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A new species of *Algansea* (Actinopterygii: Cyprinidae) from the Ameca River basin, in Central Mexico

Una especie nueva de *Algansea* (Actinopterygii: Cyprinidae) en la cuenca del río Ameca en el centro de México

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Abstract. A morphological comparative analysis was performed among different populations of the cyprinid *Algansea tincella* Valenciennes, 1844 from the Lerma-Chapala and Ameca River basins in central Mexico. A new species, *Algansea amecae* n. sp. is described from individuals collected from small tributary in the headwaters of the Ameca basin. The new species differs from Lerma-Chapala populations of *A. tincella* by having a lower number of transversal scales, a lower number of infraorbital pores, a prominent dark lateral stripe along the body, a black caudal spot extending onto the medial caudal inter-radial membranes, and a pigmented ("dotted") lateral line. This new species increases the high level of endemism in the freshwater ichthyofauna of the Ameca basin. It appears to be most closely related to populations in the Lerma-Chapala-Santiago system, as is the case for several other species in the Ameca basin. This pattern of relationship provides evidence for a historical connection between the 2 basins, and implies that a vicariance event led to the isolation of populations and a subsequent speciation event. Due to the limited distributional range of *Algansea amecae* n. sp., and the environmental deterioration of the Ameca River, we propose that this new species should be designated as a protected species under Mexican law.

Key words: *Algansea amecae* n. sp., Cyprinidae, North America, central Mexico, morphological analysis, freshwater fishes.

Resumen. Se realizó un análisis morfológico comparando diferentes poblaciones del ciprínido *Algansea tincella* Valenciennes, 1844 correspondientes a los sistemas hidrológicos Lerma-Chapala y cuenca del río Ameca. Con base en este análisis se describe una nueva especie, *Algansea amecae* n. sp. a partir de los individuos recolectados en un pequeño afluente del alto Ameca, en el centro de México. La nueva especie difiere de las poblaciones de *A. tincella* del sistema Lerma-Chapala-Santiago por presentar un menor número de escamas transversales, un menor número de poros infraorbitales, una franja obscura lateral muy marcada a lo largo del cuerpo, un punto negro presente en la base de la aleta caudal que se extiende hasta las membranas inter-radiales, y por presentar la línea lateral pigmentada. Esta nueva especie incrementa nuestro conocimiento de la diversidad de la ictiofauna endémica de la cuenca del río Ameca, y queda manifiesto su parentesco cercano con la especie *A. tincella* del sistema Lerma-Chapala-Santiago, lo cual refleja una conexión histórica entre ambos sistemas hidrológicos que posteriormente fue interrumpida por un evento vicariante que produjo el aislamiento de las poblaciones y con ello el evento de especiación. Debido a la limitada distribución del nuevo taxón y al deterioro ambiental del río Ameca, se recomienda designarla como una especie protegida dentro de la Norma Oficial Mexicana.

Palabras clave: *Algansea amecae* n. sp., Cyprinidae, Norteamérica, centro de México, análisis morfológico, peces dulceacuícolas.

Introduction

The Ameca River drains to the Pacific Ocean in west-central Mexico and has a relatively high degree of endemism in its freshwater fish fauna, particularly in the upper portion of the river basin (Miller, 1986). As currently understood, the fish fauna of the upper portion consists of about 20 species, about half of which are endemics. The following families are represented: Goodeidae, 11 species, 6 endemic (Doadrio and Domínguez, 2004);

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Cyprinidae, 3 species, 2 endemics (Chernoff and Miller, 1986; Domínguez-Domínguez et al., 2007); Poeciliidae, 3 species (Miller and Smith, 1986); Catostomidae, 1 species (Miller and Smith, 1986); Ictaluridae, 1 species (López-López and Paulo-Maya, 2001), and Atherinopsidae, 1 species (López-López and Paulo-Maya, 2001).

