



Research note

First record of the Mountain Caecilian *Gymnopsis syntrema* (Amphibia: Gymnophiona: Dermophiidae) in Mexico

Primer registro de la cecilia de montaña *Gymnopsis syntrema* (Amphibia: Gymnophiona: Dermophiidae) en México

Adriana González-Hernández¹, Omar Hernández-Ordóñez^{2,3}, Martín Cervantes-López² and Víctor H. Reynoso^{1✉}

¹Colección Nacional de Anfibios y Reptiles, Departamento de Zoología, Instituto de Biología, Universidad Nacional Autónoma de México, Circuito Exterior. Ciudad Universitaria, 04510 México, D. F., Mexico.

²Centro de Investigaciones en Ecosistemas, Universidad Nacional Autónoma de México, Antigua Carretera a Pátzcuaro No. 8701, Ex Hacienda de San José de la Huerta, 58190 Morelia, Michoacán, Mexico.

³Posgrado en Ciencias Biológicas, Universidad Nacional Autónoma de México. Av. Universidad 3000, 04510 Coyoacán, México D. F., Mexico.

✉ vrey noso@ib.unam.mx

Abstract. We document the first record of *Gymnopsis syntrema* (Dermophiidae) for Mexico. A single individual was found in the Montes Azules Biosphere Reserve, Lacandona region, in the southeast of Mexico. The specimen was collected in an old-growth forest site at the beginning of the rainy season on May, 2012 and extends former known distribution 88 km west from the nearest locality in Guatemala. We also present an updated distribution map of the species based on all known records of the species to date. With this new record, the number of amphibian species in Mexico increases to 377.

Key words: caecilians, diversity, herpetofauna, tropical rain forest, Lacandona, Chiapas.

Resumen. Presentamos el primer registro de *Gymnopsis syntrema* (Dermophiidae) para México. Se encontró un único individuo en la Reserva de la Biosfera Montes Azules, en la región de la lacandona, al sureste de México. El ejemplar fue recolectado en mayo de 2012 en bosque maduro al inicio de la temporada de lluvias, extendiendo la distribución conocida de la especie 88 km al oeste de su localidad más cercana en Guatemala. Presentamos un mapa actualizado de la especie basado en todos los registros conocidos a la fecha. Con este nuevo registro, el número de especies de anfibios en México se incrementa a 377.

Palabras clave: cecílicos, diversidad, herpetofauna, bosque tropical húmedo, lacandona, Chiapas.

Caecilians (Order Gymnophiona) are the most poorly known amphibians because of their low abundance and secretive habits. They are a highly specialized, limbless group with a long annulated body and sensitive tentacles on either side of the snout. Most species are tropical, fossorial predators with a great diversity in shape, ecology, and reproductive habits (Zug et al., 2001; Vitt and Caldwell, 2009).

Of the 4 known genera of the family Dermophiidae only *Dermophis* and *Gymnopsis* are Mesoamerican endemics, of which only *Dermophis glandulosus* extends to northern Colombia (Wilkinson et al., 2011). Prior to this report,

only 2 species of the genus *Dermophis*, *D. mexicanus* and *D. oaxacae* were known from Mexico; and the 2 species of the genus *Gymnopsis*, *G. multiplicata* and *G. syntrema* were restricted to Central America (Wilkinson et al., 2011). Both genera inhabit low and intermediated elevations of tropical premontane regions from sea level to 900 m elevation in southern Mexico and Guatemala, and up to 1400 m elevation in Costa Rica and western Panama (Savage and Wake, 1972).

The mountain caecilian *Gymnopsis syntrema* is called in Guatemala talpacua (Campbell, 1998). As described by Wake and Campbell (1983), Lee (2000) and Campbell (1998), it is moderately small and thin, from 250 to 307 mm in total length. The head and body are similar in width, the snout is rounded in dorsal view and the upper jaw is

protracted beyond the lower jaw. The eyes are reduced, visible as spots or with the orbit sometimes covered with skin or even the squamosal bone, and the sensorial tentacle is in front of the eye. The primary rings vary from 128 to 132 and the secondary rings from 63 to 93 (193 to 132 in total). It has small scales between the primary and secondary rings, which increase in size posteriorly. The tail has a rounded end.

