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## SOUTH AMERICAN FRESHWATER NEEDLEFISHES (BELONIDAE) OF THE GENUS *PSEUDOTYLOSURUS*

by

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With 7 text-figures and 4 tables

### ABSTRACT

*Pseudotylorus* Fernández Yépez is considered a valid genus of Belonidae based on the following combination of characters: depressed caudal peduncle; long narrow side branches to lateral line; pleural ribs attached to fourth vertebra; nasal papilla spatulate; lower pharyngeal plate and upper pharyngeal bones two and three elongate. Two species are recognized: *Ps. microps* (Günther) and *Ps. angusticeps* (Günther). *Belone amazonica* Steindachner and *Deltatylorus guayoensis* Martin are synonyms of *Ps. microps*; *Ps. brasiliensis* Fernández Yépez is a synonym of *Ps. angusticeps*. *Ps. microps* reaches a larger size than *Ps. angusticeps* and occurs primarily in the Orinoco, the Guianas, and the lower Amazon. *Ps. angusticeps* is primarily a species of the upper Amazon in Peru and Ecuador, Paraná and the Paraguay. *Ps. angusticeps* differs from the more generalized *Ps. microps* in having ctenoid scales; more anal fin rays (usually 17-19 compared to usually 14-16); a much narrower interorbital region that lacks scales; fewer branchiostegal rays (usually 9 compared to usually 10 or 11); shorter postorbital distance (13.3-15.0 vs. 15.3-18.3% BL); and a shorter preopercle length (9.3-10.7 vs. 10.5-12.7% BL).

### INTRODUCTION

The purpose of this paper is to diagnose the genus *Pseudotylorus* and adequately distinguish the two valid species of the genus — *Ps. microps* (Günther) and *Ps. angusticeps* (Günther). There has been confusion as to the validity of the five nominal species in two nominal genera. During the course of the last decade I have taken the opportunity to examine the scattered material that forms the basis of this paper, which is one of a series of studies on the systematics of the Synentognathi.

Separation of *Pseudotylorus microps* from *Ps. angusticeps* and the discovery of an undescribed species of *Potamorhaphis* in the Upper Orinoco and Rio Negro (Collette, 1974) raises the total number of species of fresh-

water synentognaths known from South America east of the Andes to seven. The others include the two neotenic needlefishes *Belonion dibranchodon* Collette and *B. apodion* Collette and the halfbeak *Hyporhamphus brederi* (Fernández Yépez) (see Collette, 1966).

#### MATERIALS AND METHODS

Abbreviations used for the institutions cited herein are as follows:

- ANSP — Academy of Natural Sciences, Philadelphia.  
BMNH — British Museum (Natural History), London.  
CAS — California Academy of Sciences, San Francisco.  
FMNH — Field Museum of Natural History, Chicago.  
IRSNB — Institut Royal des Sciences Naturelles de Belgique, Brussels.  
IU — Indiana University, collections now at CAS, designated CAS-IU.  
JAP — James A. Peters numbers for specimens borrowed from Dr. Gustavo Orcés, Quito.  
MACN — Museo Argentina de Ciencias Naturales, Buenos Aires.  
MCZ — Museum of Comparative Zoology, Harvard University, Cambridge, Mass.  
MLP — Museo La Plata, Argentina.  
MNM — Museo Nacional, Montevideo.  
MNRJ — Museu Nacional, Rio de Janeiro.  
NHMV — Naturhistorisches Museum, Vienna.  
RMNH — Rijksmuseum van Natuurlijke Historie, Leiden.  
SMF — Senckenberg Museum, Frankfurt-am-Main.  
SU — Stanford University; collections now at CAS, designed CAS-SU.  
UMMZ — University of Michigan Museum of Zoology, Ann Arbor.  
USNM — U. S. National Museum of Natural History, Washington.  
ZMH — Zoological Museum, Hamburg.  
ZMK — Zoological Museum, Copenhagen.

The methods are similar to those in previous papers in this series (Collette, 1966; Collette & Parin, 1970). Body length (BL) is used instead of standard length because many specimens have broken beaks and because upper jaw length is markedly allometric in some species. BL is defined as the distance from the posterior margin of the opercular membrane to the caudal base. Vertebral counts were made from radiographs and the counts of dorsal and anal fin rays made from the specimens were checked against the radiographs.

#### ACKNOWLEDGEMENTS

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### ***Pseudotylosurus* Fernández Yépez**

*Pseudotylosurus* Fernández Yépez, 1948: 72-73 (original description; type-species *Pseudotylosurus brasiliensis* Fernández Yépez, 1948 (= *Belone angusticeps* Günther, 1860), by monotypy).

*Deltatylosurus* Martin, 1954: 72 (original description; type-species *Deltatylosurus guayoensis* Martin, 1954 (= *Belone microps* Günther, 1860), by monotypy).

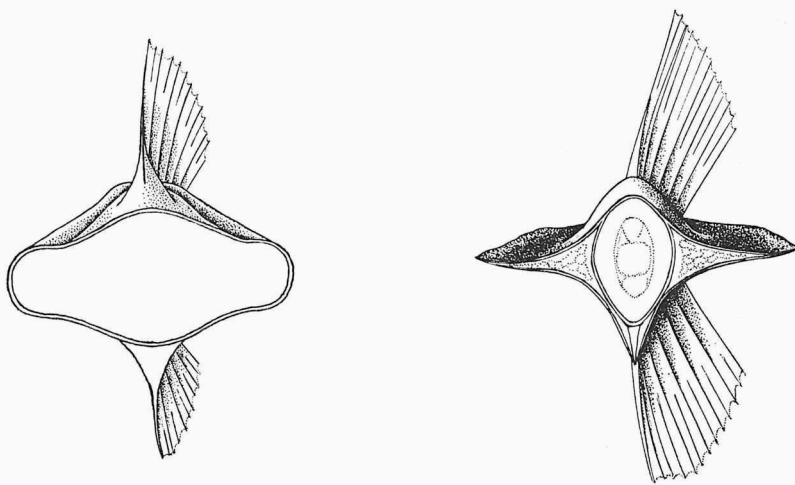


Fig. 1. Cross section through caudal peduncle posterior to ends of dorsal and anal fin bases and anterior to origin of caudal fin. *Pseudotylosurus microps* (left); *Platybelone a. argalus* (right).