The high level of endemism indicates that the Ameca basin experienced an independent history relative to other basins in the area; however the wide distribution of closely related taxa also indicates ancestral connections between the Ameca basin and several drainages which currently are not connected. Analyses of the historical biogeography of goodeid fishes, the main component of the freshwater fish fauna of river basins in central Mexico (Parenti, 1981; Doadrio and Domínguez, 2004; Domínguez-Domínguez et al., 2006), revealed at least 4 independent connection-separation events that occurred between the Ameca basin and other Pacific drainage basins and sub-basins in central of Mexico. Different taxonomic levels of shared goodeid taxa (genus, species and populations), particularly between the Ameca and Lerma-Chapala-Santiago basins, suggest these rivers formed a common system, most probably as early as the late Miocene and as recent as late Pleistocene (Webb et al., 2004). Some species native to the Ameca basin have a wide distribution throughout central Mexico, such as *Goodea atripinnis* (Domínguez-Domínguez et al., 2005), and *Chirostoma jordani* (Barbour, 1973) and apparently *Algansea tincella* (Barbour and Miller, 1978). However, the latter case seemed to be an exception since Barbour and Miller (1978) showed no taxonomically significant morphometric differences among populations of *A. tincella* populations across its distributional range, including those from the Ameca basin.

In an extensive taxonomic revision of the genus *Algansea*, Barbour and Miller (1978) mentioned body pigmentation differences of individuals of *A. tincella* from the Ameca River. Nonetheless, the authors interpreted the variation as clinal. Several meristic characters, such as the number of dorsal fin rays, were not included in the analysis, despite differences in this character noted by these authors, in differentiating the subspecies *A. monticola monticola* (7 dorsal fin rays) from *A. monticola avia* (8 dorsal fin rays), which later were recognized as 2 valid species (Jensen and Barbour, 1981; Barbour and Miller, 1994).

The main objective of this study is to re-evaluate the taxonomic status of *A. tincella* populations from the Ameca River basin. The analysis was based on detailed morphometric and meristic comparative analysis of *A. tincella* populations in the Ameca and Lerma-Chapala-Santiago basins, including a re-evaluation of commonly used morphological traits.

Materials and methods

Twenty one morphometric and 11 meristic variables (see Table 1) were measured from 29 individuals of *Algansea* n. sp. from a tributary to the Ameca River at La Coronilla, collected between 2003 and 2005 (Fig. 1). These specimens are deposited at the Colección de Peces de la Universidad Michoacana de San Nicolás de Hidalgo (CPUM), Morelia, Mexico, and the Colección Nacional de Peces, Instituto de Biología, UNAM (CNP), México, D.F., Mexico. Descriptive statistics were calculated with Sigmastat v. 3.0.1 software. All measurements are in centimeters.

In the present study, specimens of 2 populations of *A. tincella* from the Lerma-Chapala system, 1 from the Cuitzeo lake drainage and 1 from the Santiago River basin (Fig. 1) were compared to specimens from the Ameca River tributary. The localities sampled are as follows: CPUM1634, N=27, Bridge on road between Zamora-Jacona, Duero River, lower-Lerma province, Michoacán, Mexico, 1981; CPUM1637, N=20, Spring Matanzas town, Verde River, Santiago basin, Jalisco, Mexico, 1/03/2005; CPUM2082, N=4, Stream at San Cristobal town, a tributary of Cuitzeo Lake, Michoacán, Mexico, 1/12/06; CPUM2067, N=4 and CPUM2074, N=6, Bravo River northern tributary of Laja River, middle-Lerma province, Guanajuato, Mexico, 13/10/08. Additional specimens of other *Algansea* species were also examined to compare pigmentation patterns: *A. aphanea*: CPUM1528, N=52, tributary of Tuxpan River