Because of its shape and coloration, this small, thin amphibian species can be easily confused with earthworms. The head and anterior portion of the body are normally pink, but the coloration of some specimens varies from dark grey, to brown or black, limiting the pink coloration to the ventral surface of the head. The ventral surface of the head can also be light gray or brownish yellow (Campbell, 1998). As with other caecilians, *Gymnopsis syntrema* burrows in loose soil in primary and secondary vegetation in humid tropical or subtropical forest, between 400 and 1 000 m in elevation. Most of the life history data remain unknown. It is thought to feed on worms and perhaps other soil invertebrates and reproduction is thought to be similar to that of *G. multiplicata*, which produces from 2 to 12 offspring (Lee, 2000; Campbell, 1998). *Gymnopsis syntrema* is rarely seen in the wild, although Acevedo et al. (2004) reported that many specimens, deposited at the University of Texas at Arlington (UTA), were dug out by a bulldozer in Chichipate, Izabal, eastern Guatemala. Apparently, eleven of these specimens are the ones used by Ducey et al. (1993) in burrowing behavior experiments.

Gymnopsis syntrema appears to be thoroughly reported patchily in central Guatemala and southern Belize (Campbell, 1988). So far we have found only 6 specimens reported with accurate locality data at the Global Biodiversity Information Facility (GBIF, 2012), BERDS (2012), and the reference collection of the Biology Department in the Universidad del Valle, Guatemala (UVG). Reported localities for Guatemala are: ca. 8 Km south east Chisec, Alta Verapaz, GBIF: 15°45' N, 90°15' W (Staatliches Museum für Naturkunde Stuttgart, SMNS: Herpetologie: 2245); Finca El Volcán, Alta Verapaz, ca. 15°30'10" N, 89°51'42" W (Savage and Wake, 2001); Aldea Vista Hermosa, Los Amates, Izabal, GBIF: ca. 15°15'20" N, 89°05'48" W 650 m elev. (Kansas University, Herpetology, KUH: 189566, possibly same as in Savage and Wake, 2001); Finca Semuc, Sierra de Santa Cruz, El Estor, Izabal, 15°40'0.12" N, 89°28'59.88" W and 15°41'32.28" N, 89°21'7.92" W, 500 m elev. (Universidad del Valle, Guatemala, UVG 507 and UVG 929); and, Chichipate, southern Sierra de Santa Cruz, Izabal, ca. 15°28'34" N, 89°27'54" W (Acevedo et al., 2004 specimens at the University of Texas at Arlington, UTA). Campbell (1998) reported this species from the Sierra de las Minas, Izabal,

ca. 15°17'34" N; 89°28'17" W (see also Frost, 2011); Sierra de Chinajá in Petén, Alta Verapaz, ca. 15°58'21" N, 90°12'05" W; and, from the Sierra de Merendón (uncertain locality, possibly in Chiquimula province) (Fig. 1). In Belize it was reported from the Mayan Mountains: Upper Raspaculo River, Chiquibul, Cayo, ca. 16°47' N, 88°55'24" W, elev. 600 m (BERDS: Specimen ID: 90758; Rogers and Sutton, 1991; Stafford, 1994; Lee 1996) (Fig. 1). The map provided by the IUCN (Acevedo et al., 2004) is far from complete, restricting the distribution of *G. syntrema* around Lake Izabal and Belize, ignoring all other Guatemalan records. Cope (1866) described the type locality of the species from "the neighbouring region of Honduras" and Taylor (1968) later referred it to "the northern coast of Honduras". That the distribution of this species might extend to Honduras has been mentioned in the literature, but no documented record exists and it is not listed in the most recent Honduran herpetofaunal lists (e.g., Townsend and Wilson, 2010).