Diagnosis. — Caudal peduncle strongly depressed, superficially resembling *Platybelone* but without the sharp keel present in that genus (Fig. 1). Lateral line with long narrow side branches (Fig. 2). Pleural ribs attached to fourth vertebra (on third in all other synentognaths, except on second in *Belonion* and in the halfbeak genus *Hemirhamphodon*). Nasal papilla spatulate, contained within a deep nasal fossa (Fig. 3), more similar to the condition in marine genera of Belonidae, such as *Strongylura*, than to the other three

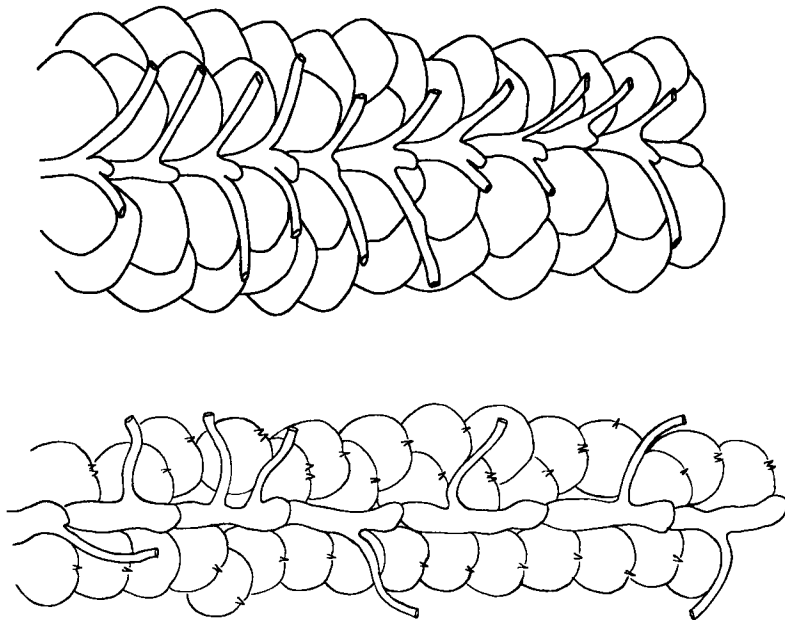


Fig. 2. Section of lateral line in region anterior to pelvic fin origin. *Pseudotylorus microps* (top); *Ps. angusticeps* (bottom).

freshwater genera (*Xenentodon*, *Potamorhaphis* and *Belonion*) each of which has an elongate nasal barbel projecting well out of a shallow nasal fossa. All three pair of upper pharyngeal bones present and dentigerous (only one or two pair present in *Xenentodon* and *Belonion*). Lower pharyngeal plate and upper pharyngeal bones two and three narrow and elongate (Fig. 4) compared to most needlefish genera. As in *Xenentodon*, almost no triangular expansion present at posterior end of lower pharyngeal plate. Caudal fin distinctly divided into two lobes (Fig. 5), not truncate or rounded as in the other three freshwater genera. As in other freshwater needlefishes, the postorbital part of the head is elongate: postorbital distance 13.3-18.3% BL (body length); preopercle length 9.3-12.7% BL.

Description. — Dorsal fin rays 13-16, usually 14 or 15; anal fin rays 14-19, usually 15-18; pectoral fin rays 8-11, usually 9 or 10. Precaudal vertebrae 42-47, usually 44-46; caudal vertebrae 25-28, usually 25-27; total vertebrae 67-73, usually 69-72. Predorsal scales 240-350. Vomerine teeth absent. Gillrakers absent. Pectoral fins nearly twice (1.7-1.9) as long as pelvic fins. Two gonads present, right slightly to nearly twice as long as left, no sexual dimorphism in ratio. No posterior dorsal lobe in fins of juveniles. Juvenile "halfbeak" stage either absent or upper jaw grows to near tip of lower jaw by an early stage. Anterior rays of dorsal and anal fins higher than posterior rays but not forming a distinct lobe.

### **Pseudotylosurus microps** (Günther, 1866)

*Belone microps* Günther, 1866: 237 (original description; Surinam and British Guiana).  
*Belone amazonica* Steindachner, 1876: 94-95 (original description; Amazon River, Pará, Manacapuru, and Tajapuru).

*Tylosurus microps*: Jordan & Fordice, 1887: 349 (after Günther). Eigenmann & Eigenmann, 1891: 65 (after Günther). Jordan & Evermann, 1896: 712 (description after Günther). Miranda Ribeiro, 1915: 1 7-8 (description after Günther). Miranda Ribeiro, 1961: 6 (Aragarças [MNRJ 9240], Goiaz, Brazil).

*Tylosurus amazonicus*: Jordan & Fordice, 1887: 349 (after Steindachner). Eigenmann & Eigenmann, 1891: 65 (after Steindachner). Jordan & Evermann, 1896: 712 (description after Steindachner).

*Strongylura microps*: Fowler, 1926: 257 (description; Pará [ANSP 89894], Brazil).

*Strongylura amazonica*: Fowler, 1941: 141 (listed).

*Deltatylosurus guayoensis* Martin, 1954: 4-6 (original description; figures; Orinoco R., Territorio Delta Amacuro, Venezuela). Mago Leccia, 1970: 19, 81 (listed, Venezuela).

