by 3–4 rows of large odontodes terminating in raised tuft at posterior supraoccipital tip.

Trunk with longitudinal odontode series to caudal peduncle; 5 prominent lateral series on caudal peduncle posteriorly, dorsal and ventral series comprising enlarged odontodes, yielding quadrangular aspect to caudal peduncle in cross section.

Pectoral skeleton exposed ventrally, with odontodes in longitudinal series on lateral cleithrum to ventral margin of swimbladder capsule opening. Abdomen of adults covered

Fig. 5. *Otothyris rostrata,* holotype, MCP 14812, 30.0 mm SL, Brazil: Osório, canal between the lagoons Emboaba and Emboabinha. **A**, lateral view; **B**, dorsal view.

by paired series of 5–7 large lateral plates, pair of preanal platelets preceded by median row of small round platelets, with nude areas in-between. Total lateral plates 25–26.

Oral disk ovoid, slightly papillose; maxillary barbels short, thin. Premaxillary teeth 17–20, dentary teeth 14–16.

Dorsal fin i,7; origin at vertical line through middle of pelvic fin. Pectoral fin i,6; spine very long, when depressed reaching to posterior third of pelvic fin. Pelvic fin i,5; its margin semicircular, not reaching anal-fin origin in females, reaching beyond anal-fin origin in males. Anal fin, i,5; truncate. Caudal fin i,12,i, its margin slightly notched, lobes equal and slightly pointed.

PIGMENTATION: Ground color dark brown, light brown areas anterior to dorsal fin and ventral region of head and trunk. Longitudinal dark brown band from rostrum to caudal fin, its width narrow at snout. Dorsum of head and trunk with 4 large transverse dark brown saddles: first anterior to dorsal fin, second posterior to dorsal-fin base, third at middle of anal fin, fourth at middle of caudal peduncle. Dorsum of head with light area at nares. All fins except caudal hyaline, fin rays with brown bands interrupted by light spaces. Caudal-fin rays and membranes dark brown, small semicircular light areas at mid-dorsal and mid-ventral regions.

DISTRIBUTION: Known from the rivers of the Atlantic coast of Santa Catarina and Rio Grande do Sul States, Brazil (fig. 1).

ETYMOLOGY: The specific name, *rostrata,* is derived from the Latin noun *rostrum,* for beak or snout, in reference to the prominent and deeply sculptured snout in this species.

