

2012

Leptodactylus pentadactylus

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Catalogue of American Amphibians and Reptiles.

Heyer, M.M., W.R. Heyer, and R.O. de Sá. 2011.
Leptodactylus pentadactylus.

***Leptodactylus pentadactylus* (Laurenti)
Smoky Jungle Frog**

Rana pentadactyla Laurenti 1768:32. Type-locality, "Indiis," corrected to Suriname by Müller (1927: 276). Neotype, Nationaal Natuurhistorisch Museum (RMNH) 29559, adult male, collector and date of collection unknown (examined by WRH).

Rana gigas Spix 1824:25. Type-locality, "in locis paludosis fluminis Amazonum [Brazil]". Holotype, Zoologisches Sammlung des Bayerischen Staates (ZSM) 89/1921, now destroyed (Hoogmoed and Gruber 1983). See **Nomenclatural History**. Pre-occupied by *Rana gigas* Wallbaum 1784 (= *Rhinella marina* {Linnaeus 1758}).

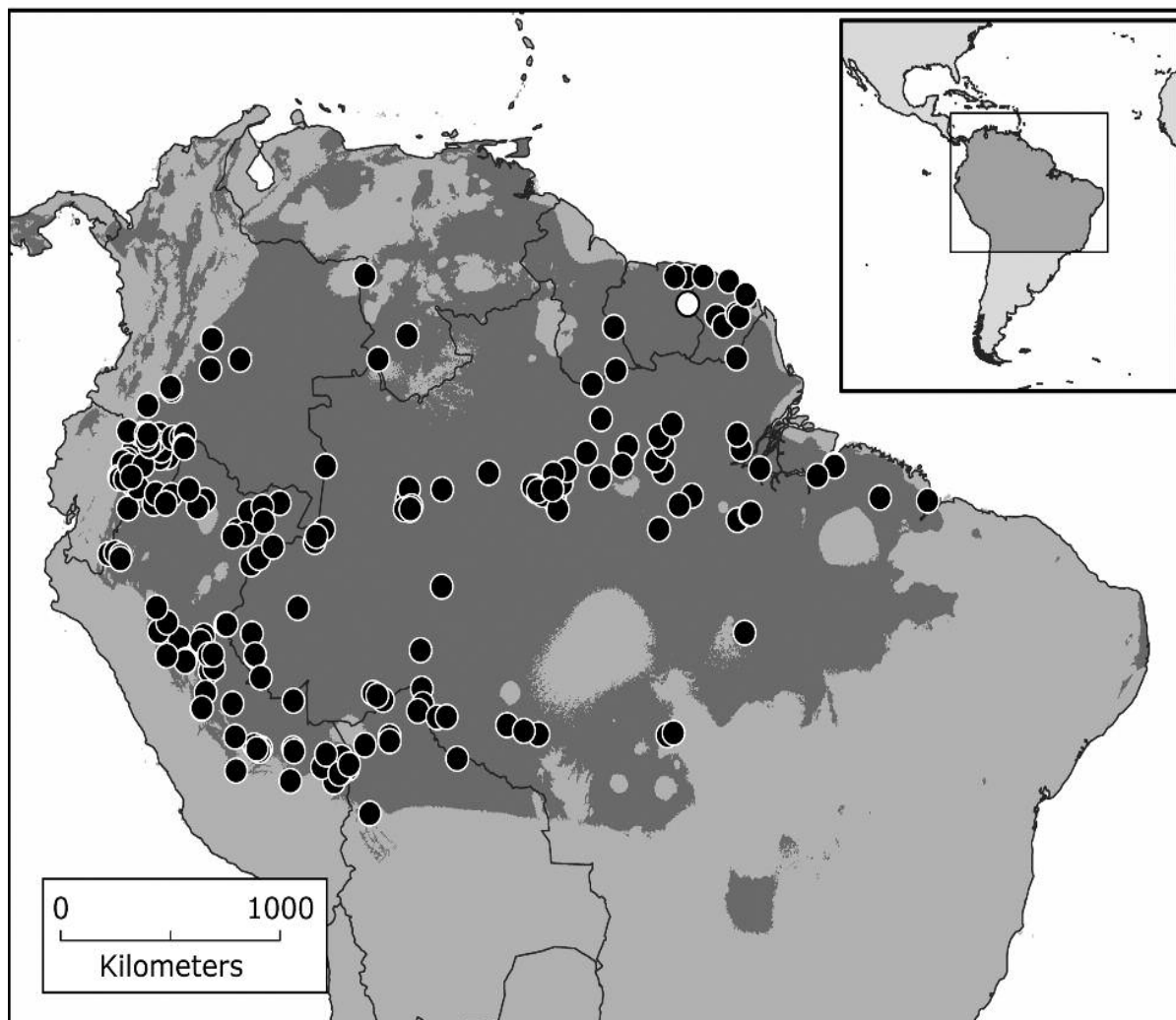
Rana coriacea Spix 1824:29. Type-locality: "aquis



FIGURE 1. *Leptodactylus pentadactylus*, Brazil, Pará, Cachoeira Juruá. Photograph courtesy of Laurie J. Vitt.

lacustribus fluvii Amazonum [Brazil]". Holotype, ZSM 2502/0, now destroyed (Hoogmoed and Gruber 1983).

Rana pachypus bilineata Mayer 1835:24. Type-local



MAP. Distribution of *Leptodactylus pentadactylus*. The locality of the neotype is indicated by an open circle. A dot may represent more than one site. Predicted distribution (dark-shaded) is modified from a BIOCLIM analysis. Published locality data used to generate the map should be considered as secondary sources, as we did not confirm identifications for all specimen localities. The locality coordinate data and sources are available on a spread sheet at <http://learning.richmond.edu/Leptodactylus>.

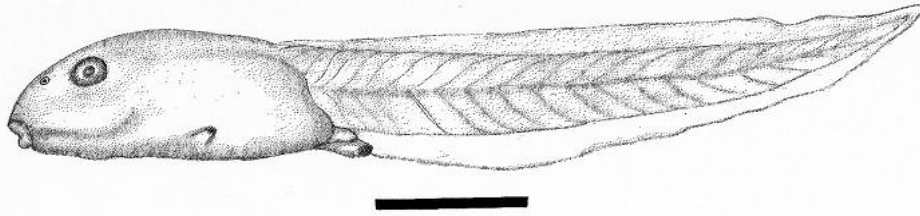


FIGURE 2. Tadpole of *Leptodactylus pentadactylus*, USNM 576263, Brazil, Amazonas, Reserva Ducke. Scale bar = 5 mm.

