

the field and then carefully released into the pond where they were captured. The terminal phalange of the third digit of the right forefoot was removed for a skeletochronological study to estimate the age of each individual based on successive resting lines in the bone (Hemelaar 1998. *J. Herpetol.* 22:369–388). The biggest female was five years old, but in the remaining individuals age determination was not possible.

Recently reported geographic variation in body size of *P. cultripipes* (Marangoni 2006. *Variación clinal en el tamaño del cuerpo a escala microgeográfica en dos especies de anuros [Pelobates cultripipes y Bufo calamita]*. Ph.D. Thesis. Universidad de Sevilla, Spain), suggests that the differences in body size among different studies could be due to latitudinal variation in body size.

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**PELOBATES CULTRIPES** (Iberian Spadefoot Toad). **PREDATION.** *Pelobates cultripipes* occurs in southern France and throughout most of the Iberian Peninsula (Spain and Portugal) (Lizana et al. 1994. *J. Herpetol.* 28:19–27). In southern Spain, *P. cultripipes* breed in a mosaic of small temporary ponds and streams that generally fill with the first autumnal rains in October–November, and dry at the end of May (Tejedo and Reques 2002. *In Pleguezuelos et al. [eds.], Atlas y Libro Rojo de los Anfibios y Reptiles de España*, pp. 94–96. Dirección General de Conservación de la Naturaleza, Madrid). Birds, mammals, and reptiles have been reported as important predators of juvenile and adult *P. cultripipes* (Salvador and García-París 2001. *Anfibios Españoles. Identificación, Historia Natural y Distribución*. Canseco [Ed.], Talavera de la Reina. 269 pp.; Díaz-Paniagua et al. 2005. *Los Anfibios de Doñana*. Organismo Autónomo Parques Nacionales, Ministerio de Medio Ambiente



FIG. 1. Ventral side photo of *Pelobates cultripipes*, showing three injuries caused by *Natrix maura*. The photo was taken 12 h after the capture.

[Ed.], 181 pp. and references therein). In addition, the snake *Natrix maura* may also be an important predator of this species (Santos 2004. *In Carrascal and Salvador [eds.], Enciclopedia Virtual de los Vertebrados Españoles*. Museo Nacional de Ciencias Naturales, Madrid. <http://www.vertebradosibericos.org>).

On 5 Nov 2001 at 1920 h, we observed a gravid female *P. cultripipes* being preyed upon by *N. maura* in a temporary pond near Aznalcóllar (Seville Province, Spain, 37°31'N, 6°16'W; 130 m elev.). The middle anterior part of the toad's body was inside the snake's mouth, and only its stomach and legs were visible. The snake was captured and the toad (SVL 79.5 mm, head width 29.5 mm, right hind leg length 92 mm, mass 41.5 g) was photographed and released alive. Injuries were observed on the body of the toad; three on the ventral side (with two apparent bite marks: Fig. 1), and two on the head immediately behind the eyes. The toad died ca. 30 min after capture. We estimated the age of the female (five years old) by skeletochronology (Hemelaar 1998. *J. Herpetol.* 22:369–388).

The *P. cultripipes* (ID AZN2) was deposited in the Estación Biológica de Doñana (CSIC), Seville Province, Spain. We thank the Consejería de Medio Ambiente de la Junta de Andalucía and the Reserva Biológica de Doñana, for providing the corresponding permits and facilities.

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**PHYSALAEMUS PUSTULOSUS** (Tungara Frog). **DISPERSAL.** *Physalaemus pustulosus* is widely distributed along the isthmus of Central America and northern South America through northwestern Venezuela (Ryan 1985. *The Tungara Frog: A Study in Sexual Selection and Communication*. Univ. Chicago Press, Chicago), and occurs as two disjunct populations on the northern and southern Pacific Coast of Costa Rica, with an approximately 165 km gap between them (N. J. Scott, pers. comm.; Savage 2002. *The Amphibians and Reptiles and Costa Rica: a Herpetofauna Between Two Continents, Between Two Seas*. Univ. Chicago Press, Chicago). The northern population occurs in the Tropical Dry Forest of Guanacaste Province and the southern population occurs in the Tropical Moist Forest of the Golfo Dulce region (Holdridge 1967. *Life Zone Ecology*. Tropical Science Center, San Jose, Costa Rica). The northern population is contiguous with the species' range in Nicaragua, and in the south the population is continuous into Panama and east into South America (Ryan 1985, *op. cit.*). *Physalaemus pustulosus* is a small, conspicuous species as males vocalize loudly in choruses and breed in altered and disturbed habitats including roadside ditches, puddles, ponds, and flooded agricultural fields (Rand 1983. *In Janzen [ed.], Costa Rica Natural History*, pp. 333–335. Univ. Chicago Press; Savage 2002, *op. cit.*).

The apparent Costa Rican gap in distribution has been surveyed periodically since 1964 (Savage and Scott, unpubl.; Bolaños and Chavez, unpubl.) and this species had not been recorded from 1964–2002. I surveyed the south-central Pacific Coast of Costa Rica from Dec 2000–April 2002 from Quepos to Palmar Norte,

and east to San Isidro de El General as part of a herpetological inventory. Herein I report on the expansion of the range of *P. pustulosus* into this gap along the Pacific Coast and the Valle General.