MATERIAL EXAMINED: Brazil, Rio Grande

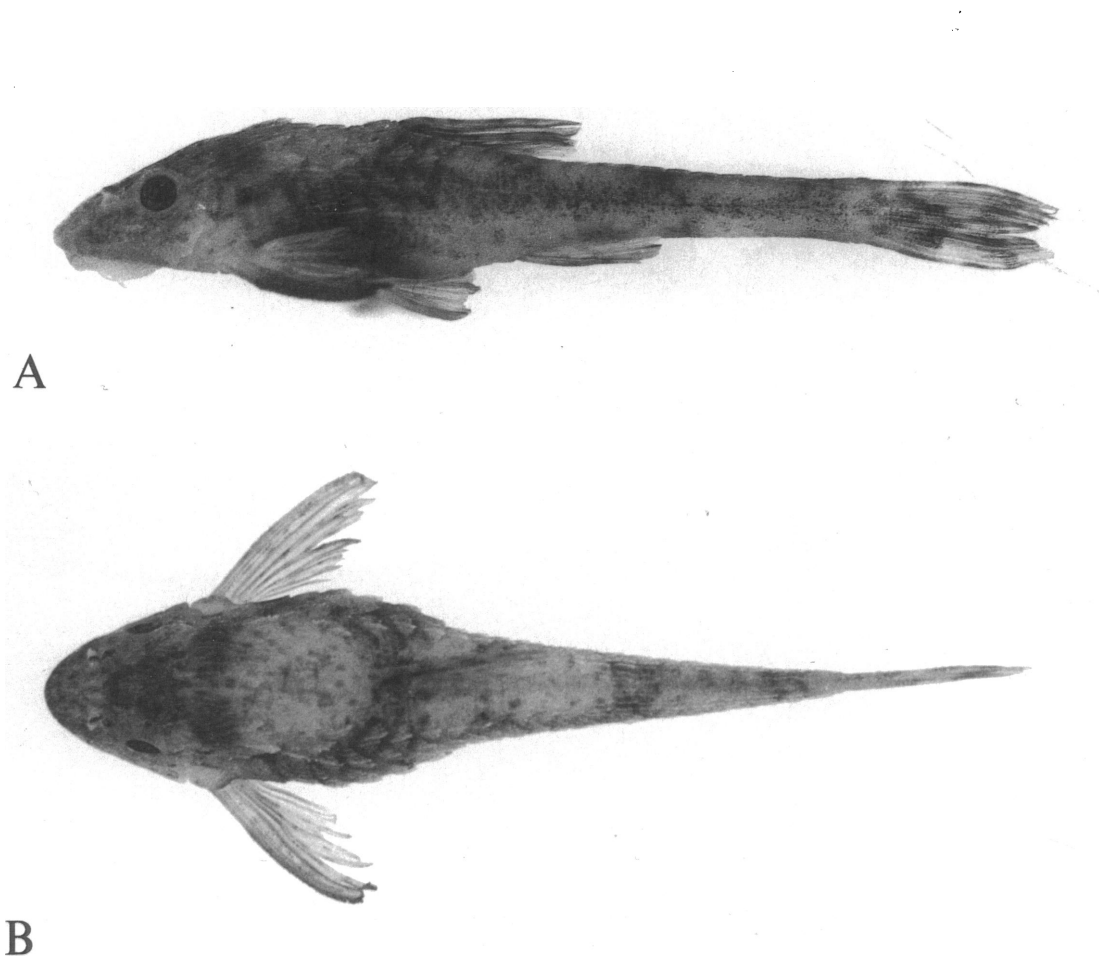

Fig. 6. *Otothyris travassosi,* MZUSP 51444, 32.0 mm SL, Brazil: Crubixá creek, tributary of the rio Santa Maria da Vitoria. **A**, lateral view; **B**, dorsal view.

do Sul and Santa Catarina States: 13 specimens, 17.0–30.8 mm SL.

Hòlotype: MCP 14812 (30.0 mm SL) Rio Grande do Sul State, Osório, canal between the Lagoons Emboaba and Emboabinha, on the highway between Osório and Tramandai, N. A. Menezes, R. E. Reis and E. H. L. Pereira, 16 Jan. 1991.

Paratypes: **Rio Grande do Sul State:** MCN 4996 (1:19.8), MCN 4724 (1:24.5) Lagoa Negra, Viamão, canal 4; MCP 14464 (2: 17.1, 20.7) Eldorado do Sul, arroio at road BR 290, 2 km W highway BR 116, rio Jacui system, L. R. Malabarba, P. A. Buckup and C. Souto, 4 Nov. 1979; MCP 19841 (1:17.0) same data as holotype. **Santa Catarina State:** ANSP 168973 (3:26.0–30.8) Tubarão, arroio Sanga de Areia, C. A. Lucena, L. R. Malabarba, and L. A. Bergmann, 7 Jan. 1986; MCP 10989 (5:19.7–22.5), Tubarão, Arroio Sanga de Areia, C. A. Lucena, L. R. Malabarba and L. A. Bergmann, 8 Jan. 1986; MZUSP 25038 (1:25.2) pool on highway BR 101, near Araranguá city, MZUSP/USNM Exped., 22 Sept. 1987.

Otothyris travassosi, new species

Figures 2C, D, 6

DIAGNOSIS: A species of the genus *Otothyris* distinguished from congeners by the following combination of characters: 16–21

premaxillary and 13–18 dentary teeth on each jaw element, 21–23 lateral plates, 2 or more series of ventrally downturned odontodes on anteroventral rostral margin, supraoccipital odontode crests short, low, orbit small, diameter less than infraorbital depth, abdomen with 2–3 paired lateral plates, pair of preanal platelets preceded by two or more additional platelets, with small naked areas between platelets, unbranched caudal-fin rays banded, large brown blotch on median caudal-fin rays, two dark brown oblique bars on caudal fin.

DESCRIPTION: Dorsal profile of head smoothly convex from snout tip to dorsal-fin origin, with small depression at origin of supraoccipital median crest. Nuchal plate elevated anterior to defensive dorsal-fin spine. Head sculptured by conspicuous series of small odontodes separated by shallow depressions. Head shallow, head depth 16–22% SL, head width 21–28% SL. Orbit small, dorsal bony margin not salient; orbit diameter 20–26% HL, less than infraorbital depth and 30–40% interorbital distance. Swimbladder capsule lateral opening small, its depth less than orbit diameter.