Here, we report the first record of the caecilian *Gymnopsis syntrema* in Mexico. The specimen was found on May 25th, 2012 in Ruinas location at the Montes Azules Biosphere Reserve, Municipality of Ocosingo, Chiapas, Mexico, (16°06'35.21" N, 91°00'59.10" W; Datum= WGS84; 300 m elev.; Fig. 1). The specimen was found on the ground, near the edge of a small stream within pristine tropical rainforest in the early rainy season during an afternoon storm. Associated microenvironmental conditions at the site were: average temperature at 1.5 m of the ground= 24.48 ± 2.21 °C (max= 31.52 °C; min= 20.19 °C); and, average humidity at 1.5 m from the ground= 96.99 ± 5.6% (Max. 100%; Min. 69.6%). In addition we characterized the vegetation structure: litter percentage average, 49.5% (SD 13.8%); average of number of trees with a diameter at breast height larger than 30 cm, 1.16 per 4m² (SD 0.7); average of palms, 4.6 per 4m² (SD 2.8) and average of ferns 3.5 per 4m² (SD 3.7). Temperature and humidity values were measured with data-loggers placed in the site during dry season (March) and wet season (August), 2011, and from May to July, 2012.

This is the first definite report for both the genus and the species for Mexico and the westernmost report for the species. It extends the known distribution 88 km west from the nearest locality in the Sierra de Chinajá in Petén, Guatemala (ca. 15°58'21" N, 90°12'05" W; Campbell, 1998) and is the lowest known elevation record at 300 m. The specimen (Fig. 2) was deposited in the Colección Nacional de Anfibios y Reptiles in the Instituto de Biología of the Universidad Nacional Autónoma de México under the accession number CNAR-IBH 26015.

According to Taylor (1968) *Siphonops oligozonus* described by Cope (1877) and synonymized by Nussbaum

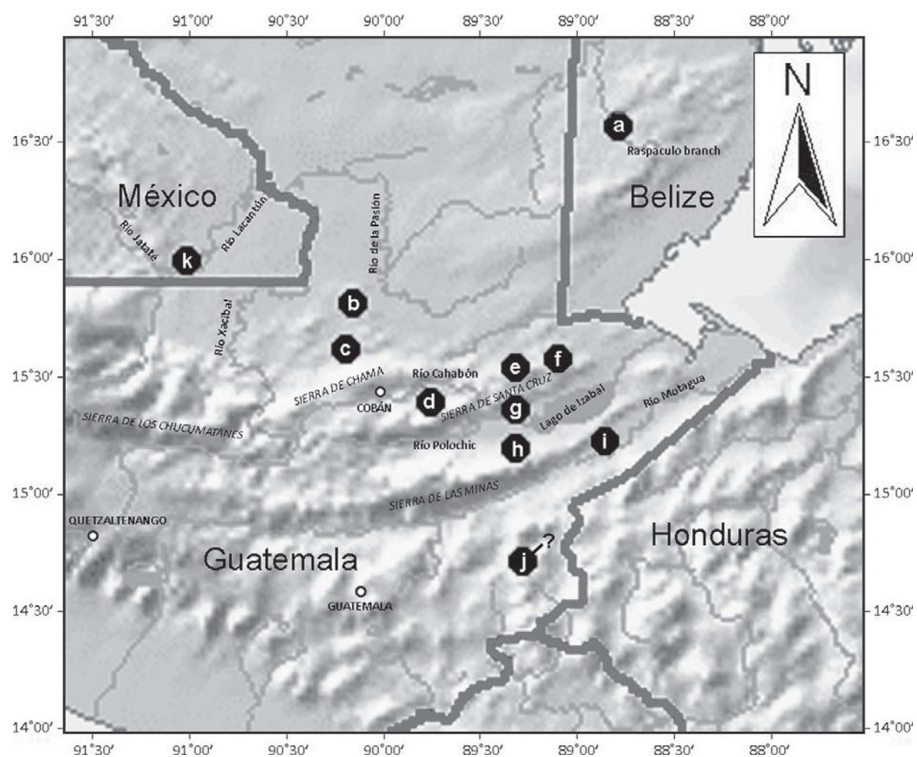


Figure 1. Distribution map of *Gymnopsis syntrema* based upon reported specimens. Belize: (a) Chiquibul, Cayo. Guatemala: (b) Sierra de Chinajá, Alta Verapaz; (c) Chisec, Alta Verapaz; (d) Finca El Volcán, Alta Verapaz; (e, f) Finca Semuc, Sierra de Santa Cruz, El Estor, Izabal; (g) Chichipate, Izabal; (h) Sierra de las Minas, Izabal; (i) Los Amates, Izabal (j); Sierra de Merendón (possibly Chiquimula). México: (k) Ocosingo, Chiapas.