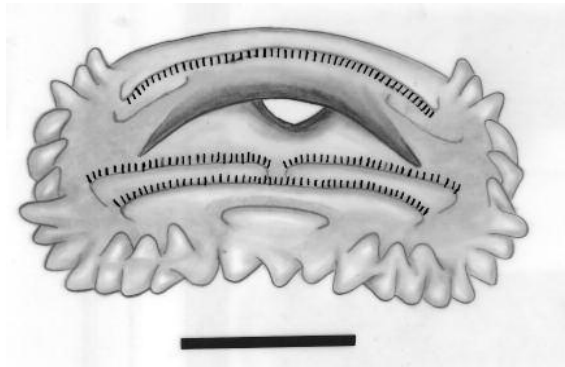


FIGURE 3. Oral disk of tadpole of *Leptodactylus pentadactylus*, USNM 576263, Brazil, Amazonas, Reserva Ducke. Scale bar = 1 mm.

ity unknown. Holotype not stated, presumed lost.

Named as a synonym of *Rana gigas* Spix 1824.

Doryphoros gigas: Mayer 1835:28 and plate III, figure 8.

Doryphorus: Temminck and Schlegel 1838:106, footnote 4. *Lapsus*.

Doryphorus: Tschudi 1838:38. *Lapsus*.

Gnathophysa gigas: Cope 1866:73.

Cystignathus pentadactylus: Peters 1872:198.

Leptodactylus goliath Jiménez de la Espada 1875:57.

Type-locality, "Archidona (Oriente del Ecuador), [00°55'S, 77°48'W]". Lectotype, Museo Nacional de Ciencias Naturales (MNCN) 1691, adult female, collector and date of collection unknown (examined by WRH).

Leptodactylus pentadactylus: Boulenger 1882:241.

Cystignathus pentadactylus: Kappler 1885:858. *Lapsus*.

Leptodactylus pentadactyles: Deckert 1915:14. *Lapsus*.

Leptodactylus macroblepharus: Miranda-Ribeiro 1926:141. *Lapsus*.

Leptodactylus macroblepharus Miranda-Ribeiro 1926:144. Type-locality, "Manáos – Amazonas [Brazil, 03°04'S, 60°00'W]". Lectotype, Museu de Zoologia da Universidade de São Paulo (MZUSP) 377, adult male, collector and date of collection unknown (examined by WRH).

Leptodactylus pentadactylus pentadactylus: Müller 1927:276.

Leptodactylus (Pachypus) pentadactylus: Lutz 1930a:2.

Leptodactylus pentadactylus dengleri Melin 1941:51.

Type-locality, "Roque, Peru [06°24'S, 76°48'W]."

Lectotype, Naturhistoriska Riksmuseet (NHMG) 497, age, sex, collector and date of collection unknown (not examined by authors).

Leptodactylus pentadactylus rubidoides Andersson 1945:47. Type-locality, "Rio Pastaza [Ecuador]." Holotype, Naturhistoriska Riksmuseet (NHMG) 1928, juvenile female, collector and date of collection unknown (examined by WRH).

Rana giga: Heyer 1974:42. *Lapsus*.

Leptodactylus pentadactylus: Pasquali, Lima, and Bastos 2003:6. *Lapsus*.

• **CONTENT.** The species is monotypic.

• **DEFINITION.** Adult *Leptodactylus pentadactylus* (Figure 1) are large, the head is about as wide as long, and the hind limbs are moderately long (Table 1; Heyer and Thompson [2000] provided definitions of adult size and leg length categories for *Leptodactylus*). Male vocal sacs are not visible externally or are moderately expanded as a single sac. Sexually active males usually do not have hypertrophied forearms (the largest male examined, 195 mm SVL, has very weakly hypertrophied forearms), only the largest males have a single small to moderate size black spine on each thumb. No males have chest spines.

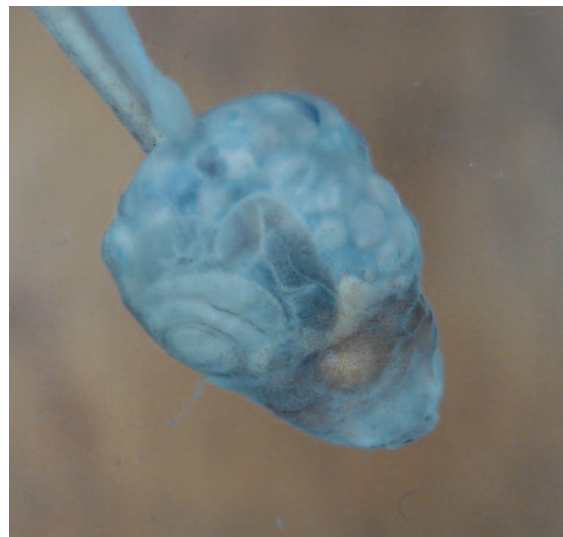


FIGURE 4. Ventral view of tadpole of *Leptodactylus pentadactylus*, MNRJ 7843, illustrating intact eggs in digestive tract.

Table 1. Summary measurement data for *Leptodactylus pentadactylus* (means are in parentheses).

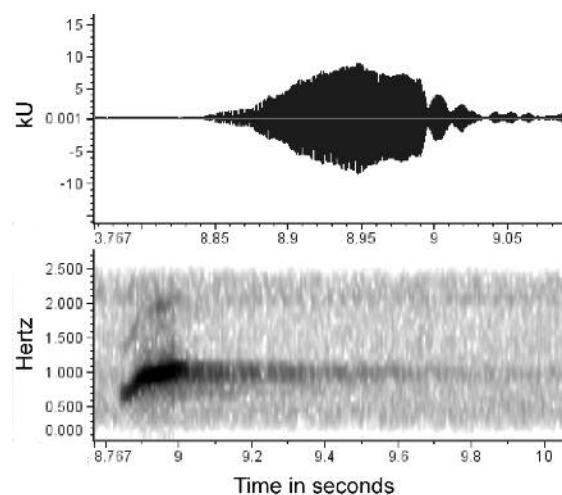
	Males (N=26)	Females (N=26)
SVL (mm)	100–195 (140.3)	134–174 (153.2)
Head length/SVL (%)	34–42 (37)	33–40 (36)
Head width/SVL (%)	34–46 (37)	36–42 (39)
Thigh length/SVL (%)	37–50 (44)	38–48 (44)
Shank length/SVL (%)	39–54 (46)	41–50 (46)
Foot length/SVL (%)	42–55 (46)	42–50 (45)

Dorsolateral folds are usually entire from the eye to at least the sacrum. Flank folds (diverging from the supratympanic fold at the uppermost portion of the tympanum) are variable, either continuous or interrupted, often extending from the tympanum to the lower flank, or only to the shoulder. The toe tips are rounded, just wider than the adjacent phalanges. The toes have prominent lateral ridges. A trace of basal webbing occurs among all toes, or toes I–II–III–IV or II–III–IV. The upper shank and outer tarsal surfaces are smooth, shagreened, or have several white or black tubercles. The sole of the foot texture is usually smooth, a few individuals have no more than a few black or white tubercles.