Dorsal profile of body slightly convex from rostrum to supraoccipital, nearly straight from supraoccipital crest to nuchal plate origin, straight to dorsal-fin origin, slightly concave between dorsal and caudal fins. Body width tapering slightly between pectoral and pelvic fins, nearly straight between pelvic fin and caudal peduncle.

Snout with pair of median odontode series from snout tip, uniting between nares to frontal bones; 4–5 series of small odontodes running laterally on snout from nares to orbit margin, joining lateral pterotic-supracleithrum odontode crest. Rostrum ventral margin with 1–2 series of ventrally downturned odontodes, dorsal margin with 2–3 series of dorsally upturned odontodes, dorsum with narrow nude area (fig. 2C, D). Supraoccipital with three short crests of large odontodes: anteriorly with pair of short lateral crests; posteriorly with median crest formed by 3–4 rows of large odontodes terminating in raised tuft at posterior supraoccipital tip; posterior limit of paired lateral crests not reaching median crest origin. Head with several series of small odontodes between interorbital region and supraoccipital and between median crest and lateral swimbladder capsule opening.

Trunk with 5–7 lateral odontode series to posterior caudal peduncle, dorsal and ventral series comprising enlarged odontodes, yielding a quadrangular aspect to caudal peduncle in cross section.

Pectoral skeleton exposed ventrally, with odontodes in longitudinal series. Abdomen of adults covered by paired series of 1–3 large lateral plates, pair of preanal platelets preceded by two or more additional platelets, with large nude areas in-between. Total lateral plates 21–23.

Oral disk nearly circular and papillose; maxillary barbels short, thin. Premaxillary teeth 16–21, dentary teeth 13–18.

Dorsal fin i,7; origin at vertical line behind pelvic-fin origin. Pectoral fin i,6; spine when depressed reaching to middle of pelvic fin. Pelvic fin i,5; margin reaching anal-fin origin in females, reaching beyond anal-fin origin in males. Anal fin i,5; truncate. Caudal fin i,12,i, its margin slightly notched, lobes equal.

PIGMENTATION: Ground color dark brown. Longitudinal brown band from rostrum to caudal fin, its width uniformly larger than orbit diameter, dorsal and ventral margins diffuse. Dorsum of head and trunk with 4 large transverse brown saddles: first at dorsal-fin origin, second posterior to dorsal fin, third between dorsal and caudal fins, fourth on caudal peduncle. All fins except caudal hyaline, fin rays with brown bands interrupted by light spaces. Caudal fin with large dark brown blotch at base of median rays and two irregular transverse dark brown bars: first just behind the basal blotch, second along distal fin margin, light areas at tips.

DISTRIBUTION: Known from the rivers of the Atlantic coast of Espírito Santo State to southern Bahia State, Brazil (fig. 1).

ETYMOLOGY: Named for the late Dr. Heroldo P. Travassos, Museu Nacional, in recognition of his many contributions to Brazilian ichthyology and his assistance with our studies of MNRJ hypoptopomatines.

MATERIAL EXAMINED: Brazil: 1848 specimens, 11.0–32.0 mm SL.

Holotype: MNRJ 10177 (24.5 mm SL) Espírito Santo State, Barra Sêca River at the

Linhares to São Mateus road, L. Travassos, H. Travassos and J. T. de Freitas, 11 Nov. 1953.

Paratypes: **Espírito Santo State:** The following lots have same collectors and locality as holotype: MNRJ 5403 (1) 3 March 1948, MNRJ 5410 (1) 3 March 1948, MNRJ 5415–5417 (3), MNRJ 5420 (923), MNRJ 10178–10196 (19:24.5–28.0) 22 Feb. 1948; ANSP 174154 (19:14.9–26.5), MZUSP 51437 (14: 18.2–27.0), MCP 18106 (17), São Gabriel da Palha, littoral stream at km 118 on highway BR 101 near Reserva Biológica de Sooretama, J. C. Garavello, W. G. Saul, and A. S. Soares, SAS95-29B, 26 Jan. 1995; ANSP 174153 (30:18.9–21.8), MZUSP 51436 (17: 18.0–28.6), MCP 18105 (30 rio Braço Norte at highway ES-130 near Boa Esperança, J. C. Garavello, S. A. Schaefer, and A. S. Soares, SAS95-27B, 26 Jan. 1995.