*Belone microps microps*: Mees, 1962: 55-56 (description; synonymy).

*Pseudotylosurus angusticeps* (not of Günther, 1866): Cressey & Collette, 1970: 416 (fig. 180, distribution, in part). Wiley & Collette, 1970: 189 (reference to specimens without spine-bearing scales).

#### Misidentifications

*Potamorrhaphis guianensis* (Schomburgk): Schultz, 1949: 79 (Rio Apure [UMMZ 146392], Venezuela).

*Strongylura timucu* (Walbaum): Schultz, 1949: 80 (Rio Apure [UMMZ 146232], Venezuela).

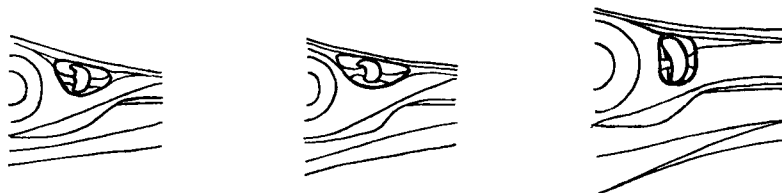


Fig. 3. Nasal papillae in nasal fossae of *Pseudotylosurus angusticeps* (left two) and *P. microps* (right fig.). From left to right: *Pseudotylosurus brasiliensis* Fernández Yépez, holotype, MCZ 8797; *Belone angusticeps* Günther, holotype, BMNH 1860.6.16.181; *Belone microps* Günther, lectotype, BMNH 1845.6.22.104.

Table 1  
Comparison of *Pseudotylosurus microps* and *P. angusticeps*.

Character	<i>P. microps</i>	<i>P. angusticeps</i>
Scales	cycloid	ctenoid
Branchiostegal rays	11 or 12	8-10, usually 9
Anal rays	14-16	17-19
Interorbital region	wide and scaly	narrow and scaleless
Nasal fossa	quadrangular	triangular
Postorbital length	15.3-18.3% BL	13.3-15.0% BL
Preopercle length	10.4-12.7% BL	9.3-10.7% BL
Pectoral rays	10	9 or 10
Size	larger	smaller
	♂♂ to 226 mm BL	♂♂ to 170 mm BL
	♀♀ to 275 mm BL	♀♀ to 203 mm BL
Distribution	mostly lowlands	mostly headwaters

Diagnosis. — The most important differences between *Ps. microps* and *Ps. angusticeps* are summarized in Table 1. *Ps. microps* lacks teeth on the scales and has fewer anal fin rays (usually 16 or less compared to usually 17 or more, Table 2). The interorbital groove is shallower and wider and is covered with several rows of scales (Fig. 6). Branchiostegal rays number 11 or 12 (compared to usually 9). Nasal fossa quadrangular instead of triangular (Fig. 3). Postorbital distance longer (15.3-18.3 vs. 13.3-15.0% BL, Table 4). Preopercle length greater (10.4-12.7 vs. 9.3-10.7% BL, Table 4).

Description. — Pectoral rays almost always 10-10 (Table 2). Predorsal scales 240-345,  $\bar{x}$  279.3 (N = 31). Dorsal rays average fewer than in *Ps. angusticeps* (usually 14 or 15 vs. usually 15, Table 2). Precaudal vertebrae (44-47) and total vertebrae (69-73) average slightly higher than in *Ps. angusticeps* (Table 3). Caudal vertebrae 25-27. Most measurements similar in both species (Table 4).

Size and maturity. — *Ps. microps* grows larger than *Ps. angusticeps*, males reaching 226 mm BL, females 275 mm BL. Six mature males ranged from 190-226 mm BL, 17 mature females from 190-275 mm. Right gonad slightly longer than left gonad in both sexes: 9 males, 98-199 mm BL, ratio of right to left 1.03-1.17,  $\bar{x}$  1.09; 31 females, 145-275 mm BL, ratio 1.01-1.17,  $\bar{x}$  1.09.

Table 2

Numbers of fin rays in populations of *Pseudotyllosurus microps* and *P. angusticeps*. (Counts for lectotype of *Belone microps* indicated by superscript 1; for lectotype of *B. amazonica* by 2; for holotype of *B. angusticeps* by 3; and for holotype of *P. brasiliensis* by 4).

	Dorsal rays						Anal rays				Pectoral rays								
	13	14	15	16	N	$\bar{x}$	14	15	16	17	18	19	N	$\bar{x}$	9-8	9-9	9-10	10-10	10-11
<i>P. microps</i>																			
Orinoco R.		2	1		3	14.33		1	2				3	15.67				1	
Guianas	3	14	4 <sup>1)</sup>		21	14.05	6	11 <sup>1)</sup>	4				21	14.90				21 <sup>1)</sup>	
Lower Amazon R.	8	17	9 <sup>2)</sup>		34	14.03	3	15 <sup>2)</sup>	14	2			34	15.44	1			31 <sup>2)</sup>	2
Upper Amazon R.		1			1	14.		1					1	15.				1	
No data	1	4	2		7	14.14		5	2				7	15.29				7	
Total	12	38	16		66	14.06	9	33	22	2			66	15.26	1			61	2
<i>P. angusticeps</i>																			
Lower Amazon R.		1			2	15.50				2			2	17.00				2	
Upper Amazon R.	3	18	4 <sup>3,4)</sup>		25	15.04		1	11 <sup>4)</sup>	10	3 <sup>3)</sup>		25	17.60	1	8	5	10 <sup>3,4)</sup>	
Paraguay-Paraná	1	5	1		7	15.00			4	3			7	17.43				6	
No data			2		2	16.00				2			2	18.00				2	1
Total	4	24	8		36	15.11	1	17	15	3			36	17.56	1	10	6	18	





Table 4  
 Measurements (as per cent of body length) of *Pseudotylosurus angusticeps*  
 and two populations of *P. microps*.