The upper lip lacks a distinct dark or light stripe; most individuals have dark inverted triangular markings on the upper lip, one of which often extends to the eye. The most frequent dorsal pattern is uniform light with one or two well defined, narrow transverse bands; the dorsal pattern often consists of irregular quadrangular or rectangular markings, of equal or alternating lighter/darker intensity, confluent laterally or not; the dorsal pattern is rarely uniform light or dark, or with a series of regularly or irregularly placed small, dark spots. The supratympanic fold is dark brown. The dorsolateral folds are outlined with dark brown. Middorsal stripes are absent. The most frequent belly pattern is dark with small light vermiculations; the belly is often dark with large light vermiculations, rarely mottled or uniform dark or light with dark reticulations or dark with small discrete light spots or dark with large light discrete spots.

Allig and Johnston (1986) included the larvae as benthic/lentic, guild 2, based on the description provided by Kenny (1969a). However, *L. pentadactylus* does not occur in Trinidad and it is likely that description corresponds to the larvae of *L. insularum* or “*macrosternum*.” The body is overall ovoid, but dorsoventrally depressed with body length about 2.3 times the body height (Figure 2). The lateral line system is not visible. The mouth is terminal and the oral disk is directed anteriorly (Figure 3). The spiracle is short, sinistral, positioned almost ventrally and directed posterodorsally; the spiracular tube is attached to the body wall. The cloacal tube and opening are median. The dorsal fin ends at the body and does not extend onto it. The tail musculature is visible but not strongly marked. The tail fins are low, about half of the height of the tail musculature and lack any pigmentation. Hero (1990, Table 1) reported the larvae of *L. pentadactylus* to be non-feeding and completing their

development in a nest in a burrow (reproductive mode 22 of Duellman and Trueb 1986). Also in Plate 30, Hero (1990) reported “Eggs terrestrial in foam nest; tadpole in terrestrial burrow”. In addition, he indicated that the larvae have a “body with scattered white chromatophores and a silver abdomen; tail muscle light grey, fins transparent.” The specimen illustrated in Hero (1990, stage 39, LTRF 1 / 2 (1)) is deposited at the Museo Nacional, Rio de Janeiro with catalog number MNRJ 7843. Photos of this specimen (provided by Dr. J. Pombal, Jr.) clearly show a belly full of eggs (Figure 4), indicating that these larvae actually feed on eggs. Furthermore, the specimen has scattered brownish spotting over the caudal musculature as well as on the dorsal surfaces of the body. The only other available larvae we know of are deposited at the National Museum of Natural History, Smithsonian Institution with lot number USNM 57722 (n = 3) and the Instituto Nacional de Pesquisas da Amazonia (INPA) (Menin et al. 2010). The USNM specimens are at development stage 30; one of them was used for the illustrations provided in this account (Figures 3 and 4). All USNM specimens lack any coloration or pattern on the body, caudal musculature, or fins; they exhibit an overall white color. Given that coloration was previously reported at stage 39 and verified by us, the complete lack of pigmentation in the USNM specimens is the result of “bleaching” due to preservation. None of these specimens had eggs in their belly; however, the intestines are clearly visible and are filled with a whitish cream material that likely corresponds to vitelline reserves usually found in all early tadpoles and is likely to be more prevalent in larvae that develop in terrestrial burrows as reported for this species. The average measurements (in mm) of the USNM larvae are (ranges in parentheses): total length 30.6 (29.8–31.0), body length 11.1 (10.3–11.6), eye diameter 1.2 (1.1–1.2), width of the oral

**FIGURE 5.** Wave form and audiospectrogram display of the advertisement call of *Leptodactylus pentadactylus*, USNM recording 254, cut 3. Recording by Claude Gascon, Barro Vermelho, Rio Juruá, Amazonas, Brazil, 24 October 1991, 19:00 h, 78° F (no specimen voucher).

disk 2.1 (2.0–2.2). The illustrated specimen (Figures 2 and 3) has a total length of 30.9, body length 11.3, eye diameter 1.2, eye diameter 10.4% of body length, width of oral disk 2.2, width of oral disk 19.3 % of the body length. The oral disk is anteroventrally positioned, entire (not emarginate), with a wide anterior gap lacking marginal papillae. A single row of marginal papillae is found on the upper labium on either side of the anterior gap, continuing laterally and onto the ventral labium. The ventral labium has an incomplete (i.e., with wide medial gap) second row of papillae. Although the papillae are short, they appear robust by having a broad base with a blunt, rounded, distal tip. No submarginal papillae are present. The tooth row formula is 2(2)/3(1). A-2 and P-1 are medially divided (A-1 wide gap). P-3 is very short. A-2 and P-3 are only represented by transverse ridges that support the larval teeth forming the bases of the tooth rows. All other tooth rows have poorly developed teeth. This differs from the other reports for the species. It is likely that Hero (1990) and Menin et al. (2010) did not report A-2 and P-3 as present due to the lack of teeth. Menin et al. (2010) found several excavated basins not associated with a water body; they did not observe females subsequently providing trophic eggs to the larvae as occurs in *L. fallax* (Gibson and Buley 2004). Menin et al. (2010) suggested that *L. pentadactylus* females “probably release all their eggs during amplexus, but most of them probably do not develop and are used as food by tadpoles that developed from viable eggs as observed in *L. labyrinthicus* (Silva and Giaretta 2008).”

The advertisement call consists of a single note per call, given at a rate of 4–37/min. Call duration ranges from 0.18–0.40 s. Calls have 12–18 pulses/call, with mean rates among individuals of 26–38 pulses/s. The call is a frequency modulated rising whoop, starting lower (mean initial frequency among individuals about 340–860 Hz) and rising through about the first 2/3 of the call. The mean dominant frequency ranges from 680–1030 Hz. (Figure 5).

