

## Occurrence of *Poeciliopsis fasciata* (Meek, 1904) (Poeciliidae) in the floodplain of the Grijalva river basin, Mexico

Nicolás Álvarez-Pliego, Alberto J. Sánchez, Alberto Macossay-Cortez, Rosa Florido, Miguel Á. Salcedo

Diagnosis and Management of Tropical Wetlands, Academic Division of Biological Sciences, Juarez Autonomous University of Tabasco, Villahermosa, Tabasco, Mexico.

Corresponding author: N. Álvarez-Pliego, nicolas.alvarez.pliego@gmail.com

**Abstract.** *Poeciliopsis fasciata* has been reported in the Chiapas-Nicaraguan Ichthyofaunal Province, and the highlands of the Coatzacoalcos and Grijalva basins. Then, the distribution of *P. fasciata* was reviewed in the floodplain of the Grijalva basin by daylight samplings with 1 mm mesh size spoon nets, as well as in fish collections. Twenty-five specimens, from 10 to 59.7 mm SL, were collected in the Mezcalapa Viejo and Samaria rivers, and none in the revised collections. These records confirm the distribution of *P. fasciata* outside of its reported occurrence area.

**Key Words:** livebearing fishes, Mesoamerica, range extension, Usumacinta Province.

**Introduction.** *Poeciliopsis fasciata* (Meek 1904) is distributed from Cihuatlán, Mexico, to the river Suchiate in Guatemala, along with the Pacific coastal plain, and in the headwaters of the Coatzacoalcos and Papaloapan river basins. (Espinosa-Pérez et al 1993; Miller et al 2005; Woolrich-Piña et al 2010). Despite the previous results from comprehensive researches (Velasco 1976; Lozano-Vilano & Contreras-Balderas 1987; Rodiles-Hernández et al 2005), the presence of *P. fasciata* in the highlands of the Grijalva basin was reported recently (González-Díaz et al 2008; Gómez-González et al 2015; Velázquez-Velázquez et al 2016). But, none of these last three papers argued the absence of records of this species in the floodplain on this basin (as examples Páramo-Delgadillo 1984; Espinosa-Pérez & Daza-Zepeda 2005; Macossay-Cortez et al 2011; Sánchez et al 2012), since of the 20 species of Poeciliids strictly reported for the Mezcalapa river (Espinosa-Pérez & Daza-Zepeda 2005; Gómez-González et al 2015; Velázquez-Velázquez et al 2016), eight are distributed in both sections of the river and the rest are restricted to the highlands (8 species) or the floodplain (4 species). Then, specimens of *P. fasciata* were looked for outside of its reported distribution area in the floodplain of the Grijalva river basin.

**Material and Method.** Daylight sampling was carried out from 2013 to 2016 at 15 sites located in the Mezcalapa Viejo and Samaria rivers, both distributaries of the Mezcalapa river, Mexico (Figure 1). Specimens (Figure 2) were caught with 1 mm mesh size spoon nets. Electric conductivity (EC), pH, dissolved oxygen (DO) and temperature were recorded at each sampling site. The taxonomic identity of the specimens was verified considering the anatomy of the gonopodium, the shape of the teeth and the color patterns (Miller et al 2005). The updated distribution of *P. fasciata* was corroborated in the Colección del Colegio de la Frontera Sur (ECOSC), the Colección Nacional de Peces of the Instituto de Biología-UNAM (CNPE), the Colección de Peces Dulceacuícolas Mexicanos of the Escuela Nacional de Ciencias Biológicas IPN (ENCB-IPN) and the FishNet2 electronic page. Specimens of this survey were deposited in the ECOSC with catalogue

number ECOSC-11976 (Figure 3).