(1988) with *Gymnopsis syntrema* was described from a specimen of “uncertain” locality, possibly Chiapas or Tehuantepec in Mexico. According to Cochran (1961) the specimen USNM 25187 is the holotype designated by Cope (1877) for *S. oligozonus*. This specimen, however, does not have any associated locality information to verify where it was collected (Smithsonian, 2012).

The new specimen has a long and slender body distinctively different from the stouter *Gymnopsis multiplicata*. The eye is covered by skin and the tactile tentacle is placed just below the eye, far posterior to the nostril. It has 126 primary rings and 69 secondary rings, and the tail is rounded and restricted to the posterior end of the body. The rings are pink contrasting with the reddish-brownish folds. The head and the tail are pink and the venter is slightly paler than the dorsum.

Gymnopsis syntrema is listed as Data Deficient in the IUCN red list, and it is not listed in CITES. This species should be immediately placed on the Mexican protected species list NOM-059-SEMARNAT (Semarnat, 2010) as it is a rare and restricted species endemic to western

Central America with a very limited distribution within Mexico. In addition, deforestation rates in some regions of the Lacandona Forest are high (Mendoza and Dirzo, 1999; Couturier et al., 2012), and it is still unknown if the species is distributed widely within the Montes Azules Biosphere Reserve.

Prior to our report 376 amphibian species were known within the Mexican territory (Parra-Olea et al., 2014); now the number of known species has increased to 377.

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Figure 2. Specimen CNAR-IBH 26015, first finding of the caecilian *Gymnopsis syntrema* in Mexico from Ruinas at the Montes Azules Biosphere Reserve, Municipality of Ocosingo, Chiapas, southern Mexico (16°06'35.21" N, 91°00'59.10" W; 300 m elev.).