• **DIAGNOSIS.** Adult specimens of *Leptodactylus pentadactylus* are large (> 100mm SVL). The toes have distinct lateral ridges, but the ridges are not vertically flexible. A single pair of distinct dorsolateral folds is present, and the head is relatively broad. These features are shared with (at least some individuals of) *L. fallax*, *L. flavopictus*, *L. knudseni*, *L. labyrinthicus*, *L. laticeps*, *L. myersi*, *L. paraensis*, *L. peritoaktites*, *L. rhodomerus*, *L. savagei*, *L. stenodema*, *L. turimiquensis*, and *L. vastus*. *Leptodactylus flavopictus* has a distinct light stripe on the upper lip, whereas *L. pentadactylus* lacks a lip stripe. *Leptodactylus laticeps* has a distinct tile-like dorsal pattern of black squares and triangles with whitish areas within and between the black markings (in life the black squares and rectangles each have a red center and are separated from one another by a yellow background); *L. pentadactylus* lacks such a tile-like dorsal pattern. The dorsolateral folds of *L. pentadactylus* originate just behind the eye whereas those of *L. stenodema* originate behind the tympanum. In *L.*

pentadactylus a continuous dark-outlined (usually) flank fold extends from the tympanum to the side of the body, a dark-outlined (usually) continuous dorso-lateral fold extends from the eye to at least the sacrum, males do not have chest spines, and the single black spine on each thumb is absent, small, or very rarely moderate in size; *L. fallax*, *L. knudseni*, *L. labyrinthicus*, *L. myersi*, *L. paraensis*, *L. savagei*, *L. turimiquensis*, and *L. vastus* do not share from one to three of these character states. *Leptodactylus pentadactylus* is morphologically very similar to *L. peritoaktites* and *L. rhodomerus*. *Leptodactylus pentadactylus* has an Amazonian distribution, whereas *L. peritoaktites* and *L. rhodomerus* occur in Colombia and Ecuador in the Pacific lowlands west of the Andes. The posterior thighs of *L. pentadactylus* are not red in life whereas *L. peritoaktites* and *L. rhodomerus* have obvious red markings on the posterior thighs.

• **DESCRIPTIONS.** Heyer’s (2005) analysis of the species group included comprehensive descriptions of both female and male adult morphology. Other descriptions were provided in Andersson (1945, as *L. p. rubidoides*), Caldwell and Araújo (2005), Jiménez de la Espada (1875, as *L. goliath*), Laurenti (1768, as *Rana pentadactyla*), Lescure and Marty (2000), Lima et al. (2006), Melin (1941, as *L. pentadactylus dengleri*), Miranda-Ribeiro (1926, p. 144; 1927, p. 124, both as *L. macroblepharus*), Müller (1927, as *L. pentadactylus pentadactylus*), Peters (1872, as *Rana gigas*), Seba (1734, characterized as *Rana maxima*, *Virginiana*, *eximia*, *rara*, *foemina*), and Spix (1824, caption for Plate I, as *Rana gigas*, caption for Plate V, fig. 2, as *Rana coriacea*). Larvae are described in Hero (1990) and Menin et al. (2010). Advertisement call characteristics are in Heyer (2005) and Zimmerman and Bogart (1984). Amaro-Ghilardi et al. (2004) provided a karyotype description.

• **ILLUSTRATIONS.** Photographs of *Leptodactylus pentadactylus* adults are in Andersson (1945, as *Lep-todactylus pentadactylus rubidoides*), Ávila-Pires et al. (2010), Bartlett (2000), Both (2000, as *L. knudseni*), Bustamante (2006), Caldwell and Araújo (2005), Cardwell (1998), Castner (2000), Cocroft et al. (2001), Coloma and Ron (2001, photos numbered 49 as *L. sp.* and 54), Dahl et al. (2009), Duellman (1978, Figure 71, upper photograph; 2005), Felix and Sahdew (2006), González-Fernández (2006, as *L. goliath*), Knell et al. (2004), Krintler (1996), Lehr (2002), Lescure and Marty (2000), Lima et al. (2006, p. 18, photo B), Luling (1962), Mattison (2007), Miranda-Ribeiro (1926, p. 144 as *L. macroblepharus*; 1927, second unnumbered photo as *L. macroblepharus*), Petzold (1977), Read (2000), Rodrigues et al. (2010), Rodríguez-Bayona and Duellman (1994), Schlüter (1987b), Souza and Cardoso (2002), Switak (2006), von May et al. (2007), and Zimmermann (1979). Illustrations of adults are provided by Crump (2002, *L. knudseni* illustration on p. 275 is probably *L. pentadactylus*, whereas the *L. pentadactylus* illustration on p. 275 is probably *L. savagei*), Daudin (1803a, as *Rana ocellata*), Schlüter (1984), Seba (1734, as

Rana maxima), Shaw (1802, the illustration of *Rana ocellata*, #34, is redrawn from Seba's 1734 picture of *Rana maxima* (= *L. pentadactylus*), Spix (1824, Plate V, fig. 2, as *Rana coriacea*, Plate I, as *Rana gigas*), and Zweifel (1998). Morphological illustrations are in Lima et al. (2006, photograph of belly pattern) and Melin (1941, lateral view of head and vomerine teeth, as *L. pentadactylus dengleri*). Juveniles are pictured in Lima et al. (2006) and Menin et al. (2010). Hero (1990) and Menin et al. (2010) illustrated the tadpole mouth, as well as dorsal, lateral, and/or ventral views. Menin et al. (2010) included photos of a stage 39 tadpole and a nest in their description. De-fensive posture is pictured in Lima et al. (2006), and a habitat schematic in Schlüter (1984). Audiospectrograms of the advertisement call are pictured in Duellman (2005), Hero and Galatti (1990), Heyer (2005), Lescure and Marty (2000), Schlüter (1980, 1984), and Zimmerman and Bogart (1984). Schlüter (1980, 1984) offered audiospectrograms of the distress call, while Toledo and Haddad (2009) pictured an audiospectrogram and an oscillogram of the frog's defensive vocalization. The karyotype is pictured in Amaro-Ghilardi et al. (2004), and compact disc recordings of the advertisement call may be heard in Cocroft et al. (2001) and Marty and Gaucher (2000).

• **DISTRIBUTION.** *Leptodactylus pentadactylus* inhabits the wet forests of the Amazon. Barrio Amorós (2004) labeled its natural bioregion as Amazon and Guayana and Heyer (2005) provided a map of its distribution.