Character	<i>P. microps</i> -Guianas			<i>P. microps</i> -Lower Amazon			<i>P. angusticeps</i> -Upper Amazon					
	Range	$\bar{x}$	N	Range	$\bar{x}$	N	Range	$\bar{x}$	N			
Body length (mm)	156	270	208.0	23	122	275	189.8	30	104	200	137.9	22
Head length	50.8	58.7	55.23	15	50.2	56.0	53.28	12	49.1	60.6	55.39	15
Snout length	30.5	37.3	34.45	15	30.6	35.9	33.04	12	32.2	41.5	37.18	15
Postorbital length	15.9	18.3	16.96	23	15.3	17.9	16.47	30	13.3	15.0	14.30	22
Preopercle length	10.5	12.6	11.69	23	10.4	12.7	11.22	29	9.3	10.7	10.10	21
Orbit length	3.3	4.2	3.68	23	3.1	4.1	3.70	29	3.4	4.3	3.88	22
Interorbit width	2.9	3.6	3.23	23	2.8	3.5	3.20	30	3.2	4.1	3.61	22
Head depth	5.7	6.6	6.10	23	5.3	6.6	5.88	30	4.9	5.7	5.25	21
Head width	3.8	5.9	5.14	23	4.1	6.1	5.27	29	4.0	5.6	4.72	22
Pectoral length	11.9	15.0	13.41	21	10.5	15.0	12.68	29	11.1	13.8	12.11	22
Pelvic length	6.4	7.8	7.27	23	5.4	7.8	6.88	30	6.1	7.1	6.68	22

A 245 mm BL female had about 340 eggs in the left ovary and about 480 in the right; the eggs averaged 1.23 mm in diameter.

Types. — *Belone microps* Günther, 1866. Lectotype: BMNH 1845.6.22.104 (♀, 190); Surinam; Frank; herein selected. D 15; A 15; P<sub>1</sub> 10-10; vertebrae 46 + 25 = 71; interorbital region wide and scaly (Fig. 6, left); nasal fossa elongate quadrangular (Fig. 3, right); scales all cycloid; ovary lengths (left-right) 98-100 mm; postorbital distance 33.0 mm; preopercle length 23.2 mm. Paralectotypes: BMNH 1845.3-5 (♀, 195); British Guiana; R. Schomburgk. BMNH unreg. (1, 173); British Guiana; Scrivener.

*Belone amazonica* Steindachner, 1876. Lectotype: NHMV uncat. (1, 135); Brazil, Amazon R. at Tajapurú; Steindachner no. 1874.I.1735a; herein selected. D 15; A 15; P<sub>1</sub> 10-10; interorbital region shallow, wide and covered with scales, at least anteriorly; nasal fossa large, deep, and quadrangular; scales all cycloid; postorbital distance 20.7 mm; preopercle length 13.7 mm. Paralectotypes: the species was described (Steindachner, 1866: 95) from "Amazonestrom bei Pará, Manacapuru und Tajapurú" but I have been able to locate only the specimen from Tajapurú.

*Deltatylosurus guaoensis* Martin, 1954. Holotype (Mus. Hist. Nat. La Salle 9923) not examined. Martin (1954: 5) gives the locality as "un caño del Orinoco cerca de la Misión de Guayo, en el Territorio Delta Amacuro, Venezuela" ... colectado por Eduardo Valladares el 20 de diciembre de 1952." Martin gives counts of D 13; A 16; P<sub>1</sub> 10; and notes that the scales lack any spines.

Distribution. — Primarily a species of the Orinoco, Guianas, and lower Amazon (Araguaia, Xingu, Negro, and Branco) but there is one record from the upper Amazon near Iquitos, Peru (ANSP 123713).

Material examined. — 66 specimens (32.4-275 mm body length) from 43 collections.

Orinoco River. UMMZ 146392 (1, 147) and 146232 (2, 32.4-33.3); Venezuela, Río Apure at San Fernando de Apure; F. F. Bond; Feb. 16, 1938.

British Guiana. BMNH 1845.3-5 (1, 195); British Guiana; Schomburgk. BMNH unreg. (1, 175), British Guiana; Scrivener.

Surinam. BMNH 1845.6.22.104 (1, 190); Surinam; Frank; lectotype of *Belone microps*. USNM 21431 (1, 245); Paramaribo; C. J. Hering; May 1878. BMNH 1878.3.10.36 (1, 270); Surinam; Kappler; 1878. RMNH 2794 (3, 156-247); Surinam; H. H. Dieperink; 1824-1842. RMNH 6944 (1, 240); Surinam. RMNH 25341 (1, 205) and USNM 210862 (1, 210); Suriname R. near Hermansdorp, near Brokopondo; G. F. Mees; June 1, 1964. RMNH uncat. (1, 219); Surinam; purchased by M. S. Hoogmoed; Oct. 10, 1968. RMNH uncat. (1, 206); Suriname R. near Brokopondo; M. Boeseman no. 227; June 24, 1964. RMNH uncat. (1, 157); Suriname R. near Brokopondo; M. Boeseman no. 275; Sept. 2, 1964. RMNH uncat. (1, 194) and USNM 210863 (3, 190-217); puddles in dry Suriname R. near Brokopondo; M. Boeseman no. 207; June 3, 1964. RMNH uncat. (1, 173); Suriname R. near Brokopondo; M. Boeseman no. 176; April 25-26, 1964. RMNH uncat. (1, 184); Suriname R. near Brokopondo; M. Boeseman no. 183; May 2, 1964. ZMK 199 (1, 231); Surinam; Kgl. Mus. Mag.