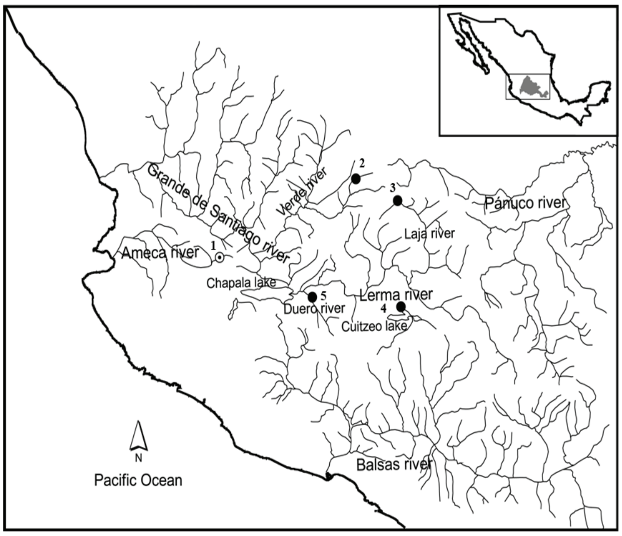

Figure 1. Map showing the localities were populations of *Algansea* were collected. 1, Ameca River basin (La Coronilla stream); 2, Verde River drainage (La Paz); 3, middle Lerma River drainage (La Laja River); 4, Cuitzeo Lake (San Cristobal stream); 5, lower Lerma River drainage (Duero River).

Table 1. Morphometric and meristic characters of *Algansea amecae* n. sp. Variables are described in Material and Methods. SD= Standard deviation

Morphometric variables	*Holotype*	*Paratype (n=29)*		
		Range	Mean	SD
Standard length	6.9	5.0-10.1	7.6	1.6
Head length	1.7	1.2-2.5	1.8	0.4
Pre-opercle length	1.1	0.8-1.7	1.2	0.2
Upper jaw length	0.7	0.4-1.0	0.6	0.1
Eye diameter	0.4	0.3-0.5	0.4	0.1
Post-orbital head length	0.9	0.6-1.4	0.9	0.2
Pre-dorsal distance	3.5	2.6-5.3	3.9	0.8
Pre-orbital length	0.4	0.3-0.6	0.5	0.1
Pre-ventral distance	3.5	2.6-5.5	4.1	0.8
Pre-anal distance	5.1	3.6-7.7	5.6	1.2
End of anal fin-caudal peduncle distance	1.3	1.0-2.2	1.5	0.3
Caudal peduncle depth	0.9	0.6-1.2	0.9	0.2
Dorsal fin length	0.8	0.5-1.1	0.8	0.2
Anal fin length	0.5	0.4-0.8	0.7	0.1
Dorsal origin fin to caudal peduncle distance	3.5	2.5-5.2	3.9	0.8
Anal origin fin to caudal peduncle distance	1.9	1.4-3.0	2.3	0.4
Pelvic origin fin to caudal peduncle distance	3.5	2.5-5.4	3.8	0.8
pectoral origin to pelvic origin fin distance	1.8	1.2-2.8	2.2	0.4
Dorsal origin to pelvic origin fin distance	1.5	1.1-2.1	1.6	0.3
Dorsal origin to anal origin fin distace	2.2	1.5-3.1	2.2	0.4
Pelvic origin to anal origin fin distance	1.7	1.1-2.6	1.6	0.4
Meristic variables				
Dorsal fin rays	8	8-8	8.0	0.0
Anal fin rays	7	6-8	7.0	0.3
Pectoral fin rays	17	15-18	16.5	0.7
Caudal fin rays	17	16-18	17.0	0.2
Transverse scales	24	23-26	24.7	0.8
Upper transverse scales	13	13-15	13.9	0.5
Lower transverse scales	10	9-11	9.8	0.5
Supraorbital pores	9	7-12	10.2	1.0
Infraorbital pores	17	14-19	16.2	1.3

in Tule, Tamazula-Coahuayana system, Pihuamo, Jalisco, Mexico; *Algansea avia*: CPUM1247, N=31, tributary of the Santiago River near Santa María del Oro east of Tepic, Nayarit, Mexico, 9/11/03.

We used principal component analysis (PCA) to compare overall patterns of morphology among the 4 populations of *A. tincella* and the *Algansea* population in the Ameca basin. We performed a PCA on 21 morphometic variables using the covariance matrix corrected by the Burnaby method (Burnaby, 1966; Rohlf and Bookstein, 1987) and another PCA on 9 meristic variables using the correlation matrix. A classificatory hypothesis of the populations suggested by the PCA was tested by a discriminant function analysis with a Hotelling´s test (DFA). All analyses were conducted with the statistics packages PAST v. 1.60 (Hammer et al., 2001).