References to distribution, localities, and elevations (where provided) follow; the symbol (M) denotes that the species is mentioned and (S) is a secondary source: **Bolivia** (Aparicio Effen 1992, 1993; Cadle and Guerrero 2003; Cadle et al. 2003; Dahl et al. 2009; De la Riva et al. 2000; Heyer 2005; Köhler 2000; Köhler and Lötters 1999 [S]; Moravec and Aparicio Effen 2006; Pérez B. et al. 2002; Reichle 2004, 2006; Reitz Montambault 2002 [M]), **Brazil** (Allmon 1991; Amaro-Ghilardi et al. 2004; Ávila-Pires et al. 2010; Bernarde et al. 1999; Bernarde and Macedo 2008; Bernarde and Santos 2009; Bernardi et al. 1999; Bokermann 1966 [p. 72 as *L. macroblepharus*, p. 88 as *Rana coriacea*, p. 89 as *R. gigas*]; Caldwell and Araújo 2005; Campos and Araujo 2007; Carmo and Silva 2008; Cei 1948 (S) [as *L. gigas*]; Crump 1971; Domenico 2008; Estupiñán and Galatti 2000; Estupiñán et al. 2002; Ferreira et al. 2007; Galatti 1992, 1999; Galatti and Hero 1987; Gardner et al. 2007; Gascon and Pereira 1993; Gordo 2003; Gutsche et al. 2007; Hero 1990; Hero and Galatti 1990; Heyer 2005; Höfer et al. 1996; Ilha and Dixo 2010; Knispel and Barros 2009; Lima 2008; Lima et al. 2006; Magnusson and Hero 1991; Martins 1994; Martins and Oliveira 1999; Menin 2005; Menin et al. 2007, 2008, 2010; Miranda-Ribeiro 1926 [as *L. macroblepharus*, p. 144], 1927 [as *L. macroblepharus*, p. 125]; Moreira et al. 1997; Müller 1927 [as *L. pentadactylus pentadactylus*]; Neckel-Oliveira and Gordo 2004; Oliveira 1996; Peters 1872 [as *Rana gigas*]; Pough et al. 1992; Ribeiro Júnior et al. 2008; Rojas-

Ahumada and Menin 2010; São Pedro et al. 2009; Sebben et al. 2007; Sena 2009; Silva and Silva 2008; Soares Filho and Silva 2008; Souza and Cardoso 2002; Souza et al. 2008; Suárez 2009; Tocher 1998; Tocher et al. 1997, 2001; Turci and Bernarde 2008, 2009; Vanzolini 1981, 2004 [both as *Rana coriacea* and *Rana gigas*]; Vogt and Bernhard 2003; Zimmerman and Bogart 1984), **Colombia** (Ardila-Robayo and Ruiz-Carranza 1997; Goin and Layne 1958; Heyer 2005; Lescure and Gasc 1986; Lynch 2005, 2006 [S]; Suárez-Mayorga 2000), **Ecuador** (Almendáriz 1987; Bass et al. 2010; Bustamante 2006; Cisneros-Heredia 2003, 2006; Heyer 1972, 2005; Heyer and Bellin 1973; Izquierdo et al. 2000; Jiménez de la Espada 1875 [as *L. goliath*]; McCracken et al. 2009; Ormaza and Bajaña 2008; Peters 1955 [as *L. goliath* and *L. pentadactylus rubidoides*]; Read 2000; Vigle 2008; Yáñez-Muñoz and Chimbo 2007; Yáñez-Muñoz and Venagas 2008c), **French Guiana** (Born 1996; Born and Gaucher 2001a,b; Breuil 1997; Bringsøe 2007; Cadenas M. 2004 [S] [Born and Gaucher 2001 citation]; Heyer 2005; Kok 2000a; Krintler 1996; Lescure 1986a, 1994; Lescure and Marty 2000; Lescure et al. 1995; Marty and Gaucher 2000), **Guyana** (Beebe 1919; Blanc and Dewynter 2004; Dewynter et al. 2008; Duellman and Hoogmoed 1992; Grimes et al. 2008; McAllister et al. 2010b; Tammesar et al. 2004), **Peru** (Aichinger 1987, 1991, 1992; Bustamante and Catenazzi 2007; Cadle et al. 2002; Cocroft et al. 2001; Córdova et al. 1996; Duellman 1995, 2005; Duellman and Mendelson 1995; Duellman and Salas 1991; Duellman and Thomas 1996; Franklin 2001; Graham 2002; Henle 1992; Heyer 2005; Icochea and Mitchell 1997a,b; Icochea et al. 1999, 1998, 2001; Knell et al. 2004, 2006; Lamar 1998b; Lehr 2002; Lescure and Gasc 1986; Lüling 1962; Melin 1941 [as *L. pentadactylus dengleri*]; Morales 1995, 1997; Morales and McDiarmid 1996; Pérez et al. 2004; Reynolds et al. 1997a,b; Rivera et al. 2003; Rodríguez-Bayona 1987, 1992, 1994; Rodríguez-Bayona and Cadle 1990; Rodríguez-Bayona and Duellman 1994; Rodríguez-Bayona and Emmons 1994; Rodríguez-Bayona and Knell 2003, 2004a,b; Rodríguez-Bayona et al. 1993, 2001; Rodríguez Gamarra et al. 2003; Salas et al. 1998; Schleser and Roberts 1998; Schlüter 1980, 1984, 1987a,b,c; Schlüter et al. 2004; Schlüter and Salas 1991; Souza and Rivera Gonzáles 2006b; Switak 2006; von May et al. 2007, 2009; Yáñez-Muñoz and Venagas 2008c), **Suriname** (De Bruin 1991, 1993; De Dijn et al. 2007; Gassó Miracle et al. 2007 [as *Rana pentadactyla*]; Heyer 2005; Kappler 1885(M), 1887(M) [both as *Cystignatus {sic} pentadactylus*]; Ouboter et al. 2007; Watling and Ngadino 2007), **Venezuela** (Barrio Amorós 1998, 2004 [*Cystignatus {sic} pentadactylus*]; Gorzula and Señaris 1999; La Marca 1992 [except for distribution statement on p. 61]; Péfaur 1992; Péfaur and Rivero 2000; Péfaur and Sierra 1995).

• **FOSSIL RECORD.** None.

• **CONSERVATION STATUS.** Least concern (Heyer et al. 2008a).