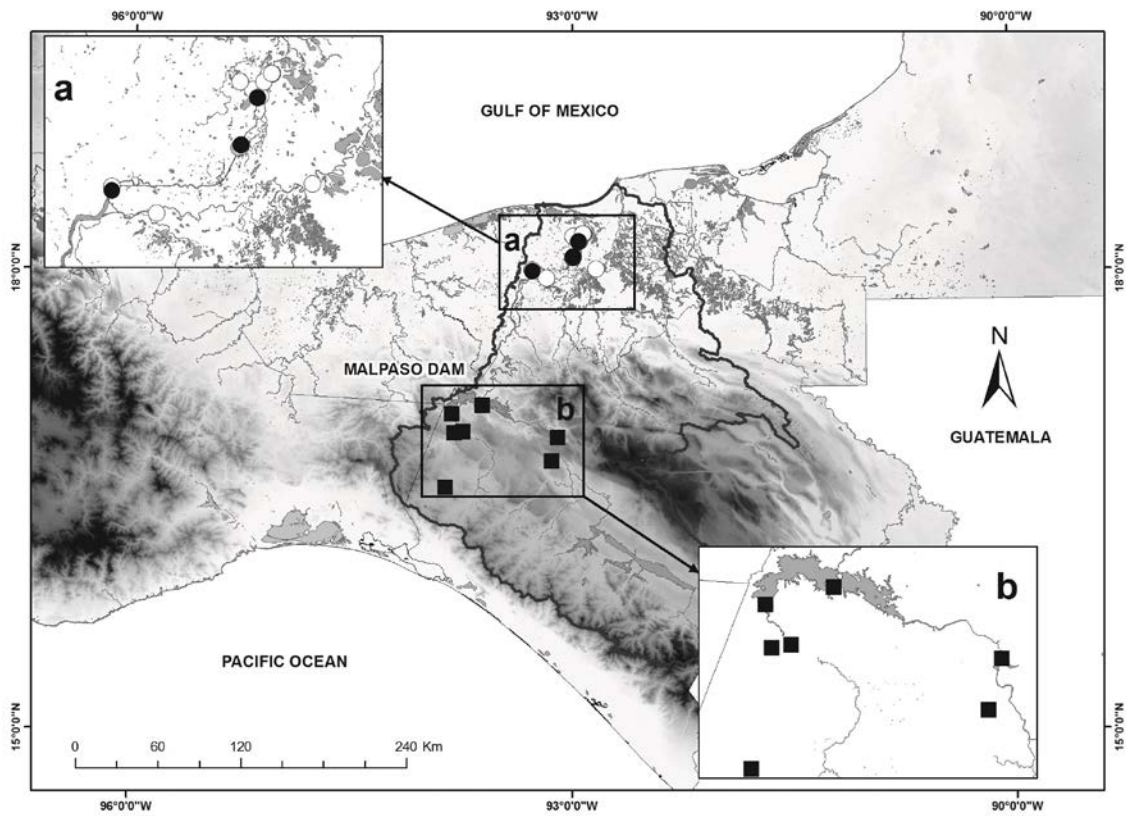


Figure 1. Distribution of *Poeciliopsis fasciata* in the Grijalva basin, Mexico. a) Floodplain, white circles = sites without records; black circles = sites with records ( $18^{\circ}12'5.57''\text{N}$ - $92^{\circ}56'59.29''\text{W}$ ;  $18^{\circ}6'8.87''\text{N}$ - $92^{\circ}59'12.09''\text{W}$ ;  $18^{\circ}0'24.66''\text{N}$ - $93^{\circ}16'6.77''\text{W}$ ). b) Highlands basin, black squares = published records; black line = Grijalva basin limits.



Figure 2. *Poeciliopsis fasciata* specimens collected in the lower basin of the Grijalva river.



Figure 3. Specimens ECOSC-11976.

**Results and Discussion.** The 25 specimens were collected only in three sites from sand pools and gravel shallows (- 0.5 m), along the river banks with no submerged aquatic vegetation. The standard length varied from 10.0 to 28.57 mm (Table 1). Water parameters fluctuated from 7.7 to 7.8 for pH, 6.34 to 7.86 mg/L for DO, 0.17 to 0.38 mS/m for EC and 28.7 to 29.4° C. No record of *P. fasciata* for the floodplain of the Grijalva basin was found or validated in the revised collections and Fishnet2, since the two records of *P. fasciata* from floodplain Grijalva basin found in the database of ENCB-IPN (ENCB-IPN P1225 and ENCB-IPN P1242) were incorrect. Both specimens were reviewed anew by the curator of the ENCB-IPN collection (E. Soto-Galera personal communication, November 1<sup>st</sup>, 2017).

Table 1  
Biometric data of *Poeciliopsis fasciata* in lower Grijalva basin, Mexico

| Characteristics      | Specimens |           |           |
|----------------------|-----------|-----------|-----------|
|                      | Males     | Females   | Juveniles |
|                      | 9         | 13        | 3         |
| Morphometric (mm)    |           |           |           |
| Total longitude      | 22.0-27.1 | 19.0-33.7 | 13.1-16.0 |
| Standard length      | 18.1-21.0 | 16.0-28.5 | 10.0-23.0 |
| Head length          | 4.1-5.0   | 4-6.8     | 3.0-3.1   |
| Body depth           | 4.0-5.0   | 3.1-6.5   | 2.3-5.0   |
| Predorsal-fin length | 11.0-14.0 | 10.0-18.7 | 7.5-8.0   |
| Meristic             |           |           |           |
| Dorsal fin rays      | 7-8       | 7-8       | 8         |
| Lateral line scales  | 30-32     | 30-34     | 29-30     |