Other Material: **Espírito Santo State:** MNRJ 8605 (30) same locality as holotype, A. L. Carvalho, Oct.–Nov. 1953; MNRJ 5748 (19), MNRJ 10197–10213 (18:20.2–30.0 mm SL) Serra, Creek Cachoeira, C. Lako, Sept. 1949; MNRJ 5400 (1), MNRJ 5407 (1) Juparanã Lagoon, L. Travassos, H. Travassos, and J. T. de Freitas, 28 Feb. and 8 March 1948; MNRJ 5402/5422 (58), MNRJ 10215–10234 (20:21.2–26.8) Cupido River, on the road from Linhares to São Mateus, L. Travassos, H. Travassos, and J. T. de Freitas, 1 March 1948; MNRJ 5401/5404 (4) Quirino River, on the road from Linhares to São Mateus, L. Travassos, H. Travassos, and J. T. de Freitas, 22 Feb. 1948; MNRJ 5405 (18) Caximbau River, on the road from Linhares to São Mateus, L. Travassos, H. Travassos, and J. T. de Freitas, 8 March 1948; MNRJ 5421 (22), MNRJ 10235–10.247 (13: 22.0–27.3) Jundiá River, on the road from Linhares to São Mateus, L. Travassos, H. Travassos, and J. T. de Freitas, 8 March 1948; MNRJ 10081 (24), MNRJ 10248–10267 (20:24.0–30.0) Engano Creek, Itaunas River Valley, Comissão Científica do Instituto Oswaldo Cruz Exped., 10 Sept. 1944; MNRJ 4735 (58) Castro Farm, Comissão Científica do Instituto Oswaldo Cruz Exped., Oct. 1944; MZUSP 39099 (10:13.0–18.5) Creek near the road to Boa Esperança, near to São Mateus River, MZUSP/USNM Exped., 3 March 1985; MZUSP (DZ) 977 (1: 30.0) rio Doce, E. Garbe, 1906; MZUSP 51444 (4:17.5–32.0) Crubixá Creek, tributary of rio Santa Maria da Vitoria, J. L. Elmer, 16 Nov. 1995; MZUSP 51445 (2:21.5, 23.9) Aracruz, Gimumuna River, J. L. Elmer, 22 Jan. 1996.

Bahia State: MZUSP 39101 (19:12.0–25.0) Creek at 18 km north of Prado, on road between Prado to Cumuruxatiba, N. Menezes and MZUSP-USNM Exped., 19 March 1985; MZUSP 39095 (52:11.0–25.0) Cumuruxatiba, rio do Sul, on the road Cumuruxatiba to Itamaraju, USNM-MZUSP Exped., 20 March 1985; MZUSP 39097 (2:20.0–22.0) Prado, Creek at the Fazenda Emboaba, USNM-MZUSP Exped., 19 March 1985; MZUSP 39098 (13:15.8–23.0) Prado, Creek at km 26 of the road Prado to Cumuruxatiba, USNM-MZUSP Exped., 19 March 1985; MZUSP 39100 (8:12.0–22.0), Prado, km 5 of the road Prado to Cumuruxatiba, USNM-MZUSP Exped., 19 March 1985; MZUSP 51441 (22:18.2–27.3) Mucuri, Mucuri River, near city of Mucuri, J. L. Gasperini and H. S. de Sá, 23 Apr. 1991; MZUSP 51442 (9: 18.0–27.0), MZUSP 51443 (23:16.0–25.0) Mucuri, rio Mucuri, approx. 80 km from Atlantic Ocean, above city of Mucuri, J. L. Gasparini and I. E. de Gasperi, 16 July 1991; ANSP 174151 (16:18.0–24.0), MZUSP 51434 (23:18.6–28.0 mm SL), MCP 18099 (24) rio Pau Alto at highway BR 418, approx. 58 km E of Nanuque, W. G. Saul, J. C. Garavello, and A. S. Soares, SAS95-24B, 25 Jan. 1995; ANSP 174156 (5:16.6–23.2), MZUSP 51439 (4:17.7–25.0), MCP 18103 (5) rio Santo Antonio at fazenda Tigre, approx. 500 m from highway BR 101 on road to Santo Antonio, W. G. Saul, R. E. Reis, J. F. P. da Silva and E. H. L. Pereira, SAS95-31A, 25 Jan. 1995; ANSP 174157 (16:13.8–18.4), MZUSP 51440 (16:17.0–21.8), MCP 18104 (16) rio do Meio at highway BR 101, approx. 28 km S of Teixeira de Freitas, J. F. P. da Silva, R. E. Reis, E. H. L. Pereira, and W. G. Saul, SAS95-34A, 25 Jan. 1995; ANSP 174152 (10:17.4–23.2), MZUSP 51435 (6:17.8–24.0), MCP 18101 (10) Gabiarra River, tributary of rio do Sul, near highway BR 101 between Itajimirim and Eunápolis, R. E. Reis, S. A. Schaefer, E. H. L. Pereira, and J. F. P. da Silva, SAS95-25A, 23 Jan. 1995; ANSP 174155 (16:15.1–20.2),