• **PERTINENT LITERATURE.** The most comprehensive account of the species was published by Heyer (2005). The ensuing literature is arranged by subject; the symbol **(M)** denotes that the species is mentioned and **(S)** indicates a secondary source: **bibliographic information and lists** (Cochran 1940 [Kellogg citation]; Heyer et al. 2009a,b; Liner 1992 [citation of *L. pentadactylus rubidoides* in Proceedings 84, p. 167–168]; Morales 1995; Péfaur 1992; Walley 2000 [except for Crump 1971 citation]), **biogeography** (Dahl et al. 2009; de Sá and Heyer 2005; Fouquet 2008; Lamotte 1986 **(M)**; Leistikow 2001 **(M)** [Peruvian *L. pentadactylus*]; Lynch 1988 [Amazon Peru sample]; Müller 1973 [as *L. macroblepharus* and *L. pentadactylus pentadactylus*, 1981), **book review** (Caldwell 2007), **call and call parameters** (Barrio 1964 **(M)**; Kwet and Schlüter 2002; Lamar 1998a; Lescure 1979a [p. 765–767]; Lima et al. 2006; Lynch and Myers 1983 **(M)**; Marty and Gaucher 2000; Schlüter 1980; Toledo 2007 [Lima et al. 2006 citation]; Toledo and Haddad 2009; Vitt and Caldwell 2009 **(M)(S)**; Zimmerman and Bogart 1988; Zug et al. 2001), **captive husbandry** (Both 2000; Sicchar Valdez et al. 1995), **checklists** (Barrio Amorós 2004; De Bruin 1991, 1993; Graham 2002; Miyata 1982; Morales 1995; Péfaur 1992; Péfaur and Rivero 2000; Señaris and MacCulloch 2005), **conservation** (Alverson et al. 2008; Bass et al. 2010; De Dijn et al. 2007; de Sá 2005; Gardner et al. 2007; Grimes et al. 2008; Lovejoy et al. 1984; Reichle 2006; Señaris et al. 2002; Tammesar et al. 2004; Tocher 1998; Tocher et al. 1997, 2001; von May et al. 2009; Watling and Ngadino 2007; Yáñez-Muñoz and Venegas 2008a,b,c), **development** (Fong et al. 2010 **(M)(S)**; Galatti 1992; Menin et al. 2010; Silva 2003 **(S)**), **dictionaries and encyclopedias** (Ananjeva et al. 1988; Arak 1986; Daubenton 1788 [as *Rana pentadactyla*]; Jacobs 1978; Zweifel 1998), **distribution** (Ceï 1953 **(M)**, 1954 **(M)** [both as *L. gigas*], 1965 **(M)**; Duellman and Thomas 1996; Harding 1983 [for South American nations in text]; Harvey 1998a,b; Heyer 1988; Heyer and Maxson 1982a; Jim 1980; Lutz 1972 [as *L. pentadactylus pentadactylus*]; Parker 1935 [p. 528, as *L. pentadactylus pentadactylus*]), **ecology, natural history, reproduction** (Allmon 1991; Almendáriz 1987; Ardila-Robayo and Ruiz-Carranza 1997; Ávila-Pires et al. 2010; Caldwell and Araújo 2005; Camargo et al. 2009 **(S)**; De la Riva 1993 **(M)**; Dubois et al. 2010 **(S)** [Magnusson and Hero 1991 citation]; Duellman 2005 [except for ambiguous information on p. 93 and 384]; Duellman and Lizana 1994 **(M)**; Eterovick and Sazima 2000 [p. 348 discussion]; Galatti 1992; Galatti and Hero 1987; Gunzburger and Travis 2005 [Magnusson and Hero 1991 citations, p. 561, 562, 564]; Hayek and Heyer 2005; Heatwole 1982 **(S)**; Hero 1990; Hero and Galatti 1990 [new information]; Heyer 2005; Heyer and Bellin 1973; Hödl 1993; Höfer et al. 1996 **(S)**; Jiménez de la Espada 1875 [as *L. goliath*]; Lehr 2002; Lescure 1986a; Lescure and Marty 2000; Lescure et al. 1980; Lima et al. 2006; Magnusson and Hero 1991; Magnusson et al. 1999; Martins 1994; Martins and Oliveira 1999; Menin 2005; Menin

et al. 2007, 2008, 2010; Ponssa and Barrionuevo 2008; Pough et al. 1992; Prado et al. 2005 **(M)(S)** [p. 279 first paragraph]; Ramirez et al. 1998; Reichle 2006; Rodríguez-Bayona 1992; Rodríguez-Bayona and Cadle 1990; Rodríguez-Bayona and Duellman 1994; Rojas-Ahumada and Menin 2010; Rossa-Feres et al. 1999 **(S)**; Salas 1995 **(M)**; Schlüter 1987b; Se-ñaris et al. 2002; Silva 2003 **(S)** [Hero 1990 and Hero and Galatti 1990 citations]; Silva and Giaretta 2009; Silva et al. 2005 [Galatti 1992 and Hero and Galatti 1990 citations]; Souza and Rivera González 2006a; Toledo 2007 [Magnusson and Hero 1991 citation]; Toledo et al. 2005 [p. 30, column 2, paragraph 2]; von May et al. 2009; Wells 2007 **(S)** [p. 688]; Yáñez-Muñoz and Venegas 2008a,b,d); **evolution** (Heyer et al. 2005b; Silva and Giaretta 2009), **faunal lists** (Beebe 1919; Ormaza and Bajaña 2009), **field guides** (Crump 2002 [as Smoky Jungle Frog]; Felix and Sahdew 2006; Lima et al. 2006; Rodríguez-Bayona and Duellman 1994), **genome size** (Camper et al. 1993), **habitat** (Aichinger 1987, 1991; Allmon 1991; Almendáriz 1987; Ávila-Pires et al. 2010; Bernarde et al. 1999; Bernarde and Macedo 2008; Bernardi et al. 1999; Bustamante and Catenazzi 2007; Cadenas M. 2004; Cadle et al. 2002; Caldwell and Araújo 2005; Duellman 2005; Duellman and Mendelson 1995; Duellman and Salas 1991; Estupiñán and Galatti 2000; Franklin 2001; Galatti 1992, 1999; Gardner et al. 2007; Goin and Layne 1958; Gordo 2003; Graham 2002; Heyer 1972, 2005; Jim 1980; Knell et al. 2006; Kok 2000a; Lamar 1998a; Lescure 1986a; Lescure and Marty 2000; Lescure et al. 1995; Lima et al. 2006; Menin et al. 2007, 2008, 2010; Müller 1981; Neckel-Oliveira and Gordo 2004; Pérez B. et al. 2002; Rodríguez-Bayona 1992, 1994; Rodríguez-Bayona and Cadle 1990; Rodríguez-Bayona and Emmons 1994; Rodríguez-Bayona and Knell 2003, 2004a,b; Rodríguez-Bayona et al. 2001; Schleser and Roberts 1998; Schlüter 1984, 1987b,c; Schlüter et al. 2004; Sena 2009; Souza and Rivera González 2006b; Suárez-Mayorga 2000; Tocher 1998; Tocher et al. 1997, 2001; Watling and Ngadino 2007; Yáñez-Muñoz and Chimbo 2007; Yáñez-Muñoz and Venegas 2008c), **historical papers** (de la Riva 2000; González-Fernández 2006 [as *L. goliath*]; González-Fernández et al. 2010 [except MNCN 17783 = *L. savagei*]; Gutsche et al. 2007; Hallermann 2006 [as *Rana pentadactyla*]), **identifications** (Hoogmoed 1967; Oliveira 1996; Rodríguez-Bayona and Duellman 1994), **inventories** (Almendáriz 1997; Aparicio Effen 1992; Ardila-Robayo and Ruiz-Carranza 1997; Bernarde and Macedo 2008; Blanc and Dewynter 2004; Born and Gaucher 2001b; Bustamante and Catenazzi 2007; Carmo and Silva 2008; De Dijn et al. 2007; Estupiñán et al. 2002; Galatti 1999; Gordo 2003; Ilha and Dixo 2010; Knispel and Barros 2009; Kok 2000a; Lima 2008; Morales 1997; Morales and McDiarmid 1996; Moravec and Aparicio Effen 2006; Moreira et al. 1997; Ouboter et al. 2007; Rivera et al. 2003; Rodríguez-Bayona and Emmons 1994; Rodríguez-Bayona and Knell 2003, 2004b; Rodríguez-Bayona et al. 2001; Salas et al. 1998; São Pedro et al. 2009;

