A new species of *Anchoviella* Fowler, 1911 (Clupeiformes: Engraulidae) from the Amazon basin, Brazil

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*Anchoviella juruasanga* is described from the drainages of rios Negro, Madeira, Tapajós, Trombetas, Tocantins, and Jari, in the Amazon basin, Brazil. The new species is distinguished from its congeners by having a short upper jaw, with its posterior tip extending between the verticals through anterior and posterior margins of the pupil (vs. posterior tip of upper jaw extending beyond the vertical through posterior margin of the pupil). *Anchoviella juruasanga* is also distinct from other strictly freshwater Amazonian species of the genus by the distance from tip of snout to posterior end of upper jaw between 8 and 11% in standard length (vs. 14% or more in *A. alleni*, *A. carrikeri*, *A. guianensis*, and *A. jamesi*). The anal-fin origin slightly posterior to or at the vertical through the base of the last dorsal-fin ray further distinguishes the new species from *A. alleni* (anal-fin origin posterior to the vertical through the last anal-fin ray by at least 14% of head length) and *A. jamesi* (anal-fin origin anterior to the vertical through the last anal-fin ray). An identification key for the Amazonian species of *Anchoviella*, including marine and estuarine species known to occur in the lower portion of the basin, is presented.

**Key words:** Anchovies, Engraulinae, Freshwater fish, Systematics, Taxonomy.

Introduction

*Anchoviella* Fowler, 1911 comprises small to medium sized fishes (3-14 cm standard length) of marine, estuarine, or freshwater habits distributed in South, Central, and North America. According to Whitehead *et al.* (1988) the genus is distinguished in the Engraulidae by a body slightly compressed, the presence of numerous elongate gill rakers (usually more than 15 on the lower branch of the first gill arch) and a short upper jaw (not extending posteriorly to the vertical through the anterior margin of the opercle). Members of the Engraulidae, which includes approximately 140 species, are typically schooling coastal fishes commonly known as anchovies (English) or “manjubas” in the Brazilian Portuguese (Nelson, 2006; Di Dario, 2009).

Jordan & Seale (1926) recognized 18 valid species of *Anchoviella*. *Anchoviella jamesi* (Jordan & Seale, 1926) and *A. balboae* (Jordan & Seale, 1926), which are species of anchovies with a small mouth and a rounded posterior end of the upper jaw, were included in the genus *Amplova* by Jordan & Seale (1926). Hildebrand (1943) concluded that Jordan & Seale’s (1925) classification was unsatisfactory. He combined *Amplova* and *Anchoviella* in an expanded genus *Anchoviella*. *Anchoviella manamensis* Cervigón, 1982 and *A. perezi* Cervigón, 1987, both from rio Orinoco in Venezuela (Cervigón, 1982), are the most recently described valid species of the genus.

*Anchoviella* has not been thoroughly reviewed for more than 50 years, and the number of currently valid species of the genus is still debatable. Whitehead *et al.* (1988), which...
presented the most recent comprehensive review of the Engraulidae, recognized 15 valid species of Anchoviella. Eschmeyer & Fricke (2012), on the other hand, recognized 18 valid species of the genus. In spite of discrepancies in those numbers, Whitehead et al. (1988) and Eschmeyer & Fricke (2012) recognized the validity of four strictly freshwater Amazonian species of Anchoviella: A. alleni (Myers, 1940), A. carrickeri Fowler, 1941, A. guianensis (Eigenmann, 1912), and A. jami (Jordan & Seale, 1926). Anchoviella nattereri (Steindachner, 1880), which supposedly inhabits the lower (probably estuarine) portion of the Amazon basin, is known only from the original description (Whitehead et al., 1988). The species is sometimes recognized as valid (e.g. Kullander & Ferraris, 2003; Eschmeyer & Fricke, 2012; Menezes & Figueiredo, 2003), but Whitehead et al. (1988: 337) considered it as a possible senior synonym of the marine and estuarine A. lepidentostole (Fowler, 1911). Recently, Loeb (2009) considered A. nattereri as a nomen dubium.

During a recent review of the South American freshwater species of Anchoviella (Loeb, 2009), new species from the Amazon basin were discovered. One of those species is described herein. An identification key for the Amazonian species of Anchoviella, including coastal species known to occur in the lower portion of the basin, is also presented.