MZUSP 51438 (15:16.2–19.0), MCP 18100 (16) rio Caraiva, approx. 500 m W of highway BR 101 in Monte Pascoal, J. F. P. da Silva, E. H. L. Pereira, S. A. Schaefer, and R. E. Reis, SAS95-30A, 24 Jan. 1995; USNM 300902 (14:14.4–23.6) Prado, creek at 18 km north of Prado, on road between Prado and Cumuruxatiba, N. Menezes and MZUSP-USNM Exped., 19 March 1985; USNM 300903 (15:15.2–23.4) small stream, south of CUM.02, on road between Cumuruxatiba and Itamaraju, N. Menezes and MZUSP-USNM Exped., 20 March 1985; USNM 300911 (2:19.8, 22.4), streamlet near Fazenda Emboaba, tributary of Ubarube River on SE 24, northwest of Cumuruxatiba, N. A. Menezes and MZUSP-USNM Exped., 20 March 1985; USNM 279277 (47:12.7–22.2) first stream south of rio Cai, on dirt road between Cumuruxatiba and Itamaraju, not far from Limoeiro farm, stream locally called rio do Sul, N. A. Menezes and MZUSP-USNM Exped., 20 March 1985; UFPB 1800 (6: 16.6–26.7) Porto Seguro, Creek Ronca Água, tributary of right margin of stream Caramugi, João de Tiba drainage, Biológic Station Pau-Brasil, 15 km NW of Porto Seguro City, R. T. C. Ramos, 23 Feb. 1986.

DISCUSSION

COMPARISONS: The following morphological features are useful in distinguishing *Otothyris* among genera of the Hypoptopomatinae.

Head and swimbladder capsule. Otothyris can be readily identified among hypoptopomatine genera by the presence of odontodes arranged in conspicuous longitudinal rows, or ridges, on the head. It can be further distinguished from all other hypoptopomatines (except *Pseudotothyris*) by the sculpture of the supraoccipital bone, which bears enlarged odontodes forming three conspicuous ridges, or crests. The swimbladder capsule is expanded posteriorly and fenestrae of the pterotic bone are relatively large and irregularly shaped. The lateral opening of the swimbladder capsule is correspondingly enlarged, the suproccipital contributes to the dorsal wall of the swimbladder capsule, and swimbladder capsule dorsal margin is bordered by the elongate posterior process of the pterotic. *Pseudotothyris* shares each of these features with *Otothyris,* however the swimbladder capsule is not expanded posteriorly beyond the joint between the Weberian complex and sixth centra in *Pseudotothyris.* No other members of the subfamily Hypoptopomatinae, with the exception of *Otocinclus,* have the swimbladder capsule expanded as in *Otothyris.*

Caudal fin rays. It was noted by Britski and Garavello (1984) in the description of the genus *Pseudotothyris,* and by Schaefer (1991) in the diagnosis of the tribe Otothyrini, that *Otothyris* is distinguished from the remaining genera of Hypoptomatinae by the presence of 14 principal caudal-fin rays (12 branched) versus 16 (14 branched) in all other Hypoptopomatinae except *Acestridium* (10–12 branched).

Pectoral skeleton. As in all Hypoptopomatinae, and synapomorphic for the subfamily, the pectoral-fin skeleton is exposed ventrally, covered only by a thin epidermis, and bearing odontodes. In *Otothyris,* the ventral lamina of the cleithrum and coracoid are of equivalent breadth along the ventral midline, with the separation between these bones located half the distance from the anterior margin. Arrector fossae are closed in *Otothyris,* a condition shared with *Parotocinclus* and *Pseudotothyris* among the Otothyrini.