Silva and Silva 2008; Soares Filho and Silva 2008; Souza and Cardoso 2002; Souza and Rivera Gonzáles 2006b; Turci and Bernarde 2008, 2009; Watling and Ngadino 2007; Yáñez-Muñoz and Chimbo 2007; Yáñez-Muñoz and Venegas 2008c), **karyotypes** (Amaro-Ghilardi et al. 1999, 2004, 2006, 2008; Córdova et al. 1996), **keys** (Duellman 2005; Hero 1990; Heyer 1972; Miranda-Ribeiro 1926 [p. 141, as *L. macroblepharus*], 1927 [p. 115, as *L. macroblepharus*]), **lists of specimens in collections** (Breuil 1997; Gassó Miracle et al. 2007 [as *Rana pentadactyla*]; Glaw and Franzen 2006 [as *Rana coriacea* and *Rana pentadactyla*]; González-Fernández 2006 [as *L. goliath*]; González-Fernández et al. 2010 [except MNCN 17783 = *L. savagei*]; Gutsche et al. 2007; Hoogmoed and Gruber 1983; Miranda-Ribeiro 1955 [as *L. macroblepharus*]), **miscellaneous** (Berg 1896; Brehm 1878 [as *Rana coriacea*, *R. gigas*, and *R. pentadactyla*]; Cei and Erspamer 1965 [as *L. pentadactylus pentadactylus*]; Gallopín 1962 [as *L. pentadactylus pentadactylus*]; Gosse 1851 [as *Rana gigas*]; Hoogmoed and Ávila-Pires 1991; Limeses et al. 1972 [p. 634, as *L. pentadactylus pentadactylus*]; Lutz 1967 [as *L. pentadactylus pentadactylus*], 1969 [p. 277]; Mertens 1933; Müller 1926; Oken 1816 [as *Rana pentadactyla*]; Schwartz 1978; Shaw 1802 [as *Rana pentadactyla*]; Zamore 2000), **morphology** (Aichinger 1992; Deckert 1915 (M) [as *L. pentadactyles*]; Duellman and Mendelson 1995; Goin and Layne 1958; Hayek and Heyer 2005; Hero and Galatti 1990; Miranda and Ferreira 2008 (M)(S) [p. 226, Hero 1990 citation]; Ponssa 2008; Ponssa et al. 2010; Rodríguez-Bayona 1992; Sebben et al. 2005, 2007; Vitt and Caldwell 2009 (S); Zug et al. 2001), **nomenclature and taxonomy** (Acosta-Galvis et al. 2006; Betta 1876 [as *Rana pentadactyla*]; Brocchi 1882 [as *Rana coriacea*, *R. gigas*, and *R. pentadactyla*]; Cei 1950 [p. 396], 1965 (M); Cloquet 1821 [as *Rana pentadactyla*]; Cuvier 1829, 1836 [both as *Rana coriacea* and *R. gigas*]; Cuvier et al. 1831 [as *Rana coriacea* and *R. gigas*]; Daudin 1803a,b [both as *Rana pentadactyla*]; De la Riva 2000; Dubois and Ohler 1994 [as *Rana gigas*]; Duméril and Bibron 1841 [as *Rana coriacea*, *R. gigas*, and *R. pentadactyla*]; Fitzinger 1833 [as *Rana gigas* and *Rana coriacea*]; Gallardo 1964a; González-Fernández 2006 [as *L. goliath*]; Gravenhorst 1829 [as *Rana pentadactyla*]; Guichenot 1855 [as *Rana coriacea* and *R. gigas*]; Günther 1858 [as *Rana coriacea*, *R. gigas*, and *R. pentadactyla*]; Hallermann 2006 [as *Rana pentadactyla*]; Harlan 1826, 1827, 1835a,b [all as *Rana pentadactyla*]; Heyer 1974 [p. 42–45, as *Leptodactylus goliath*, *L. macroblepharus*, *L. pentadactylus rubidoides*, *Rana giga*, *R. pentadactyla*], 2000, 2005; Heyer and Heyer 2006; Heyer and Peters 1971 [p. 167 and 168]; Kaiser 1994; Kellogg 1932 [as *Rana pentadactyla*]; Kok 2000b; La Cépède 1788, 1802 [both as *Rana pentadactyla*]; Lescure 1979a [p. 758]; Lima et al. 2006; Lutz 1930a [as *L. pentadactylus pentadactylus* and *L. macroblepharus*]; Mayer 1835 [as both *Doryphoros gigas* and *Rana pachypus bilineata*]; Merrem 1820 [as *Rana pentadactyla*]; Müller 1865 [as *Rana coriacea*, *R. gigas*, and *R. pentadactyla*]; Müller 1927; Murphy 1997 [as *L. pentadactylus pentadactylus*], Nieden 1923 [as *Gnathophysa gigas*, *Leptodactylus goliath*, and *Rana pentadactyla*]; Oken 1816 [as *Rana pentadactyla*]; Peters 1872 [as *Cystignathus pentadactylus*, *Rana coriacea*, and *R. gigas*]; Rivero 1968 [p. 146]; Schmidt and Inger 1951 [as *L. pentadactylus pentadactylus*]; Sherborn 1902 [as *Rana pentadactyla*], 1925 [as *Rana coriacea*], 1926 [as *Rana gigas*], 1933 [as *Rana coriacea* and *Rana gigas*]; Smith et al. 1977; Temminck and Schlegel 1838 [as *Doryphoros*, *Rana coriacea*, and *R. gigas*]; Tschudi 1838 [as *Doryphoros*, *Rana coriacea*, and *R. gigas*]; Ulber 1996; Vanzolini 1981; Wagler 1830 [as *Rana coriacea* and *R. gigas*]), **non-technical literature** (Bartlett 2000; Behler and Behler 2005 [p. 19 and 62]; Blankenship 1990 (M); Cardwell 1998; d'Audretsch 1961 [12 cm specimen of *L. caliginosus* re-identified as *L. pentadactylus* by Hoogmoed 1967]; Hödl 1993; Pasquali et al. 2003 [as *L. pentadactylus*]; **parasites and diseases** (Bass et al. 2010 (S); Bursey et al. 2001; Cabrera-Guzman et al. 2007 [p. 100]; Goldberg et al. 2007 (S) [p. 328], 2009a (S) [Bursey et al. 2001 citations p. 260, 261, 262]; Ferreira et al. 2007; González and Hamann 2006 (S); McAllister et al. 2010a (S) [except Fahel 1952 citation], b (S) [Bursey et al. 2001 citations p. 189 and 190]; McCracken et al. 2009), **relationships and systematics** (Barbour 1930 (M), 1935 (M), 1937 (M); Brooks 1982 (M); Crother 1999 (M); de Sá and Heyer 2003; Fouquet 2008; Fouquet et al. 2007 [samples AY947867, AY947868, and EU201134]; Heyer 2005; Heyer and Cisneros-Heredia 2008 (M)(S); Heyer et al. 2005a [non-molecular data, *contra* statement on p. 85], 2008b (M)(S); Maxson and Heyer 1988 [Peru sample]; Ponssa 2008; Ponssa and Barrionuevo 2008; Ponssa et al. 2010), **species accounts** (Almendáriz 1987; Caldwell and Araújo 2005; Duellman 2005 [reproduction, male characteristics, food and tadpole sections do not refer to *Leptodactylus pentadactylus*]; Heyer 2005; Jiménez de la Espada 1875 [as *L. goliath*]; Miranda-Ribeiro 1926 [p. 144, as *L. macroblepharus*], 1927 [p. 124, as *L. macroblepharus*]), **species comparisons** (Anderson 1911 (M); Barrio 1964 (M); Bokermann 1957 [p. 496 and first full paragraph on p. 500]; Caldwell and Araújo 2005; Cei 1948 [as *L. gigas*]; Duellman 2005; Galatti 1992; Galatti and Hero 1987; Hero and Galatti 1990; Heyer 1972, 2005; Heyer and Heyer 2006; Heyer et al. 2010; Jiménez de la Espada 1875 [as *L. goliath*]; Kaiser 1994; Köhler and Böhme 1996; Lescure 1979b, 1986b [p. 443]; Lescure and Marty 2000; Lima et al. 2006; Menin et al. 2010; Mertens 1927 (M); Müller 1923a,b; Péfaur and Sierra 1995; Pyburn and Heyer 1975; Reig and Cei 1963; Rodrigues et al. 2007, 2010; Rodríguez-Bayona and Duellman 1994; Skuk et al. 2007), **species or taxonomic lists** (Cadenas M. 2004; Dahl et al. 2009 [p. 4 of supporting materials]; De Dijn et al. 2007; Dewynter et al. 2008; Domenico 2008; Duellman 2003b; Franklin 2001; Frost 1985 [except distribution statement]; Glaw et al. 2000; Gmelin 1789 [as *R. pentadactyla*]; Gorham 1963, 1966 [as *L. pentadactylus pentadactylus* and *L. pentadactylus rubidoides*], 1974 [as *L. pentadactylus*