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Literature cited

- Acevedo, M., J. Lee, M. Wilkinson, M. Wake, T. Papenfuss and C. Vásquez. 2004. *Gymnopsis syntrema*. IUCN Red List of Threatened Species. <http://www.iucnredlist.org>; last accessed: 12.XI.2013.
- BERDS (The Biodiversity and Environmental Resource Data System of Belize). 2012. Belmopan Belize. <http://dnss0.ltpb.org/>; last accessed: 12.XI.2013.
- Campbell, J. A. 1998. Amphibians and reptiles of northern Guatemala, the Yucatán and Belize. University of Oklahoma Press. Norman 380 p.
- Cochran, D. M. 1961. Type specimens of reptiles and amphibians in the U.S. National Museum. Bulletin of the United States National Museum 220:1-289.
- Cope, E. D. 1866. Fourth contribution to the herpetology of tropical America. Proceedings of the Academy of Natural Sciences of Philadelphia 18:123-132.
- Cope, E. D. 1877. Tenth contribution to the herpetology of tropical America. Proceedings of the American Philosophic Society 17:85-98.
- Couturier, S., J. M. Núñez and M. Kolb. 2012. Measuring tropical deforestation with error margins: a method for REDD monitoring in South-Eastern Mexico. In Tropical Forests, S. Padmini (ed.) Intech-Open Access Company, p. 269-296. Available in <http://www.intechopen.com/books/tropical-forests/measuring-tropical-deforestation-with-error-margins-a-method-for-redd-monitoring-in-south-eastern-me>;
- last access: 13.IV.2014.
- Ducey, P. K., D. R. Formanowicz, L. Boyet, J. Mailloux and R. A. Nussbaum. 1993. Experimental examination of burrowing behavior in caecilians (Amphibia: Gymnophiona. effects of soil compaction on burrowing ability of four species. Herpetologica 49:450-457.
- Frost, D. R. 2011. Amphibian species of the World. American Museum of Natural History. <http://research.amnh.org/vz/herpetology/amphibia/>; last accessed: 12.XI.2013.
- GBIF (Global Biodiversity Information Facility). 2012. Biodiversity occurrence data published. University of Kansas Biodiversity Institute and National Museum of Natural History, Smithsonian Institution (*Gymnopsis syntrema*). <http://data.gbif.org/species/2430979/>; last accessed: 12.XI.2013.
- Lee, J. C. 1996. The amphibians and reptiles of the Yucatán Peninsula. Comstock Publishing Associates, Cornell University Press, Ithaca. 500 p.
- Lee, J. C. 2000. A field guide to the amphibians and reptiles of the Maya World: The lowlands of Mexico, Northern Guatemala and Belize. Comstock Publishing Associates, Cornell University Press, Ithaca. 402 p.
- Mendoza, E. and R. Dirzo. 1999. Deforestation in Lacandonia (southeast México). Evidence for the declaration of the northernmost tropical hot spot. Biodiversity and Conservation 8:1621-1641.
- Nussbaum, R. A. 1988. On the status of *Copeotyphlinus syntremus*, *Gymnopsis oligozona*, and *Minascaecilia sartoria* (Gymnophiona, Caeciliidae): a comedy of errors. Copeia 4: 921-928.
- Parra-Olea, G., O. Flores-Villela and C. Mendoza-Almeralla. 2014. Biodiversidad de anfibios en México. Revista Mexicana de Biodiversidad 85:S460-S466.
- Rogers, A. D. F. and D. A. Sutton. 1991. Report of the 1991 joint services scientific expedition to the upper Raspaculo River, Belize, Central America, January-March 1991. The Natural History Museum and HM stationery Office, London.
- Savage, J. M. and M. H. Wake. 1972. Geographic variation and systematic of the Middle American Caecilians, Genera *Dermophis* and *Gymnopsis*. Copeia 1972:680-695.
- Savage, J. M. and M. H. Wake. 2001. Reevaluation of the status of taxa of Central American caecilians (Amphibia: Gymnophiona) with comments on their origin and evolution. Copeia 2001:52-64.
- Semarnat. 2010. NOM-059-SEMARNAT. 2010. Norma Oficial Mexicana Protección Ambiental-Especies nativas de México de flora y fauna silvestres -Categorías de riesgo y especificaciones para su inclusión, exclusión o cambio -Lista de especies en riesgo, 2nd Edition. Diario Oficial de la Federación, México.
- Smithsonian National Museum of Natural History. 2012. Division of amphibians and reptiles database. Collection: *Gymnopsis syntrema*. Smithsonian National Museum of Natural History, Washington D. C. <http://collections.mnh.si.edu/search/herps/?irn=6203418>; last accessed: 12.XI.2013.
- Stafford, P. J. 1994. Herpetology and ichthyology. In Report on the joint services expedition to the Upper Raspaculo River,

- Belize, Central America, April-June 1993, with a report on the Matola Expedition along the Lower Raspaculo River, P. Rogers, A. D., Sutton, D. A. and P. J. Stafford (eds.). Natural History Museum, London. p. 1-13.
- Taylor, E. H. 1968. The caecilians of the World: a taxonomic review. University of Kansas Press, Lawrence. 848 p.
- Townsend, J. H. and L. D. Wilson. 2010. Conservation of the Honduran herpetofauna: issues and imperatives. *In* Conservation of Mesoamerican Amphibians and Reptiles, L. D. Wilson, J. H. Townsend and J. D. Johnson. Eagle Mountain Publishing, L. C., Eagle Mountain, Utah. p. 460-487.
- Vitt, L. J. and J. P. Caldwell. 2009. Herpetology: an introductory biology of amphibians and reptiles. 3rd Edition. Academic Press, Burlington, Massachusetts. 720 p.
- Wake, M. H. and J. A. Campbell. 1983. A new genus and species of caecilian from the sierra de Las Minas, Guatemala. *Copeia* 4:857-863.
- Wilkinson, M., D. San Mauro, E. Sherratt and D. J. Gower. 2011. A nine-family classification of caecilians (Amphibia: Gymnophiona). *Zootaxa* 2874:41-64.
- Zug, G. R., L. J. Vitt and J. P. Caldwell. 2001. Herpetology. An introductory biology of amphibians and reptiles, 2nd Edition. Academic Press, San Diego. 527 p.