Rostral plates. The anterior rostral margin comprises several plates bearing large and recurved odontodes, without a single median rostral plate and without isolated fragmented plates or extensive nude areas. This combination of enlarged rostral odontodes and absence of a single median rostral plate is uniquely shared between *Otothyris* and *Pseudotothyris.* Also, these two genera share the presence of enlarged rostral odontodes restricted to the dorsum of the snout, as opposed to having enlarged odontodes both dorsally and ventrally.

The following features are variable among species of *Otothyris* and useful in their discrimination.

Head and rostrum. Within *Otothyris, O. lophophanes, O. juquiae,* and *O. rostrata* have larger and more extensive odontode crests, more pronounced odontode ridges, larger swimbladder capsule, and larger pterotic fenestrae, in comparison with *O. travas-*

sosi, which has smaller, shorter odontode crests and less pronounced ridges, a relatively small swimbladder capsule, and smaller pterotic fenestrae. *Otothyris lophophanes* has a single series of downturned rostral odontodes separated from a series of upturned odontodes along the dorsal rostral margin by a distinct, broad linear discontinuity, which extends laterally to a line through the anterior nares. In all other *Otothyris,* the ventrad downturned odontodes comprise more than one series and are not separated from the dorsal odontodes by a broad linear discontinuity (contrast fig. 2A, C).

Tooth counts. Tooth counts in *Otothyris* vary from 10 to 30 premaxillary and 9 to 22 mandibular. *Otothyris juquiae* differs from other *Otothyris* species in having fewer teeth, namely 10–16 premaxillary, 9–12 mandibular. In contrast, *O. lophophanes, O. travassosi,* and *O. rostrata* have 14–21 premaxillary and 12–18 mandibular.

Lateral line and abdominal plates. The plates of the median series vary from 21 to 26 among *Otothyris* species. *Otothyris rostrata* has 25–26 lateral plates, whereas *O. travassosi* and *O. juquiae* have 21–23. The remaining species, *O. lophophanes,* has intermediate plate counts, with 23–25 plates. Abdominal plates in all *Otothyris* species consist of a paired lateral series of large plates and smaller plates in the median region anterior to the anus, which differ in size, arrangement, and extent of coverage on the abdomen. The median abdominal plating is extensive in adults of *O. juquiae,* covering nearly the entire abdomen. Adult specimens of *O. travassosi* have a nearly completely plated abdomen. *Otothyris lophophanes* and *O. rostrata* have an irregular arrangement of plates in the median series, often limited to a few small plates anterior to the anus. Early ontogenetic series of all hypoptopomatine species have extensive nude areas on the abdomen.

Morphometrics. Large shape contrasts among *Otothyris* species were revealed by the principal components analysis (table 1, fig. 7). The first principal component accounted for 68.2% of the total morphometric variance, while the second component accounted for 22.6%. *Otothyris juquiae* and *O. lophophanes* were separated from *O. travassossi* and *O. rostrata* along PC2 in the scatterplot of scores along the first two principal components (fig. 7). The second principal component can be described as a factor expressing a contrast among species for head depth, head width, and orbit diameter, with positive scores reflecting positive allometry for these morphometric features. Within these species-pair clusters, there was no separation among scores for individual species along the second component, based on the limited number of morphometric variables examined in this study. However, we suspect that closer examination of shape variation, particularly in terms of localized head shape, might reveal additional differentiation among *Otothyris* species.

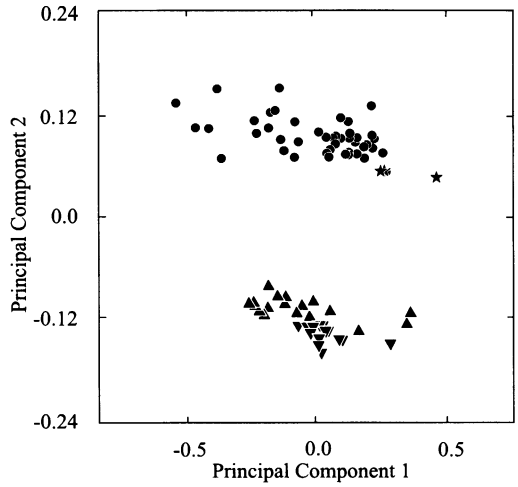

Fig. 7. Scatter plot of scores on first two principal components from morphometric analysis of *Otothyris* species. Symbols as in figure 1, variables and loadings given in table 1.