Material and Methods

Measurements and counts were taken according to Whitehead (1985) with the following modifications: caudal peduncle depth, measured at the origin of caudal fin; pelvic-fin length, measured from the base of the fin to the posterior tip of the longest pelvic-fin ray; prepelvic, prepectoral and preanal length, measured from tip of snout to the origin of the respective fin; pupal diameter, measured as the horizontal distance between pupal margins; lower jaw length, measured as the distance between anterior and posterior margins of the lower jaw; interorbital width, corresponding to the shortest distance between the orbits in dorsal view; length of pectoral and pelvic axillary scales, measured as the distance between the anterior and posterior margins of the axillary scale. Measurements and counts were taken in 41 type specimens (including holotype) on the left side of the specimen. Standard Length (SL) is expressed in mm and other measurements are expressed as either percentage of SL or Head Length (HL). Vertebral counts, presented in Table 1, are based on two cleared and stained specimens prepared according to Taylor & van Dyke (1985). Comparative material examined of the genus includes Anchoviella alleni, A. carrickeri, A. guianensis, and A. jami (the four valid Amazonian freshwater species of Anchoviella), two recently recognized but yet undescribed Amazonian species of Anchoviella (Loeb, 2009), and also A. vaillanti (Steindachner, 1908), from the São Francisco basin (Whitehead et al., 1988). Anchoviella brevirostris (Günther, 1868), A. cayennensis (Puyo, 1946), and A. lepidentostole, which are coastal marine species known to occur in the lower portion of the Amazon basin, were also examined.

Institutional abbreviations are ANSP, Academy of Natural Sciences, Philadelphia, PA; INPA, Instituto Nacional de Pesquisas da Amazônia, Manaus, AM; MZUSP, Museu de Zoologia da Universidade de São Paulo, SP; MN RJ, Museu Nacional, Universidade Federal do Rio de Janeiro, RJ; MPEG, Museu Paraense Emílio Goeldi, Belém, PA.

Results

Anchoviella jurusanga, new species

Figs. 1-2

Holotype. MZUSP 109249, 42.4 mm SL. Brazil, Pará, rio Trombetas, upstream from mouth of Lago do Jacaré at Reserva Biológica de Trombetas, 01°20’S 56°51’W, 2 Aug 1979, R. C. Castro.

Paratypes. ANSP 192138 (20, 42.7-48.1mm SL), INPA 39086 (20, 42.0-49.8 mm SL), MPEG 22814 (20, 44.0-48.5 mm SL), MZUSP 15831 (243, 42.0-52.8 mm SL), all collected with holotype. INPA 7104 (30, 26.1-42.3 mm SL), Pará, rio Tapajós, near mouth of rio Cupari, 03°36 ‘22.79”S 55°19’13.76”W, 26 Oct 1991, L. Rapp Py-Daniel & J. Zuanon. MZUSP 31422 (1, 39.2 mm SL), Rondônia, rio Madeira at Calama, 08°03’S 62°53’W, 9 Dec 1980, M. Goulding. MZUSP 52015 (2, 23.1-26.7 mm SL), Rondônia, rio Machado near its mouth, 08°04’S 62°4’W, 21 Nov 1970, Expedição Permanente à Amazônia. MZUSP 85397 (5, 21.90-25.80 mm SL), Rondonia, rio Machado near its mouth, 21 Nov 1975, Expedição Permanente à Amazônia.

Diagnosis. Anchoviella juruasanga is distinguished from its congeners by having a short upper jaw, with its posterior tip extending between the verticals through anterior and posterior margins of the pupil (vs. posterior tip of upper jaw extending beyond the vertical through posterior margin of the pupil). Anchoviella juruasanga is also distinct from other strictly freshwater Amazonian species of the genus by the distance from tip of snout to posterior end of upper jaw between 8 and 11% in SL (vs. 14% or more in A. alleni, A. carrikeri, A. guianensis, and A. jamesi). The anal-fin origin slightly posterior to or at the vertical through the base of the last dorsal-fin ray further distinguishes the new species from A. alleni (anal-fin origin posterior to the vertical through the last anal-fin ray by at least 14% of HL) and A. jamesi (anal-fin origin anterior to the vertical through the last anal-fin ray).

Description. Morphometric data of holotype and 40 paratypes is presented in Table 1. Body elongated, compressed laterally; greatest body depth at dorsal-fin origin. Dorsal body profile convex from snout tip to nostril, gently convex from nostril to dorsal-fin origin, approximately straight from latter point to caudal peduncle. Ventral body profile convex from anterior tip of lower jaw to posterior margin of orbit, gently convex from vertical through posterior margin of orbit to the posterior end of anal-fin base, nearly straight from latter point to the origin of lower caudal fin lobe. Caudal peduncle longer than deep. Vertebrae 39-40 (2 specimens examined).