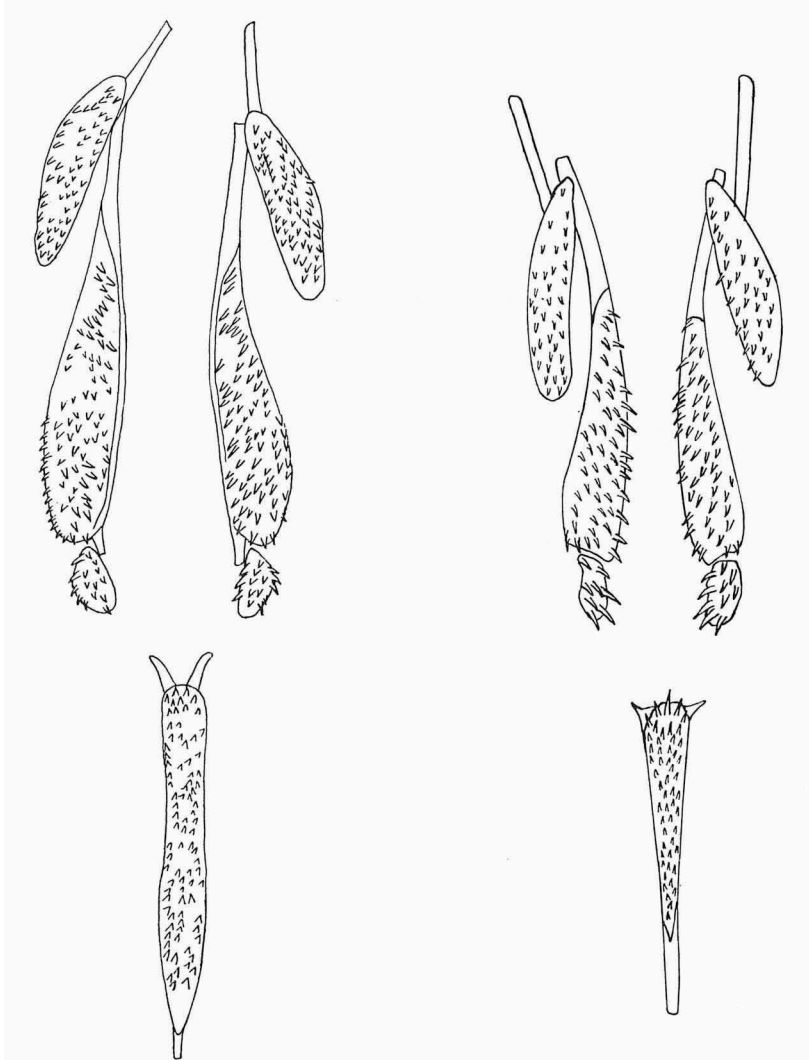


Fig. 4. Pharyngeal bones of *Pseudotylosurus microps* (left) and *Ps. angusticeps* (right).

Lower Amazon, Brazil. SMF uncat. (1, 180); Ilha do Marajó, Rio Soure; Oct.-Nov. 1923; W. Ehrhardt. NHMV uncat. (1, 135); Tajapuru; 1874.I.1735a; Steindachner don.; lectotype of *Belone amazonica*. ANSP 80894 (1, 139); Pará; R. M. de Schauen-see; 1926. NHMV 5583 (1, 145); Pará; J. D. Haseman; 1913. FMNH 76961 (1, 198); Pará; J. D. Haseman 3459; Jan. 18, 1910. FMNH 76959 (1, 144); Igarapé de Jaura entering Rio Tapajós 2 mi. above Santarem; J. D. Haseman 3268; Dec. 11, 1909. FMNH 76960 (4, 122-130); island in Amazon 3 mi. above Santarem; J. D. Haseman 3284 + 3286; Dec. 15, 1909. USNM 211270 (2, 143-144); Rio Tapajós at Santarem; J. D. Haseman 3204; Dec. 8, 1909. CAS 27551 (1, 226); Santarem market; C. Ternetz; Oct. 1924. CAS 27552 (1, 163); Santarem market; C. Ternetz; Nov. 1924. IRSNB 15672 (6, 199-239); Rio Tapajós at Santarem; Feb. 1964; G. Marlier. MCZ 8790 (1,

192); Villa Bella, mouth of Rio Tupinambaranas; L. Agassiz; Thayer Expedition. NHMV 5584 (4, 190-230); mouth of Rio Negro; J. D. Haseman; 1913/268b. NHMV 5582 (2, 207-237); Boa Vista, Rio Branco; J. D. Haseman; 1913/208. ANSP 119137 (1, 132); jct. Rio Negro and Rio Branco; SIO 68-141. MNRJ 9240 (1, 255); Aragarças, on trib. of Rio Araguaia; H. Sick; Oct. 14, 1952. MNM 632 (2, 194-251); Ilha do Bananal, Rio Araguaia; A. A. Pesce; 1953. ZMH uncat. (1, 229); Ilha do Bananal, Rio Araguaia; Feb. 1954. BMNH unreg. (1, 275); Xaventina (= Chaventina), Rio das Mortes (= R. Manso), trib. of Rio Araguaia; R. McConnell-Lowe sta. 113A; April 29, 1968. MNRJ 1330 (1, 226); Brazil.

Upper Amazon, Peru. ANSP 123713 (1, 97.5); Loreto, vicinity of Iquitos; M. Hohn; Oct. 17, 1955.

No locality data. RMNH 2376 (1, 90.2); old cabinet (before 1820). RMNH 2795 (1, 222); old cabinet (before 1820). RMNH 7479 (1, 253); P. Bleeker. NHMV 5587 (1, 236); labelled "*Belone truncata*, Antillen, 1842-37." NHMV 5580 (1, 207); labelled "*Belone cancila*, Indien, 1838.IV.3." IRSNB 121 (2, 156-178); purchased from Baron de Heusch; entered in 1847.