Description

Algansea amecae n. sp. (Figure 2 A, Tables 1 and 2)

Diagnosis. 24-25 transverse scales (rarely 26); 14 upper row scales (occasionally 13 or 15); 14-19 pores in the infraorbital head sensory canal (usually 15-16). Body is divided dorsoventrally into 4 pigmentation zones as follows: a dark dorsal region; a light band equal to or greater than the width of the pupil; a prominent dark lateral stripe along body, considerably narrower at the anterior region just before the opercular opening; and a silver ventral region. Black spot at the base of caudal fin set off from lateral stripe by a constriction of the pigment band, the spot extending out onto median caudal interradial membranes. Lateral line pigmented, edged by high concentrations of

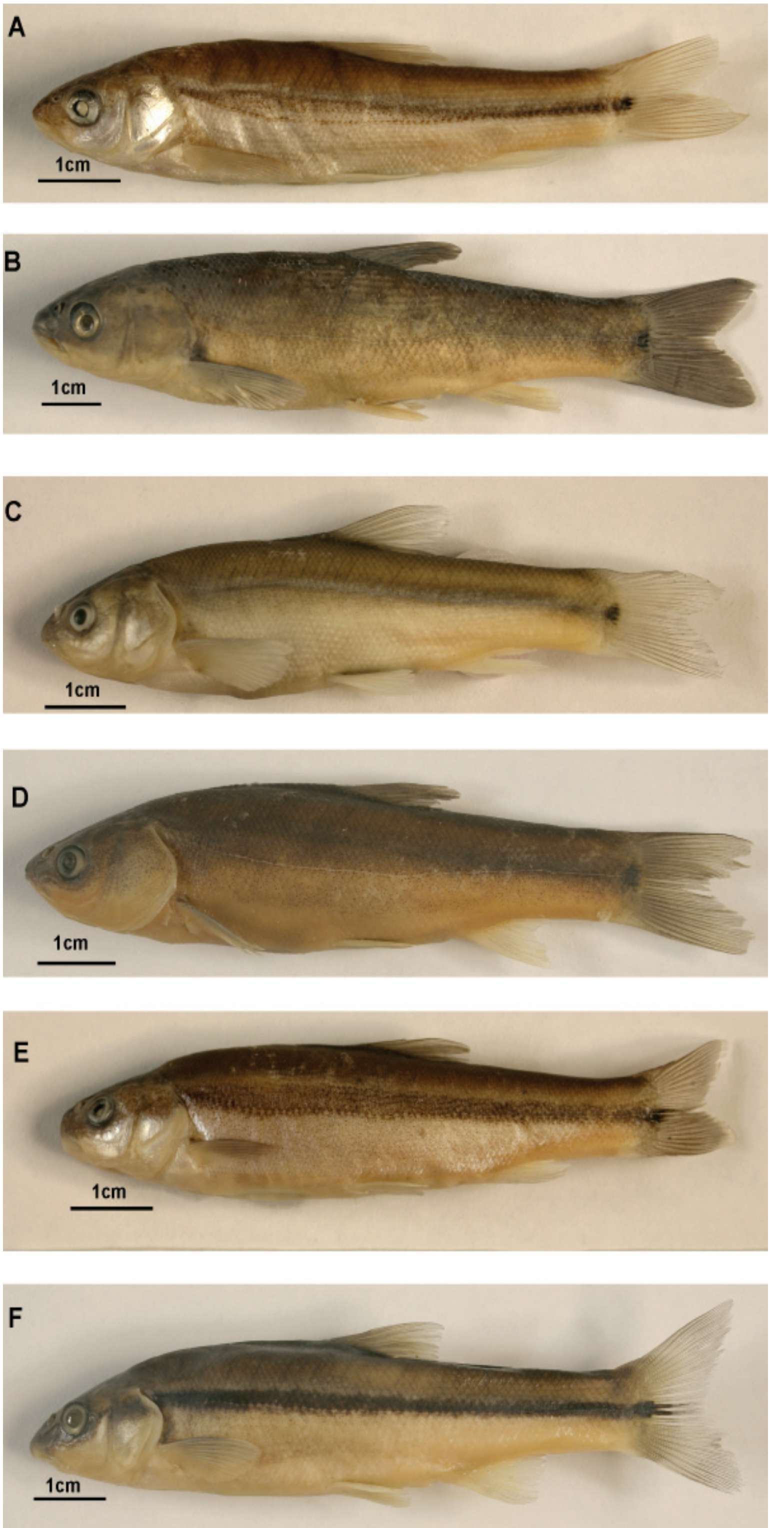

Figure 2. Photographs of *Algansea* species compared in this study. A), holotype of *A. amecae* n. sp., CPUM2079; B), *A. tincella* "Cuitzeo basin" population; C), *A. tincella* "La Laja River drainage" population; D), *A. tincella* "Verde River drainage" population; E), *A. avia*, and F), *A. aphanea*.

melanophores around scale pores.

