

SHORT COMMUNICATION

On the clutch size of *Geophis omiltemanus* (Squamata: Dipsadidae) in the Sierra Madre del Sur, Mexico

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Geophis omiltemanus Günther, 1893 is a Mexican endemic snake restricted to the Sierra Madre del Sur, known from central Guerrero, and a disjunct record from western Oaxaca, near San Andrés Chicahuaxtla in an elevation range of 2153–2413 m a.s.l. (AMNH 97962; Campbell 1988, Heimes 2016). Despite being described over a century ago and despite its type locality, “Omilteme”, being one of the most extensively collected sites of the Sierra Madre del Sur (Flores-Villela and Muñoz-Alonso 1993), almost nothing is known of its natural history. Additionally, recollections beyond a ca. 20 km radius from its type locality have not been reported after Campbell’s record (Campbell 1988). Here we report the first data known on the clutch size of this species and compare it to existing published reports in the genus.

During fieldwork conducted at the El Llano, Llanos de Tepoxtepec, municipality of Chilpancingo de los Bravo, Guerrero, Mexico (17.45711°N, -99.53738°W; 2413 m a.s.l.) on 22 June 2019 three specimens of *G. omiltemanus* were found inside rotting logs. The specimens were collected, humanely euthanized, fixed in 10% formalin, transferred to 70% ethanol for permanent storage, and accessioned at the herpetological collection of the Museo de Zoología “Alfonso L. Herrera”, Facultad de Ciencias, Universidad Nacional Autónoma de México under a collecting permit issued by the Dirección General de Vida Silvestre, Secretaría de Medio Ambiente y Recursos Naturales (SEMARNAT). The specimens included an adult male (MZFC 35735) and two adult females (MZFC 35736–35737), of which one (MZFC 35736, Figure 1) was pregnant. The female measured 408 mm snout–vent length, 63 mm tail length, with 158 ventral scales, and 37 subcaudals. Upon dissection we found five

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oviductal eggs on the left ovary; the eggs measured (mean \pm SD) 7.4–11.1 mm in length (\bar{x} = 9.3 \pm 1.373) and 4.3–5.6 mm in width (\bar{x} = 4.7 \pm 0.503). Measurements of each egg are in Table 1.

According to the published literature, clutches have been recorded in other *Geophis* every month except December, with most records being from June to October (Table 2). The number of eggs per clutch varies from one to six in species with available data (Table 2), and an annual reproductive cycle has been suggested in most cases. However, the phylogenetic relationships of *Geophis* remain unclear, hindering comparisons among closely related taxa. Phylogenetic hypothesis by Sheehy (2012) and Grünwald *et al.* (2021) place *G. omiltemanus* and members of the *G. chalybeus* group closer to large-bodied taxa formerly included in *Tropidodipsas* [i.e., *G. annuliferus* (Boulenger, 1894) and *G. sartorii* (Cope, 1863)] and *Sibon* [*G. sanniolus* (Cope, 1866)].

Geophis sartorii is reported to have a clutch size of 3 to 6 eggs in examined specimens from Veracruz and the Yucatán Peninsula, although without exact dates of reproductive activity (Campbell 1998, Goldberg 2017). *Geophis sanniolus* is reported to have seasonal and annual reproductive activity, with clutches of 2–5 eggs deposited between June and September on the Yucatán Peninsula (Kofron 1983). Our data on *G. omiltemanus* is similar to these reported clutch sizes, and dates of pregnancy suggest a seasonal, probably annual, reproductive cycle, as reported in *G. sanniolus* (Kofron 1983).

It is worth noting that several authors (e.g., Sheehy 2012, Figueroa *et al.* 2016, Zaher *et al.* 2019, Grünwald *et al.* 2021, Arteaga and Batista 2023) have found *Geophis* to be non-monophyletic, and the relationships of many of the supraspecific groups defined by Downs (1967) remain ambiguous. We believe that more information on representatives, as well as better phylogenetic sampling, is needed before properly comparing data on reproduction and other interesting life-history traits of *Geophis* and other Neotropical snake genera.



Figure 1. Gravid female *Geophis omiltemanus* (MZFC 35736) in life. Photo by RPA.

Table 1. Individual measurements of the eggs found in *Geophis omiltemanus* (MZFC 35736).

Egg number	Length (mm)	Width (mm)
1	8.9	4.5
2	10	5.6
3	7.4	4.3
4	9.1	4.6
5	11.1	4.7

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Table 2. Compiled information on clutch size, reproduction date, and location of the genus *Geophis*.

Species	Species group	Number of eggs		Month of observation	Location	References
		Min.	Max.			
<i>G. godmani</i>	<i>championi</i>	-	6	Not provided	Costa Rica	Solórzano 2004
<i>G. anocularis</i>	<i>dubius</i>	Ovarian follicles		April	Oaxaca, Mexico	Campbell <i>et al.</i> 1983
<i>G. dubius</i>	<i>dubius</i>	3	4	August	Oaxaca, Mexico	Bogert and Porter 1966
<i>G. mutitorques</i>	<i>latifrontalis</i>	3	6	March	Hidalgo, Mexico	Cruz-Elizalde <i>et al.</i> 2012
<i>G. omiltemanus</i>	<i>omiltemanus</i>	-	5	June	Guerrero, Mexico	This study
<i>G. sanniolus</i>	<i>sanniolus</i>	2	5	June–September	Yucatán Peninsula	Kofron 1983
<i>G. sartorii</i>	<i>sartorii</i>	3	6	Not provided	Yucatán Peninsula/Veracruz, Mexico	Campbell 1988, Goldberg 2017
<i>G. semidoliatus</i>	<i>semidoliatus</i>	1	3	July–October	Veracruz, Mexico	Goldberg 2006b
<i>G. bellus</i>	<i>sieboldii</i>	1	1	September	Panamá	Elizondo-Lara <i>et al.</i> 2015
<i>G. brachycephallus</i>	<i>sieboldii</i>	3	6	July–February	Costa Rica	Sasa 1993
<i>G. hoffmani</i>	<i>sieboldii</i>	2	5	June–November	Costa Rica	Goldberg 2006a, Solórzano 2004
<i>G. laticollaris</i>	<i>sieboldii</i>	-	3	September	Guerrero, Mexico	Palacios-Aguilar <i>et al.</i> 2022

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