### ***Pseudotylosurus angusticeps* (Günther, 1866)**

*Belone angusticeps* Günther, 1866: 238 (original description; Ecuador).

*Tylosurus amazonicus* (not of Steindachner, 1876): Eigenmann & Kennedy, 1903: 531 (Laguna Asuncion [CAS 10095], Paraguay). Eigenmann, McAtee & Ward, 1907: 155 (listed; Paraguay Basin). Pearson, 1937: 112 (listed; Paraguay R.). Eigenmann & Allen, 1942: 46, 48, 50, 52, 58, 61 (distrib., lower Marañon, Ucayali, Huallaga, and Pichis); 382 (synonymy, three Peruvian collections [CAS-IU 15812, 15813, 16161]).

*Tylosurus* aff. *microps* (? = *amazonica*): MacDonagh, 1938: 181-188 (description; comparisons; ctenoid scales; figs.; Paraná R., Argentina).

*Tylosurus microps* (not of Günther, 1866): Pozzi, 1945: 264, 276 (Paraná R.). Berst 1946: 1-2 (description, figs., Río Colastiné near Sante Fe, Argentina). Berst, 1948: 1 (Santa Fe, Argentina). Ringuelet & Arámburu, 1961: 53 (listed; Argentina). Schollaert, 1965: 209-215 (description, seven specimens from Paraná R., Santa Fe Prov., Argentina; figs.; ctenoid scales).

*Pseudotylosurus brasiliensis* Fernández Yépez, 1948a: 72-73 (original description; Pôrto do Mos, Brazil). Fernández Yépez, 1948b: 142-144 (in key; figs.). Mees, 1962: 4 (listed).

*Belone microps angusticeps*: Mees, 1962: 56-57 (description based on re-examination of type).

*Belone brasiliensis*: Mees, 1964: 315-316 (description based on type of *P. brasiliensis* plus Peruvian specimen; considered distinct from *B. microps*).

*Pseudotylosurus angusticeps*: Collette & Berry, 1965: 389 (*B. angusticeps* a senior synonym of *P. brasiliensis*; *Pseudotylosurus* recognized as valid genus). Collette, 1966: 3-7 (number of vertebrae, pectoral rays, branchiostegal rays), 15 (figure of pharyngeal teeth of Peruvian specimen), 21 (evolution). Cressey & Collette, 1970: 360 and 400 (new species of ergasilid copepod, *Acusicola cumula* Cressey described from type of *P. brasiliensis*), 416 (fig. 180, distribution of *Pseudotylosurus* in part). Wiley & Collette, 1970: 189-191 (in part, description and fig. 10F of spine-bearing scales).

*Strongylura microps*: Ringuelet, Arámburu & Alonso de Arámburu, 1967: 433-434 (synonymy; description; range; Río Paraná).

Diagnosis. — *Ps. angusticeps* is compared with *Ps. microps* in Table 1. *Ps. angusticeps* has "ctenoid" scales and more anal fin rays (usually 17 or

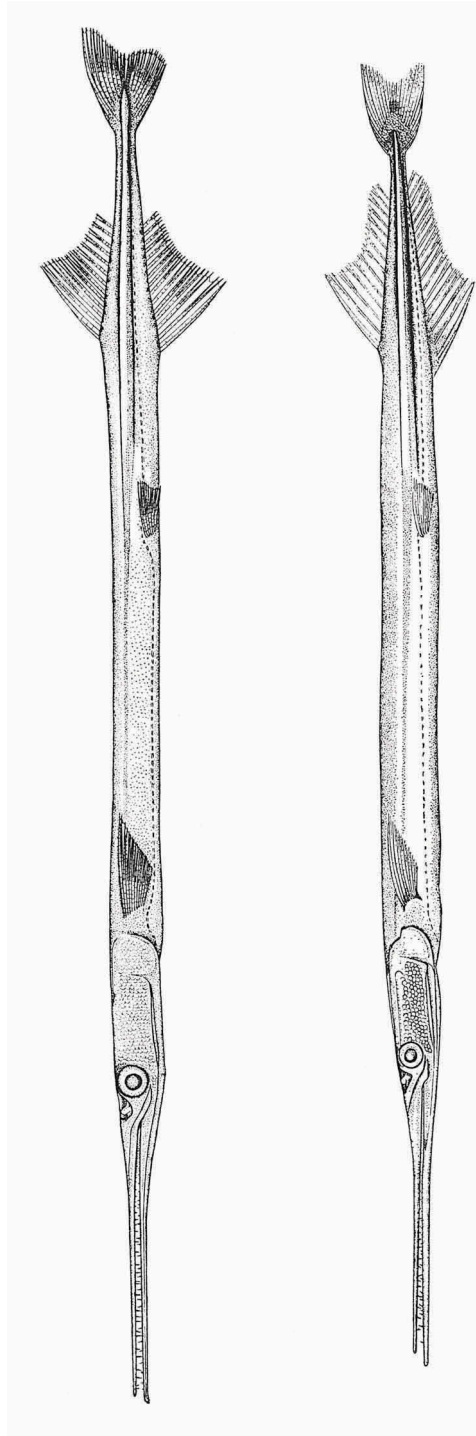


Fig. 5. Lateral views of *Pseudotylorus microps* (upper fig., RMNH uncat., Suriname River near Brokopoondo, 184 mm BL) and *P. angusticeps* (lower fig., USNM 163892, Ecuador, Río Cotapino, 185 mm BL).

more compared to usually 16 or less, Table 2). The interorbital groove is much deeper and narrower than in *Ps. microps* and there are no scales present in the groove (Fig. 6). Branchiostegal rays 8-10, usually 9 (compared to 11 or 12). Nasal fossa triangular instead of quadrangular (Fig. 3). Postorbital distance shorter (13.3-15.0 vs. 15.3-18.3% BL, Table 4). Preopercle length shorter (9.3-10.7 vs. 10.4-12.7% BL, Table 4).