*P. fasciata* specimens in the Samaria and Mezcalapa Viejo rivers are the first records for the floodplain Grijalva basin. The sampling sites are located below 20 m above mean sea level (AMSL) and less than 50 km from the Gulf of Mexico coastline. Both conditions differ from the previous occurrence area located above 350 m AMSL and 200 km away from the same coastline. Moreover in the highlands, rivers and streams present many steep slopes (>25%), whereas the floodplain has sloping areas that occupy barely 2%

(Sánchez-Hernández et al 2013). Indeed, the particular geomorphic conditions and habitat structure of sites located in different river sections have been used to explain the dissimilarity of the fish assemblages along some rivers (Smith et al 2016), as well as the distribution of some fish restricted to the highlands of the Grijalva river, as occurred with *Heterophallus milleri* Radda and *Poeciliopsis pleurospilus* (Günther) (Miller et al 2005).

In this study, the confirmation of the extension of the geographical distribution of the *P. fasciata* in the Grijalva floodplain represents an incentive to further biological study of this poeciliid, since it has been considered endemic to Chiapas Nacaome on the Pacific coast (*sensu* Matamoros et al 2015). Distribution extensions have recently occurred in the case of other small-bodied fish. For example, the occurrence area of *Xiphophorus clemenciae* Álvarez and *Heterophallus echeagarayi* (Álvarez) (= *Gambusia echeagarayi*) were recently updated (Gómez-González et al 2014; Álvarez-Pliego et al 2016). The inaccuracies in the distribution of small-bodied fish may be related to the selectivity of the sampling devices, the sampling effort, low abundance and habitat association (Olden et al 2007; Álvarez-Pliego et al 2016).

**Acknowledgements.** We would like to acknowledge Dr. Eduardo Soto Galera for the update of the taxonomic identity of the specimens deposited in the ENCB-IPN, Henry Reyes, Karen Cárdenas and Jessica Camarero for the photographs and sampling, and Ana Belen Rodríguez-Guadarrama for the preparation of the map.

## References

- Álvarez-Pliego N., Sánchez A. J., Florido R., Salcedo M. A., Macossay-Cortez A., Brito R., Reyes H., 2016 New records and extension of geographical distribution of *Heterophallus echeagarayi* (Poeciliidae) in the Usumacinta Province, Mexico. *Cybium* 40(2):178-180.
- Espinosa-Pérez H., Gaspar-Dillanes M. T., Fuentes-Mata P., 1993 Listados faunísticos de México III. Peces dulceacuícolas mexicanos. México, D. F: IBUNAM. 100 p.
- Espinosa-Pérez H., Daza-Zepeda A., 2005 Peces. In: Biodiversidad del estado de Tabasco. Bueno J., Álvarez F., Santiago S. (eds), pp. 225-240, IBUNAM, Ciudad de México.
- Gómez-González A. E., Velázquez-Velázquez E., Anzueto-Calvo J., 2014 Primer registro de *Xiphophorus clemenciae* (Cyprinodontiformes: Poeciliidae) en la cuenca del río Grijalva, México. *Revista Mexicana de Biodiversidad* 85:975-978.
- Gómez-González A. E., Velázquez-Velázquez E., Anzueto-Calvo J. Maza-Cruz M. F., 2015 Fishes of the Grijalva River basin of Mexico and Guatemala. *Check List* 11(5):1-11.
- González-Díaz A. A., Quiñones M. R., Velázquez-Martínez J., Rodiles-Hernández R., 2008 Fishes of La Venta River in Chiapas, Mexico. *Zootaxa* 1685:47–54.
- Lozano-Vilano M. L., Contreras-Balderas S., 1987 Lista zoogeográfica y ecológica de la ictiofauna continental de Chiapas, México. *The Southwestern Naturalist* 32:223-236
- Macossay-Cortez A., Sánchez A. J., Florido R., Huidobro L., Montalvo-Urgel H., 2011 Historical and environmental distribution of ichthyofauna in the tropical wetland of Pantanos de Centla, southern Gulf of Mexico. *Acta Ichthyologica et Piscatoria* 41(3):229-245.
- Matamoros W. A., McMahan C. D., Chakrabarty P., Albert J. S. Shaefer J. F., 2015 Derivation of the freshwater fish fauna of Central America revisited: Myers's hypothesis in the twenty-first century. *Cladistics* 31:177-188.
- Miller R. R., Minckley W. L., Norris S. M., 2005 *Freshwater Fishes of Mexico*. Chicago: University of Chicago Press, 490 p.
- Olden J. D., Hogan Z. S., Vander Zanden M. J., 2007 Small fish, big fish, red fish, blue fish: size-biased extinction risk of the world's freshwater and marine fishes. *Global Ecology and Biogeography* 16(6):694–701.
- Páramo-Delgadillo S., 1984 Ictiofauna del río González y Lagunas adyacentes, Tabasco, México. *Universidad y Ciencia* 1:5-19.
- Sánchez-Hernández R., Mendoza-Palacios J. D. D., De la Cruz-Reyes J. C., Mendoza-Martínez J. E., Ramos-Reyes R., 2013 Mapa de erosión potencial en la cuenca