Morphometric and meristic characters are given in Table 1. A medium-sized species of *Algansea* with a maximum standard length of 10.1 mm. Body dorsoventrally narrow and laterally compressed. Maximum body depth at dorsal origin-pelvic origin fin distance, which is 4.1-5.6 (= 4.8) times the standard length. Head length short, 3.8-4.7 (= 4.1) times shorter than maximum body depth. Dorsal profile more arched than ventral profile. Minimum body depth equal to caudal peduncle depth, which is 1.5-2.6 (= 1.8) times the end of the anal fin-caudal peduncle distance. Mouth upturned and maxillary barbels absent. Head provided with continuous supraorbital and infraorbital sensory canals. Preorbital length equal to eye diameter. Ventral fin inserted slightly behind origin of dorsal fin. Minimum body depth equal to caudal peduncle depth and 1.5-2.6 (= 1.8) times the end of the anal fin-caudal peduncle distance.

Lateral-line complete with 22-38 pored scales below the dark median lateral stripe. 13-15 scales between lateral line and the origin of dorsal fin and 9-11 rows of scales between lateral line and the origin of pelvic fin. Dorsal fin with 1 simple and 7 branched rays; outer margin straight to slightly concave. Anal fin with 1 simple and 7(-8) branched rays; outer margin straight. Pectoral fin with (15-)16-17(-18) rays. Pelvic fin with (7-)8(-9) branched rays. Caudal fin forked, lobes rounded, with (16-)17(-18) branched rays. Gill rakers 14-15.

Pigmentation. Live specimens have a dark-brown or olive-brown dorsum with a dark and narrow middorsal longitudinal stripe, a light band, a dark lateral stripe, and a metallic silvery ventral region.

Distribution. *Algansea amecae* n. sp. is endemic to the eastern headwaters of the Ameca River basin in west-central Mexico in the state of Jalisco. In their revision of *Algansea*, Barbour and Miller (1978) examined 3 localities of *A. tincella* in the Ameca River basin, 2 from Teuchitlán River (including the La Vega Dam), and other from a spring north of Etzatlán town. In recent years, this new species has been found only in 1 small stream with little flow in the small town of La Coronilla, south of the city of Ameca.

Table 2. Range of proportional measurements of among populations of *A. tincella* and *A. amecae*. Standard length is in mm; other variable are expressed as proportions of standard length