Description. — Pectoral rays usually 9 or 10; half the specimens 10-10; half with one or both sides 9 (Table 2). Predorsal scales 250-350,  $\bar{x}$  294.5 (N = 22). Dorsal fin rays 14-16, usually 15 (Table 2). Precaudal vertebrae 42-46, modally 44, fewer than the usual count for *Ps. microps* (45 or 46, Table 3). Caudal vertebrae 25-28, usually 26 or 27. Total vertebrae 67-72. Morphometrically generally similar to *Ps. microps* (Table 4).

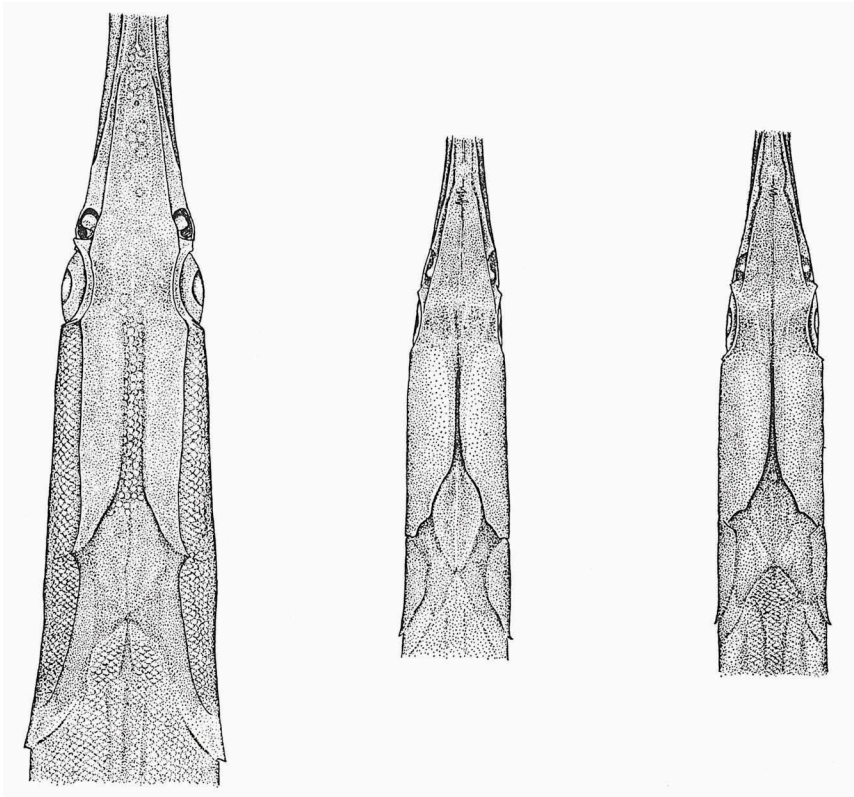


Fig. 6. Dorsal view of heads of *Pseudotyllosurus microps* (left fig.) and *Ps. angusticeps* (two figs. on right). From left to right: *Belone microps* Günther, lectotype, BMNH 1845.6.22.104; *Belone angusticeps* Günther, holotype, BMNH 1860.6.16.181; *Pseudotyllosurus brasiliensis*, holotype, MCZ 8797.

Size and maturity. — *Ps. angusticeps* does not grow as large as *Ps. microps*, males reach 170 mm BL, females 203 mm BL. Six mature males ranged from 135-170 mm, nine mature females from 168-203 mm. Right gonad about half again as long as left in both sexes: 9 males, 110-170 mm BL, ratio of right to left 1.43-1.83,  $\bar{x}$  1.56; 12 females, 108-203 mm BL, ratio 1.32-2.00,  $\bar{x}$  1.57.

Types. — *Belone angusticeps* Günther, 1866. Holotype BMNH 1860.6.16.181 (♀, 168); Ecuador; Fraser's collection. Günther (1866: 238) gave the locality as "Coast of Ecuador." The original register book gives only "Ecuador" for BMNH 1860.6.16.173-204. Numbers 205-213 are recorded as from Guayaquil but there is no evidence for where 173-204 came from within the country. D 16; A 19; P<sub>1</sub> 10-10; vertebrae 45 + 27 = 72; interorbital groove narrow and deep without any scales (Fig. 6, center); nasal fossa triangular