- hidrológica Grijalva-Usumacinta México mediante el uso de SIG. *Universidad y Ciencia* 29(2):153-161.
- Rodiles-Hernández R., González-Díaz A. A., Chan-Sala C., 2005 Lista de Peces continentales de Chiapas, México. *Hidrobiológica* 15:245–253.
- Sánchez A. J., Salcedo M. A., Macossay-Cortez A., Feria-Díaz Y., Vázquez L., Ovando N., Rosado L., 2012 Calidad ambiental de la laguna La Pólvora en la cuenca del río Grijalva. *Tecnología y Ciencias del Agua* 3(3):143-152.
- Smith C. D., Quist M. C., Hardy R. S., 2016 Fish assemblage structure and hábitat associations in a large wetern river system. *River Research and Applications* 32:622-638.
- Velasco C. R., 1976 Los Peces de Agua dulce del Estado de Chiapas. Tuxtla Gutiérrez, Chiapas: Gobierno del Estado de Chiapas, México.
- Velázquez-Velázquez E., López-Vila J. M., Gómez-González A. E., Romero-Berny E. I., Lievano-Trujillo J. L., Matamoros W. A., 2016 Checklist of the continental fishes of the state of Chiapas, Mexico, and their distribution. *ZooKeys* 632:99-120.
- Woolrich-Piña G. A., Smith G. R., Oliver-López L., Barbosa-Morales M., Lemos-Espinal J. A., 2010 Factors influencing the distribution of *Poeciliopsis fasciata* along the Río Salado (Puebla, México). *Journal of Freshwater Ecology* 25(1):127-133.
- \*\*\* FishNet2 2016 Available at: <http://www.fishnet2.net> Accessed November 2017).

Received: 02 December 2017. Accepted: 03 January 2018. Published online: 08 January 2018.

Authors:

Nicolás Álvarez-Pliego, Juarez Autonomous University of Tabasco, Academic Division of Biological Sciences, Diagnosis and Management of Tropical Wetlands, Mexico, Tabasco, Villahermosa, 86039, e-mail: [nicolas.alvarez.pliego@gmail.com](mailto:nicolas.alvarez.pliego@gmail.com)

Alberto J. Sánchez, Juarez Autonomous University of Tabasco, Academic Division of Biological Sciences, Diagnosis and Management of Tropical Wetlands, Mexico, Tabasco, Villahermosa, 86039, e-mail: [alberthoj.sanchez@gmail.com](mailto:alberthoj.sanchez@gmail.com)

Alberto Macossay-Cortez, Juarez Autonomous University of Tabasco, Academic Division of Biological Sciences, Diagnosis and Management of Tropical Wetlands, Mexico, Tabasco, Villahermosa, 86039, e-mail: [aamacossayc@gmail.com](mailto:aamacossayc@gmail.com)

Rosa Florido, Juarez Autonomous University of Tabasco, Academic Division of Biological Sciences, Diagnosis and Management of Tropical Wetlands, Mexico, Tabasco, Villahermosa, 86039, e-mail: [rosyflorido@gmail.com](mailto:rosyflorido@gmail.com)

Miguel Ángel Salcedo, Juarez Autonomous University of Tabasco, Academic Division of Biological Sciences, Diagnosis and Management of Tropical Wetlands, Mexico, Tabasco, Villahermosa, 86039, e-mail: [mzalcedo@gmail.com](mailto:mzalcedo@gmail.com)

This is an open-access article distributed under the terms of the Creative Commons Attribution License, which permits unrestricted use, distribution and reproduction in any medium, provided the original author and source are credited.

How to cite this article:

Álvarez-Pliego N., Sánchez A. J., Macossay-Cortez A., Florido R., Salcedo M. A., 2018 Occurrence of *Poeciliopsis fasciata* (Meek, 1904) (Poeciliidae) in the floodplain of the Grijalva river basin, Mexico. *Poec Res* 8(1):1-5.