On 12 Jan 2002 I found a small chorus of ca. 5 *P. pustulosus* males calling from a flooded rice field adjacent to the Coastal Highway near Coronado (08°57'99"N, 83°26'60"W; 35 m elev.) after heavy rains. The rice field was ca. 2 ha in size, and water depth ranged from 2 cm at the shore to 0.5 m towards the center of the field, and less than 20 m from the Coastal Highway. This population is ~ 45 km N of the Golfo Dulce populations and is across the large Río Terraba. Six days later on 18 Jan 2002 I found 3 puddles along the Pan American Highway in San Isidro de El General (09°31'97"N, 84°46'51"W; 900 m elev.) with 1–3 male *P. pustulosus* calling. The first puddle was 500 m, the second 1.5 km, and the third 4 km south of San Isidro on the southbound side of the Pan American Highway. There is little forest left in the valley but it is in the Premontane Moist forest. I had surveyed these areas bi-monthly from Dec 2000–April 2002 and it was not until Jan 2002 that I encountered this species.

Two major highways, the Pan American Highway and the Coastal Highway, connect this region to the Golfo Dulce and Panama. I suggest that *P. pustulosus* is expanding its range northward in southwestern Costa Rica along trucking routes, possibly as stowaways on commercial trucks shipping agricultural or forest products from the Golfo Dulce region or Panama where this species is known to occur. Savage (2002, *op. cit.*) also reports a “new” population in Siquirres in the Limón Province providing evidence that this species is also invading on the Caribbean versant. Future monitoring along the Coastal Highway north to Quepos may validate my hypothesis that *P. pustulosus* is moving north along trucking routes. It is possible that genetic markers could be used to identify where these “new” populations of *P. pustulosus* originated and the speed at which the species is expanding its range.

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**PROCERATOPHRYS AVELINOI** (Cow Frog). **ADVERTISE-  
MENT CALL.** *Proceratophrys avelinoi* was recently described (Barrio and Barrio 1993. *Amphibia-Reptilia* 14:13–18) and its advertisement call was described by Kwet and Baldo (2003. *Amphibia-Reptilia* 24:104–107), who classified *P. avelinoi* as rare. Ecological information on advertisement call and reproductive site and seasonality of this species remain little known. Herein I present information on advertisement call and reproduction.

Surveys of calling male *P. avelinoi* were conducted from Sept 2003 to Dec 2004 in Brazil, Paraná state, municipality of São João do Triunfo (25°34'18"S; 50°05'56"W), 780 m elev.. Sites were surveyed two days each month in two fountainheads in Araucaria Forest and two in plantation fields; all sites were ca. 10 m<sup>2</sup>. Dur-

ing each visit information was collected on seasonal, daily, and spatial patterns of vocalization and reproduction.

In the Araucaria Forest, *P. avelinoi* could be heard calling all day between September and February. In plantation fields there was only one record of a single male in October 2003. No more than six individuals were heard in the same fountainhead (1–6, N = 36). Individuals were recorded and collected on 25 Oct 2003 by A M X Lima and placed at the Instituto de Pesquisas em Cananéia, Campinas, state of São Paulo (MIPEC 0001; MIPEC 0002). For individuals recorded (N = 7) on 25–26 Oct 2003 (air temp 11–24°C; water temp 16.5–22°C), I observed differences in call duration (868–1184 ms at this locality vs. 220–754 ms reported by Kwet and Baldo 2003, *op. cit.*), although there were no differences between SVL, pulse rate, number of pulses/call, or dominant frequency. Distance between calling males was 52–128 cm (N = 26) and no contact interactions were observed. Call site selection was consistent (N = 63), always in the water, and often under or above dead leaves. A mark-recapture effort (toe clipping) was conducted in Sept (N = 11) and Oct (N = 8) 2004, although no individuals were recaptured. Tadpoles were found from October–February in the forest.

The patterns of vocalization, distribution, and tadpole occurrence suggest the species has low density, open populations, with a variable length of advertisement call, and an extended reproductive season (six months) coinciding with the wet season. Although *P. avelinoi* can be found in fountainheads in open areas, reproduction is sensitive to deforestation.

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**PROCERATOPHRYS MELANOPOGON** (NCN). **REPRO-  
DUCTION.** *Proceratophrys melanopogon* is a little known species of ceratophryine leptodactylid that inhabits the forest floor leaf litter in Atlantic Rainforest areas of southeastern Brazil (Izecksohn et al. 1998. *Rev. Univ. Rural, Sér. Ciênc. Vida* 20:37–54). Males of this species vocalize near small bodies of water, and tadpoles develop in lentic water at the edges of permanent streams (Izecksohn and Peixoto 1996. *Rev. Univ. Rural, Sér. Ciênc. Vida* 18:105–107). Little else is known of the biology of this species, which was removed from the synonymy of the morphologically similar *P. appendiculata* (Heyer et al. 1990. *Arq. Zool., São Paulo* 31:318). On 16 Nov 2005, at 1845 h, a pair of *P. melanopogon* in were collected in axillary amplexus in an area of montane rainforest (22°21'38.5"S, 44°34'14.6"W; 1360 m elev.) located within the Área de Preservação Ambiental (APA) da Serra da Mantiqueira, in Resende municipality, state of Rio de Janeiro, Brazil. The pair (female: SVL 47.6 mm, preserved mass 11.7 g; male: SVL 34.7 mm, preserved mass 4.4 g) was kept in a plastic bag containing a small amount of water and some leaves. The following morning, the female had laid 664 eggs. Upon dissecting the female, we found an additional 78 eggs, indicating that all eggs were not laid at spawning. The frogs were deposited in the Museu Nacional, Rio de Janeiro (MNRJ 40711, male; MNRJ 40712, female).

The total number of eggs (742) reported for the female *P. melanopogon* is within the range (729–946; N = 3) reported by