Mouth inclined relative to body axis, sub-terminal, posterior tip of upper jaw rounded. Snout long, pointed in lateral view. Anterior tip of upper jaw distant from tip of snout by about 7.3 to 8.8% of HL. Posterior margin of upper jaw rounded, its posterior tip extending between the verticals through anterior and posterior margins of the pupil. Teeth pointed, small, slender, slightly recurved posteriorly, arranged in a single row in the premaxilla, maxilla and lower jaw.

Eye lateral on head, located dorsal to horizontal through pectoral-fin insertion; eye visible in dorsal and ventral views. Two confluent nostrils on each side of the head, the anterior elliptical and the posterior larger crescent-shaped. Lateral line absent.

Dorsal-fin rays ii-iii+11-12, origin closer to base of caudal fin than to tip of snout, not reaching the latter by 2.0 to 6.2% of SL, distal margin approximately straight. Anal-fin rays ii-iii+i+12-13, its origin at vertical through base of last dorsal-fin ray, anterior rays longer. Pectoral-fin rays i+i+11-13, distal tip of longest pectoral-fin ray not reaching pelvic-fin origin by 6.0 to 13.0% of SL, distal margin slightly convex. Pectoral-fin axillary scale absent in most specimens, probably lost during collecting or storage. Pelvic-fin-rays i+6, distal tip of longest pelvic-fin ray not reaching anal-fin origin by 4.0 to
9.9% of SL, distal margin slightly convex. Pelvic-fin axillary scale absent in most specimens, probably lost during collecting or storage. Base of anteriormost pelvic-fin ray closer to anal-fin origin than to base of anteriormost pectoral-fin ray, failing to reach the latter by about 2.6 to 4.8% of SL. Caudal fin forked, upper and lower lobes equally developed. Caudal-fin rays 5,10/10,5.

Pseudobranchia present, shorter than eye, approximately 18 to 23% of HL. Gill rakers long and thin in the first branchial arch, 8-12 on the upper branch, 16-22 on the lower branch, 25 to 34 in total. Length of raker inserted in the angle of first gill arch between 14-17% of HL.

**Coloration in alcohol.** Body coloration pale to light yellowish or brownish. Longitudinal stripe pale to silver, absent in most preserved specimens, when present extending from posterior margin of head to caudal peduncle; width of the stripe 10-20% of HL at vertical through pectoral-fin origin, increasing posteriorly to 20-35% of HL at vertical through anal-fin origin. Dark spots present above and below the lateral stripe in some specimens, on top of the head, along the dorsum from origin of dorsal fin to caudal fin, along the ventrum, from origin of anal fin to caudal fin; also present along base of dorsal, anal, and caudal fins, and arranged in two vertical parallel stripes at caudal fin. Orbit and middle portion of the postorbital region in the head translucent to silver.

**Coloration of freshly preserved specimens.** Description of the coloration of freshly preserved specimens is based on a single specimen (MZUSP 103314, paratype, 46 mm SL; Fig. 2). Dorsum from the vertical through opercle to caudal fin above the longitudinal stripe translucent with dark spots; ventrum translucent from the vertical through opercle to caudal fin above the longitudinal stripe; posterioriormost portion of upper and lower jaw and posterioriormost portion of preorbital region also translucent. Dark spots present above the longitudinal stripe along body, on top of the head, along base of dorsal, anal and caudal fins, and also arranged in two vertical parallel stripes at caudal fin. Tip of upper and lower jaw, top of the head, base of dorsal and anal fins, above the longitudinal stripe, along the dorsum at caudal peduncle and at the anteriormost portion of caudal fin light yellowish. Postorbital region and longitudinal stripe along body silver, width of the stripe 25% of HL at vertical through pectoral-fin origin, increasing posteriorly to 30% of HL at vertical through anal-fin origin.

**Etymology.** In the Tupi language “juru” means mouth and “a-sanga” means short. The epithet *juruasanga*, thus, refers to the short maxilla, a diagnostic character of the species among congeners.

**Distribution.** *Anchoviella juruasanga* is known from tributaries of the middle and lower Amazon basin, Brazil, including rio Tapajós, rio Negro, rio Branco, rio Madeira, rio Trombetas, rio Tocantins, rio Maicá, and rio Jari (Fig. 3).

