

Note on Reproduction of *Phyllodactylus angustidigitus* (Squamata: Gekkonidae) from Peru

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Abstract

A histological examination of gonadal material from *Phyllodactylus angustidigitus* collected in November–December in Peru was carried out. The smallest mature male *P. angustidigitus* (late spermiogenesis) measured 45 mm SVL; the smallest mature female (oviductal egg) measured 48 mm SVL. One female contained an enlarged follicle (3 mm) and concurrent microscopic yolk deposition in a separate follicle indicating *P. angustidigitus* can produce more than one clutch in the same reproductive season. High percentages of *P. angustidigitus* from December, nearing the end of reproductive activity suggests seasonality, in the form of a period of reproductive inactivity, to be followed by a subsequent recovery and resumption of reproduction, as occurs in other lizards.

The narrow leafed-toed gecko, *Phyllodactylus angustidigitus* Dixon and Huey, 1970 is known from the beaches of Paracas Peninsula, Department of Ica, and associated islands, Peru (De Lisle et al., 2013). To my knowledge, the only information on reproduction of *P. angustidigitus* is a report of clutches of one egg (Dixon and Huey, 1970). In this note I provide additional information on *P. angustidigitus* reproduction from a histological examination of museum specimens.

I examined 41 specimens (loan 2015-11) of *P. angustidigitus* deposited in the Biodiversity Research and Teaching Collection (TCWC), Department of Wildlife and Fisheries Sciences, Texas A&M University, College Station, Texas, USA. The sample consisted of (17 males, mean SVL = 49.6 mm \pm 2.9 SD, range = 45–54 mm; 20 females, mean SVL = 50.1 mm \pm 1.9 SD, range = 48–54 mm; 1 subadult male, SVL = 35 mm; three subadult females mean SVL = 42.3 mm \pm 2.3 SD, range 41–45 mm) collected November–December 1968, 19 km SW of Paracas near Puerto Pisco, (13.71667°S, 76.21667°W), Department of Ica, Peru (Appendix).

A cut was made in the lower abdominal cavity and the left testis or ovary was removed, embedded in paraffin, cut into 5 μ m sections and stained with Harris hematoxylin followed by eosin counterstain (Presnell and Schreiber, 1997). Enlarged yolking follicles (> 3 mm) or oviductal eggs were counted. No histology was done on them. Slides were examined to determine the stage of the testicular cycle or the presence of yolk deposition or corpora lutea. Histology slides were deposited at TCWC. An unpaired *t*-test was used to compare adult male versus female mean SVLs using InStat (Graphpad Software, San Diego, CA).

The difference between adult male and female mean body sizes (SVLs) was not significant (unpaired *t*-test, *t* = 0.643, 35 *df*, *P* = 0.64). Three stages were noted in the testicular cycle (Table 1): (1) Spermiogenesis (= sperm formation), lumina of the seminiferous tubules are lined by clusters of sperm or metamorphosing spermatids; (2) Late spermiogenesis, layers of germinal epithelium and constituent spermiogenic cells are greatly reduced in number; the period of spermiogenesis is coming to a close; (3) Regressed, germinal epithelium is exhausted and consists of 1–2 layers of spermatogonia and inter-

persed Sertoli cells. The smallest mature male measured 45 mm SVL (TCWC 28020) and contained a testis that exhibited late spermiogenesis. One smaller male (TCWC 27955) that measured 35 mm SVL contained a tiny reproductively inactive testis and was considered to be a subadult.

Four stages were present in the ovarian cycle of *P. angustidigitus* (Table 2): (1) Quiescent, no yolk deposition; (2) Early yolk deposition, vitellogenic granules in the ooplasm; (3); Enlarged follicle > 3 mm (4) Oviductal egg. Mean clutch size (*n* = 7) was invariant 1.0. One female with an enlarged yellow follicle of 3 mm diameter was undergoing microscopic yolk deposition in a separate follicle for a subsequent clutch (TCWC 27956) indicating *P. angustidigitus* can produce more than one clutch in the same reproductive season. The smallest reproductively active female (one oviductal egg) measured 48 mm SVL (TCWC 27952). Two smaller females (SVL = 45 mm, TCWC 28047; SVL = 41 mm, TCWC 28055) contained tiny reproductively inactive ovaries and were considered to be subadults. Production of clutches of one egg appears typical for South American *Phyllodactylus* (Dixon and Huey, 1970), although, in an apparent exception, *Phyllodactylus reissi* from Peru produces clutches of 1-2 eggs (Dixon and Huey, 1970; Goldberg, 2007). The presence of 9/17 (53%) of *P. angustidigitus* males from November–December in late spermiogenesis or with regressed testes (Table 1) and 12/20 (60%) females from November–December with quiescent ovaries (Table 2) indicates the current period of reproduction is approaching its end, suggesting seasonality in the form of a period of reproductive inactivity, to be followed by a subsequent recovery and resumption of reproduction as occurs in other lizards.

Examination of reproductive data from the congeners *P. reissi* (Goldberg, 2007) and *P. inaequalis* and *P. microphyllus*

Table 1. Stages in the testicular cycle of 17 *Phyllodactylus angustidigitus* from November–December from Peru.

Month	N	Spermiogenesis	Late spermiogenesis	Regressed
November	3	2	1	0
December	14	6	5	3

Table 2. Stages in the ovarian cycle of 20 *Phyllodactylus angustidigitus* from November–December from Peru; * = one female with an enlarged follicle and concomitant microscopic yolk deposition in a separate follicle.

Month	N	Quiescent	Early yolk deposition	Enlarged follicle > 3 mm	Oviductal egg
November	8	5	0	1*	2
December	12	7	1	2	2

(Goldberg, 2008) from Peru revealed much higher percentages of reproductive activity during November–December as compared to *P. angustidigitus* described herein: *P. reissi* 32/36 (89%) for females, 30/30 (100%) for males; *P. inaequalis* 9/10 (90%), for females, males not available; *P. microphyllus* 3/5 (60%) for females, males not available, suggesting differences in reproduction may exist between these three species. Reproductive examination of *P. angustidigitus* from different months are

required before the reproductive cycle of this species can be ascertained.

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Literature Cited

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Appendix

Phyllodactylus angustidigitus from Peru examined from the Biodiversity Research and Teaching Collection (TCWC), Texas A&M University, College Station, Texas, USA. TCWC: 27945, 27950, 27952, 27955, 27956, 27961, 27963, 27965, 27971, 27974, 27976, 27979-27981, 27983-27985, 27987, 27990, 27992, 27995, 27996, 27997, 28008, 28013, 28015, 28019-28022, 28030, 28034, 28037, 28038, 28043, 28047, 28051-28053, 28055, 28062.