GEOGRAPHIC DISTRIBUTION: The genus *Otothyris* is distributed along the Atlantic coast of Brazil between Barra do Ribeira, rio Guaiba Basin of Rio Grande do Sul State in the south to the rio Jequitinhonha Basin of Bahia State in the north (fig. 1). The species are apparently restricted to the lowland sections of these river systems near the coast and have not been collected further to the west in higher elevation or headwater streams. This distribution is coincident with that of several *Parotocinclus* species: *P. maculicauda* in the isolated coastal rivers from Santa Catarina to Espírito Santo, *P. doceanus* in the rio Doce,

TABLE 1

Descriptive Morphometric Characters of *Otothyris* Species and Their Loadings (derived from log-transformed data) on the First Two Principal Components (PC1, PC2; × 10^{-3})

For each species, data is given for the species sample mean followed by the standard deviation.

			lophophanes	*rostrata*	*juquiae*	*travassosi*
	PC1	PC2	N = 19	N = 3	N = 18	N = 46
Standard length	60	3	21.0 2.9	28.2 2.4	22.4 1.6	24.4 1.5
Head length	51	14	4.9 .71	6.8 .38	5.4 .28	5.8 .51
Head width	64	60	4.1 .78	6.7 .57	4.1 .21	5.7 .52
Head depth	52	−76	5.1 .88	4.5 .42	5.5 .41	4.1 .38
Body depth	70	3	3.7 .71	4.3 .58	3.5 .21	4.0 .50
Trunk length	63	1	16.0 2.2	21.5 2.2	16.9 1.4	18.5 1.3
Predorsal length	59	4	9.3 1.4	12.5 1.3	10.1 .71	10.8 1.0
Orbit diameter	48	−38	1.3 .16	1.7 .10	1.5 .06	1.3 .12
Interorbit length	50	−23	3.2 .37	4.1 .27	3.6 .26	3.4 .24
Snout length	56	22	3.1 .40	4.3 .40	3.4 .22	4.0 .36
Peduncle depth	61	9	1.6 .17	2.1 .23	1.6 .12	1.8 .16
Variance	37	12				
% total variance	68.2	22.6				

P. cristatus at Ilhéus, *P. jimi* in the rio Contas, *P. bahiensis* at Senhor do Bonfim, Itapecuru drainage, and *P. minutus* in the rio Vasa-Barris system (Garavello, 1977).

The limited knowledge available on the distribution of other South American freshwater fishes suggests several areas of similarity with the range of *Otothyris*. Among the glandulocaudin characid fishes studied by Weitzman et al. (1988) and Menezes and Weitzman (1990), the more derived species of *Mimagoniates,* in relation to its sister-group *Glandulocauda,* occur in the eastern Atlantic coastal area of Brazil, suggesting that much active glandulocaudin speciation has occurred in this area. Menezes (1988) proposed three areas of endemism for *Oligosarcus* in the coastal region: a south coastal subregion (for *O. jenynsii* and *O. robustus* in Rio Grande do Sul), a central coastal subregion (for *O. hepsetus* from Santa Catarina to Rio de Janeiro), and a north coastal subregion (*Oligosarcus* sp. "C" = *O. acutirostris* Menezes, 1990, from rio Doce, Espirito Santo state, to the mouth of the rio Jequitinhonha). *Otothyris* shows a pattern of endemism congruent with *Oligosarcus*: *Otothyris rostrata* occurring in streams of Rio Grande do Sul; *O. juquiae* endemic to the rio Ribeira de Iguape; *O. lophophanes* in isolated streams of Rio de Janeiro State; and *O. travassosi* in the rio Mucuri of southern Bahia State. Similarly, according to Langeani (1990), *Neoplecostomus microps* is endemic to the rio Paraiba do Sul basin, *N. ribeirensis* in the rio Ribeira de Iguape, *N. espiritosantensis* in the isolated coastal rivers of Espírito Santo, and *N. franciscoensis* is a rio São Francisco endemic. In the pimelodid genus *Steindachneridion, S. amblyura* is endemic to the rio Jequitinhonha, *S. doceana* is endemic to the rio Doce, and *S. parahybae* is endemic to the rio Paraiba do Sul. Like the situation facing Menezes (1988) for *Oligosarcus,* at present we lack phylogenetic information for the relationships among species of *Otothyris* and other genera mentioned herein and are therefore unable to further interpret these distribution patterns within the context of the complex hydrographic history of the coastal region (Schwarzbold and Schafer, 1984).

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