	A. ameca n. sp.	*A. tincella*			
	N=29	*Verde river N=20*	*Duero river N=27*	*Laja river N=10*	*Cuitzeo N=4*
Standard length	5.0 - 10.1	4.7 - 7.9	6.7 - 11.2	6.5 - 11.2	9.5 - 11.3
Head length/SL	1.2 - 2.5	1.3 - 2.0	1.7 - 2.7	1.7 - 2.8	2.4 - 2.7
Preopercle length/SL	0.8 - 1.7	0.8 - 1.3	1.1 - 1.8	1.1 - 1.9	1.6 - 1.8
Upper jaw length/SL	0.4 - 1.0	0.5 - 1.6	0.6 - 1.0	0.5 - 1.0	0.9 - 1.0
Eye diameter/SL	0.3 - 0.5	0.3 - 0.4	0.4 - 0.6	0.3 - 0.4	0.4 - 0.6
Postorbital head length/SL	0.6 - 1.4	0.7 - 1.1	0.9 - 1.5	0.9 - 1.6	1.3 - 1.6
Predorsal distance/SL	2.6 - 5.3	2.7 - 4.4	3.6 - 6.0	3.6 - 6.0	5.0 - 5.7
Preorbital length/SL	0.3 - 0.6	0.3 - 0.6	0.4 - 0.8	0.4 - 0.5	0.6 - 0.7
Preventral distance/SL	2.6 - 5.5	2.6 - 4.3	3.4 - 5.7	3.5 - 5.8	4.9 - 5.7
Preanal distance/SL	3.6 - 7.7	3.5 - 5.9	4.9 - 10.4	4.8 - 8.3	6.8 - 7.9
End of the anal fin-caudal peduncle distance/SL	1.0 - 2.2	1.0 - 1.6	1.3 - 2.6	1.2 - 2.1	2.1 - 2.6
Caudal peduncle depth/SL	0.6 - 1.2	0.6 - 1.3	0.5 - 1.4	0.8 - 1.3	1.1 - 1.6
Dorsal fin length/SL	0.5 - 1.1	0.4 - 0.8	0.7 - 1.3	0.7 - 1.3	1.1 - 1.2
Anal fin length/SL	0.4 - 0.8	0.3 - 0.7	0.3 - 1.0	0.5 - 0.9	0.8 - 1.1
Dorsal origin fin to caudal peduncle distance/SL	2.5 - 5.2	2.4 - 3.9	0.6 - 6.0	3.2 - 5.6	4.9 - 6.0
Anal origin fin to caudal peduncle distance/SL	1.4 - 3.0	1.2 - 2.9	1.8 - 3.4	1.9 - 3.0	2.9 - 3.6
Pelvic origin fin to caudal peduncle distance/SL	2.5 - 5.4	1.8 - 3.9	3.3 - 6.1	3.2 - 5.6	4.9 - 5.9
Pectoral origin to pelvic origin fin distance/SL	1.3 - 2.8	1.3 - 2.2	1.7 - 2.9	1.7 - 2.9	2.8 - 7.2
Dorsal origin to pelvic origin fin distance/SL	1.1 - 2.1	1.2 - 2.1	1.2 - 2.5	1.4 - 2.6	2.2 - 3.0
Dorsal origin to anal origin fin distance/SL	1.5 - 3.1	1.5 - 2.5	2.0 - 3.5	1.9 - 3.5	2.8 - 3.6
Pelvic origin to anal origin fin distance/SL	1.1 - 2.6	0.9 - 1.7	1.4 - 2.8	1.4 - 2.6	2.1 - 2.9

Conservation status: Extensive sampling within the Ameca River (with the main tributaries of the basin included), by López-López and Paulo-Maya (2001) reported the absence of *Algansea* at all collecting sites. These authors pointed out that the construction of La Vega reservoir, pollution from the sugar industry which dominates the upper Ameca basin, and wastewater from the city of Ameca have caused major environmental deterioration of the upper Ameca River basin. Currently, only 1 small population of the new species is extant, in a tributary of the Ameca River in La Coronilla town. The small and localized nature of this population and the general recent deterioration of the upper Ameca River system makes *A. amecae* highly vulnerable to extinction, and we recommend that this new species be designated as a protected species under Mexican law.

Taxonomic summary

Holotype: male 6.90 mm SL, collected in a tributary of Ameca River at town of La Coronilla, 13 km to south of Ameca city, Jalisco, Mexico, 20° 28´ 9.4´´N and 104° 4´ 10.6´´W, by Rodolfo Pérez-Rodríguez and Omar Domínguez, 10/November/2003. Colección de Peces de la Universidad Michoacana (CPUM2079), Universidad Michoacana de San Nicolás de Hidalgo Morelia, Michoacán, México.
Paratypes: CPUM1612, N=25 and CNP-IBUNAM 14622, N=3, collected with holotype by Rodolfo Pérez-Rodríguez and Omar Domínguez-Domínguez, 10/November/2003.
Etymology: the species is named after the type locality. The name *amecae* is a feminine noun in the genitive singular.