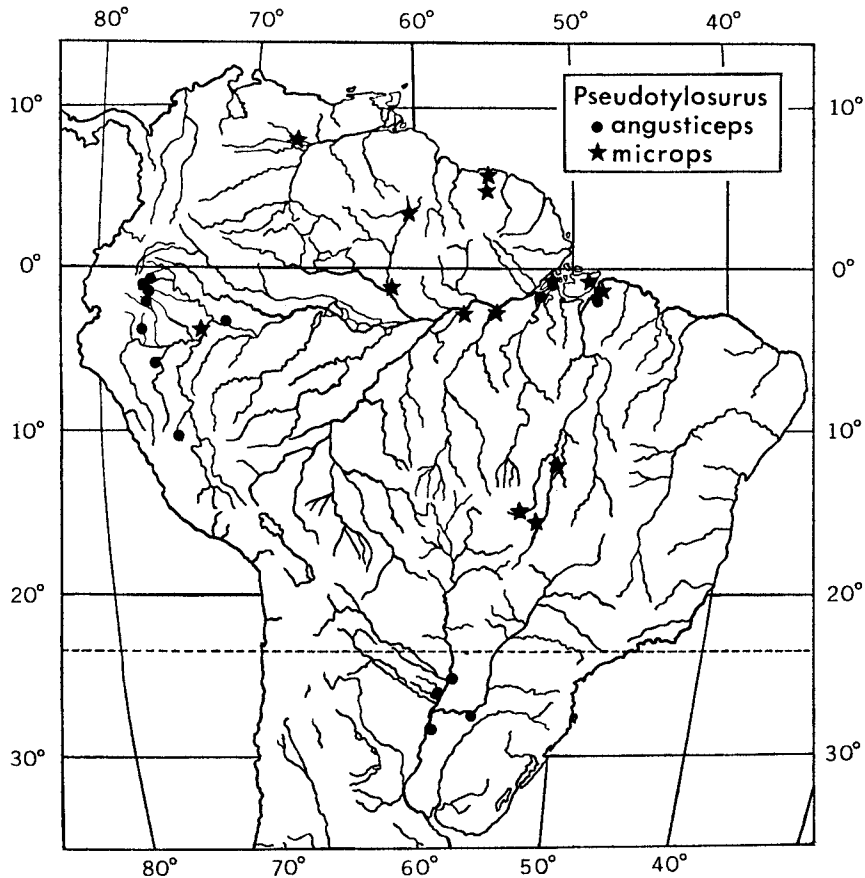


Fig. 7. Distribution, based on specimens examined, of *Pseudotylorus microps* (stars) and *Ps. angusticeps* (solid circles).

(Fig. 3, center); scales "ctenoid"; ovary lengths (left-right) 26-41 mm; postorbital distance 22.4 mm; preopercle length 17.0 mm.

*Pseudotylorus brasiliensis* Fernández Yépez, 1948. Holotype MCZ 8797 (1, 159); Brazil, Pôrto do Mos at junction of Rio Xingu with the Amazon; L. Agassiz; Thayer Expedition; received at MCZ Jan. 1866. D 16; A 17; P<sub>1</sub> 10-10; branchiostegal rays 9-9; vertebrae 44 + 27 = 71; interorbital groove narrow and deep without any scales (Fig. 6, right); nasal fossa triangular (Fig. 3, left); scales "ctenoid"; postorbital distance 21.7 mm; preopercle length 15.1 mm.

Distribution. — Primarily a species of the upper Amazon in Peru and Ecuador, the Paraná and the Paraguay (Fig. 7). There are two records from the lower Amazon — Pôrto do Mos at the mouth of the Xingu (MCZ 8797) and Pará (NHMV 5581) where *Ps. microps* has also been taken.

Material examined. — 38 specimens (23.4-203 mm body length) from 23 collections.

Lower Amazon, Brazil. MCZ 8797 (1, 159); Pôrto do Mos, jct. Rio Xingu with Amazon; L. Agassiz, Thayer Exped.; rec'd Jan. 1866; holotype of *Pseudotylorus brasiliensis* Fernández Yépez. NHMV 5581 (1, 197); Pará; Bras. Exped.; 1904.

Upper Amazon, Peru. USNM 167714 (1, 111) and CAS-IU 15812 (1, 125); Yurimaguas, Río Paranaupura, trib. of R. Huallaga; W. R. Allen, Indiana Univ. Centennial Exped.; Nov. 1920. CAS-IU 16161 (2, 23.4-31.8); Puerto Bermudez, Río Pichis, trib. of R. Ucayali; W. R. Allen, Indiana Univ. Cent. Exped.; July 13, 1920. CAS-IU 15813 (2, 57.8-67.0); Gosulina Cocha, Río Morona; W. R. Allen, Indiana Univ. Cent. Exped.; Oct. 1920. CAS-SU 36854 (1, 104); vicinity of Pébas. CAS-SU 36855 (1, 120); Shansho Caño, vicinity of Pébas. CAS-SU 36856 (1, 118); Río Ampiyacu, vicinity of Pébas.

Upper Amazon, Ecuador. BMNH 1860.6.16.181 (1, 168); Ecuador; holotype of *Belone angusticeps* Günther; Fraser's collection. USNM 163892 (2, 170-185); Río Cotapino, Pucuno; J. Olalla; Oct. 1950. USNM 211165 and JAP 9269 (3, 137-200); Napo Prov., Río Payamino, trib. of R. Napo; M. Olalla; Dec. 1953. USNM 211166 and JAP 9273 (4, 108-153); Napo Prov., Río Pacuno; J. Olalla. USNM 211167 (1, 110); Pastaza Prov., Río Lipuno, trib. Río Villano; P. Mena; April 1962. USNM 211168 (2, 143-154); Pastaza Prov., Río Bobonaza below Chichirota, trib. of R. Pastaza; J. Olalla and P. Mena; Feb. 1954. USNM 211169 (2, 111-121); Pastaza Prov.; Río Bobonaza; L. Mena; Nov. 1958.

Upper Amazon, Bolivia. FMNH 76958 (2, 105-126); San Joaquín, lake 1 mi. W of town, Río Machupo, tributary of Río Guaporé; J. D. Haseman 2935; Sept. 4, 1909.

Paraná-Paraguay. FMNH 76957 (1, 128); Brazil, Campos Alegre, Río Jauru into Río Paraguay, 28 mi. above mouth of Río Jauru; J. D. Haseman 2759; June 2, 1909. MLP uncat. (3, 152-192); Arroyo Zaionam, Posadas, Río Paraná; Prof. Colombo; 1936. MLP uncat. (1, 164); Goya, Corrientes, Río Paraná; July 1, 1947. MACN 255 (1, 92.9); Formosa, Río Paraná. CAS-IU 10095 (1, 177); Asuncion, Río Paraguay; March 1900.

No data. IRSNB 3737 (3, 182-203); labelled "Amboine."

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