**Remarks.** *Anchoviella juruasanga* is similar in terms of external morphology to *A. jamesi* and *Amazonsprattus scintilla* Roberts, 1984, which are paedomorphic engraulids known to co-occur with *A. juruasanga* in some rivers of the Amazon basin, such as the rio Jari. These three species share a short upper jaw, which, nevertheless, differs in terms of relative lengths. In *A. jamesi* the posterior tip of the upper jaw extends beyond the vertical through the posterior margin of the orbit by about ¼ the orbit diameter. The upper jaw of *A. juruasanga* is shorter than that of *A. jamesi*, with its posterior tip extending between the verticals through anterior and posterior margins of the pupil. In *Amazonsprattus scintilla* the upper jaw is extremely short compared to the condition typically present in the Engraulidae, and its posterior tip is located in a region anterior to the vertical through the anterior margin of the orbit (Whitehead *et al.*, 1988). Another morphological difference between these three species is the relative position of the fins: in *A. juruasanga* the anal-fin origin is located in a region immediately posterior to the vertical through the base of the last dorsal-fin ray, whereas in *Amazonsprattus scintilla* and in *A. jamesi* the anal-fin origin is located at the vertical through the anterior quarter of the dorsal-fin base. The non-type material listed in the description was used in the color diagnosis, and also for inferring the distribution of the species.

**Identification key of Anchoviella from the Amazon basin.**

1a. Anal-fin origin at the vertical through base of last dorsal-fin ray or posterior to it ...........................................2

1b. Anal-fin origin anterior to the vertical through base of last dorsal-fin ray .................................................................6

2a. Posterior margin of upper jaw extending between the verticals through anterior and posterior margins of the pupil .................*Anchoviella juruasanga*
Table 1. Morphometrics and meristics of Anchoviella juruaensis. n = number of examined specimens, SD = Standard Deviation (frequency in parenthesis).

<table>
<thead>
<tr>
<th>Meristics</th>
<th>Holotype</th>
<th>n</th>
<th>Range</th>
<th>Mean</th>
<th>SD</th>
</tr>
</thead>
<tbody>
<tr>
<td>Standard length, SL (mm)</td>
<td>42.4 (41)</td>
<td>19.3</td>
<td>51.3</td>
<td>34.00</td>
<td>10.00</td>
</tr>
<tr>
<td>Head length, HL (mm)</td>
<td>10.8 (41)</td>
<td>5.2</td>
<td>12.4</td>
<td>8.37</td>
<td>2.22</td>
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<tr>
<td>Body depth</td>
<td>16.37 (41)</td>
<td>10.47</td>
<td>16.56</td>
<td>13.82</td>
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<tr>
<td>Caudal peduncle depth</td>
<td>8.36 (41)</td>
<td>7.05</td>
<td>9.13</td>
<td>8.03</td>
<td>0.57</td>
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<tr>
<td>Dorsal-fin base length</td>
<td>11.21 (41)</td>
<td>11.01</td>
<td>14.81</td>
<td>12.57</td>
<td>1.10</td>
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<tr>
<td>Anal-fin base length</td>
<td>11.50 (41)</td>
<td>11.08</td>
<td>15.98</td>
<td>13.09</td>
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<td>Pelvic fin length</td>
<td>10.81 (41)</td>
<td>8.81</td>
<td>13.13</td>
<td>10.79</td>
<td>1.06</td>
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<td>Pectoral fin length</td>
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<td>9.73</td>
<td>14.99</td>
<td>13.06</td>
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<td>Predorsal length</td>
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<td>49.42</td>
<td>55.43</td>
<td>52.21</td>
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<td>Pinnate length</td>
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<td>64.54</td>
<td>1.81</td>
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<td>Prepelvic length</td>
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<td>47.90</td>
<td>45.07</td>
<td>1.43</td>
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<td>Prepectoral length</td>
<td>24.13 (41)</td>
<td>22.14</td>
<td>27.85</td>
<td>24.47</td>
<td>1.42</td>
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<tr>
<td>Pectoral-fin axillary scale length</td>
<td>8.36 (30)</td>
<td>3.45</td>
<td>11.31</td>
<td>6.93</td>
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<tr>
<td>Pelvic-fin axillary scale length</td>
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<td>2.70</td>
<td>6.64</td>
<td>4.03</td>
<td>1.09</td>
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<tr>
<td>Head length</td>
<td>24.36 (41)</td>
<td>22.43</td>
<td>28.07</td>
<td>24.82</td>
<td>1.37</td>
</tr>
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</table>

Comparative material. Amazonsprattus scintilla: MZUSP 92908 (71, 21.3-25.1 mm SL), Amazonas, igarapé Castanha, downstream Santa Rosa community, 00°05'26"S 69°39'57"W, 28 Nov 2006, F. Lima. Anchoviella alleni: MZUSP 18485 (5, 68.3-75.35 mm SL).
A new species of Anchoviella from Brazil


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Literature Cited