Remarks

Our analysis demostrate that the new species is clearly a discrete taxonomic unit. A PCA with meristic variables indicated that scores along the first PC did not overlap between *A. amecae* and *A. tincella* (Fig. 3). The number of transversal scales, number of upper row scales, and the number of infraorbital pores were the variables with the greatest loadings on the first PC (Table 3). In univariate comparisons, *Algansea amecae* n. sp. exhibit a lower number of transversal scales 24-25 (rarely 26) vs. 26-28 (rarely 25 or 29) in *A. tincella*; 14 scales in upper row (rarely 13 or 15) in *A. amecae* n. sp.vs. 15-16 (rarely 14 or 17) in *A. tincella*; 14-19 pores in the infraorbital head sensory canal (usually 15-16) in *A. amecae* n. sp. vs. 16-24 (usually 18-20) in *A. tincella* (Table 4). Scores on

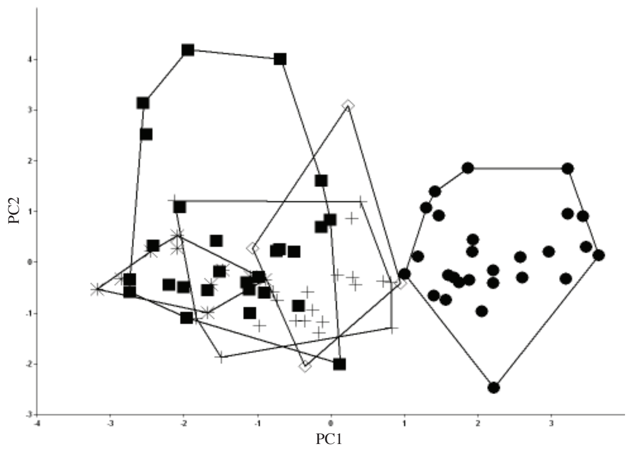

Figure 3. Scatterplot of scores on the first 2 principal components for 9 meristic variables. Key: ● *A. amecae* n. sp. (n = 29), *A. tincella*: + Verde River (n = 20), ■ Duero River (n = 27), * La Laja River (n = 10), and ◊ San Cristobal Stream lake (n = 4).

Table 3. Eigenvalues and eigenvectors for the first 2 principal components (PC1, PC2) from 9 meristic variables for the 4 populations of *A. tincella*, Verde River (n = 20), Duero River (n = 27), La Laja River (n = 10), and San Cristobal Stream lake (n = 4) and *A. amecae* n. sp. from La Coronilla stream (n= 29)

	PC1	*PC2*
Eigenvalue	3.13	1.37
Percent variation explained	34.78	15.06
Eigenvectors		
supraorbital pores	-0.3947	0.0663
infraorbital pores	-0.4669	0.1143
total transversal scales	-0.5274	-0.1522
upper transversal scales	-0.4846	0.0195
lower transversal scales	-0.2847	-0.4302
dorsal rays	0.1224	-0.3115
anal rays	-0.0145	0.4439
pectoral rays	0.1295	-0.4768
caudal rays	0.01488	-0.5025

the second PC overlapped almost completely between *A. amecae* and *A. tincella*. For this axis, the number of anal, dorsal, and caudal rays and the lower transverse scales had the highest loadings. A discriminant function analysis of principal component scores from the first 2 axes showed a significant difference ($P < 0.001$) between *A. amecae* n. sp. *A. tincella*, with a 99% correct classification.

Comparisons. The new species most closely resembles *A. popoche* and *A. lacustris* by lacking maxillary barbels and clearly this trait distinguishes it from the other congeneric species such as: *A. aphanea, A. avia, A. monticola* and *A. barbata* (Barbour and Miller, 1978). *Algansea ameca* n. sp. differs from the non-barbeled species by the standard length (23-26 cm vs 5-10 cm in the new species), the degree of obliquity of the mouth (upturned vs terminal in the new species), and the gill rakers (18-23 in *A. lacustris*, 49-84 in *A. popoche* vs 14-15 in the new species).

Pigmentation pattern. Lateral stripe pigmentation of *A. amecae* n. sp. (Fig. 2A) is a key character in distinguishing it from *A. tincella* but also it is important in distinguishing the new species with other congeners that might exhibit some similarity in pigmentation patterns such as *A. aphanea* and *A. avia* (Fig. 2), even though these species possess maxillary barbels. In both large and small individuals of *A. amecae* the prominent dark lateral stripe along the body extends from the black caudal spot at the median caudal inter-radial membranes to the opercle, where it is reduced. This trait is shared between *A. amecae* n. sp. and *A. aphanea* and *A. avia*, except that in the latter 2 species the stripe width is relatively homogeneous along the body, and it extends from the black spot at the median caudal interradial membranes to the preopercular region, continuing in a reduced form across the infraorbital region to the snout (more evident in *A. aphanea*, see Figure 2 F).

The prominent dark lateral stripe is wider in *A. amecae* than in *A. aphanea*, being equal to or greater than eye diameter, and the light band above the stripe is wider than in *A. avia*, also being equal to or greater than width of pupil. In *A. tincella*, the lateral stripe is considerably lighter (Fig. 2 B-D), and is prominent along the length of the body primarily in small individuals. In larger *A. tincella* individuals the lateral stripe is prominent only in the Verde River population and there only posterior to the insertion of dorsal fin (Fig. 2 D).

The caudal spot and lateral line pigmentation also helps distinguish *A. amecae* from the aforementioned congeneric species. In *A. avia* and *A. aphanea* (Fig. 2 E-F, respectively), the black spot at the base of caudal fin may extend into median caudal interradial membranes as in *A. amecae* n. sp., whereas in *A. tincella*, the black spot is present only at the middle of the base of caudal fin (Fig. 2 B-D). High concentrations of melanophores around the whole lateral line pored scales produce a dotted pattern in the new species. *Algansea tincella* usually lacks such a pigmented lateral line, but if it is present it is light and incomplete, appearing dotted only when a high concentration of melanophores are scattered in the ventral region or, in the Verde River population, when the lateral line is close to the median lateral stripe (Fig. 2 D).

Biogeographical considerations

The new species described here raises the number of endemic freshwater fishes of the upper Ameca River basin to

Table 4. Diagnostic characters distinguishing *A. amecae* from *A. tincella*. For each meristic variable the count is given first, followed in parentheses by the number of individuals with that count

	A. amecae n. sp.	*A. tincella*			
		Verde River	Duero River	La Laja River	Cuitzeo Lake
Transverse scales	24(10)-25(16)-26(3)	25 (1)-26(8)-27(6)-28(5)	26(4)-27(14)-28(8)-29(1)	27(4)-28(5)-29(1)	26(2)-27(2)
Upper transverse scales	13(3)-14(20)-15(6)	14(2)-15(12)-16(6)	14(1)-15(4)-16(18)-17(4)	16(6)-17(4)	15(2)-16(2)
IOP	17(1)-18(4)-19(3) -20(8)-21(6)-22(5)	16(3)-17(5)-18(5)-19(3)-20(3)-22(1)	24(8)-25(8)-26(3)-27(7) -28(1)	18(1)-19(2)-20(2)-21(1)-22(1)-23(2)-24(1)	18(4)
Lateral stripe	dark and prominent along entire length of body	prominent only posterior to dorsal fin	light and occurring only posterior to dorsal fin	light along entire length of body	Lightly and occurring only posterior to dorsal fin
Caudal spot	extends to median caudal interradial membranes	extends only to midbase of caudal fin	Extends only to midbase of caudal fin	Extends only to midbase of caudal fin	Extends only to midbase of caudal fin
Lateral line pigmentation	dark pigment above and below pores, giving "dotted" appearance	not dotted	not dotted	lightly dotted, lateral line close to median lateral stripe	not dotted

11 species. Vicariance of ancestral taxa caused by geologic events probably accounts for the relatively high level of endemism in the Ameca basin. Domínguez-Domínguez et al. (2006; 2007) attributed genetic divergence between the goodeids, *Ameca splendens*, *Allotoca goslinae and Zoogoneticus tequila*, and the cyprinid *Yuriria amatlana* from Ameca basin and their hypothesized sister species from the Lerma-Chapala-Santiago basin to the isolation of paleolakes caused by tectonic events such as the Tepic-Zacoalco, Ameca, San Marcos, Tamazula and Techolula faults. These geological events were dated between 3.3 and 5 Ma (Ferrari and Rosas-Helguera, 1999). Our findings concerning morphological similarity between *A. amecae* and *A. tincella* are consistent with findings of Domínguez-Domínguez et al. (2006) concerning the proposed biogeography of the Ameca and Lerma-Chapala-Santiago basin. However, whether *A. amecae* is sister to *A. tincella* or to another member of the genus remains to be demonstrated through a phylogenetic analysis. We are currently sequencing several genes to propose a phylogenetic hypothesis of this interesting group of cyprinids endemic to central Mexico.

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