pentadactylus and *L. pentadactylus rubidoides*]; Gorzula and Señaris 1999; Gray 1831 [as *Rana coriacea*, *R. gigas*, and *R. pentadactyla*]; Hoff and Daszkiewicz 2001; La Marca 1995, 1997; Lehr 2002; Lescure 1986a; Lescure and Gasc 1986; Lescure and Marty 2000; Lima 2008; Ouboter et al. 2007; Rodríguez-Bayona 1987, 1992; Rodríguez-Bayona et al. 1993; Rodríguez Gamarra et al. 2003; Rojas-Ahumada and Menin 2010; Salas et al. 1998; São Pedro et al. 2009; Schlüter 1987a; Schlüter and Salas 1991; Schlüter et al. 2004; Tocher 1998; Tocher et al. 1997, 2001; Vanzolini 1981, 1986, 2004; Vagle 2008; von May et al. 2009; Watling and Ngadino 2007; Yáñez-Muñoz and Venegas 2008c,d), **techniques** (Fouquet et al. 2009; Ribeiro Júnior et al. 2008; Rueda-Almonacid et al. 2006).

Leptodactylus pentadactylus citations were omitted from two previously published CAAR *Leptodactylus* accounts (*L. fallax* Kaiser 1994 and *L. knudseni* Heyer and Heyer 2006). The following references citing *L. pentadactylus* actually correspond to *L. fallax*: Anonymous 1888:304; Boettger 1891:250; Boulenger 1891:354; Garman 1888b:14; Grant 1931:62, 1932:163; Mattison 1987:142; May 1930:4; McClelland 1931:5; Schmidt 1928:23; Sclater 1883:626, 1896:652; Valmont-Bomare 1800:278; Verrill 1892:350. The following references citing *L. pentadactylus* actually correspond to *L. knudseni*: Cerda et al. 1979 Table 1, Rivero 1964 citation; Duellman 1997:25; Gorzula and Cerda 1979:l-7; Hardy 1982:69 (Trinidad only); Heatwole et al. 1965:360; Hellmich 1939:392; Hoogmoed 1980:31; Mole and Urich 1894:89; Nishikawa and Wassersug 1989:17; Parker 1933:7, 1934:123; Rivero 1964a:298; Schneider 1984:60-62; Warren 1973:86; Werner 1904:159. The following reference citing *L. ocellatus* corresponds to *L. knudseni*: Taylor 1864:162.

Many citations of *Leptodactylus pentadactylus* in the literature pertain to other valid species and will be addressed in subsequent *Leptodactylus* CAAR accounts. The following citations of *L. pentadactylus* cannot be associated with any single species and should not be used for any purposes where the species identification is important: Acosta-Galvis 2000 (a combination of information for *L. pentadactylus*, *L. rhodomerus*, and *L. savagei*); Adesiyun 1998, 1999; Ahl 1930; Albuja et al. 1980 (p. 126, data combined for *L. pentadactylus* and *L. peritoaktites*); Alcalde 2005; Alevén and Bouwmeester 1958 (not *L. pentadactylus*, likely *L. knudseni*, *L. labyrinthicus*, or *L. vastus*); Almeida 1934 (most likely *L. labyrinthicus*); Almendáriz 1991 (a combination of information for *L. pentadactylus*, *L. peritoaktites*, and *L. rhodomerus*); Altig 1979 (information based on a combination of *L. knudseni*, *L. savagei*, and perhaps *L. pentadactylus*); Altig and McDiarmid 1999 (probably *L. savagei*); Amaro 1964 (either *L. flavopictus* or *L. vastus*), 1969a,b; Amaro and Sena 1968 (*L. labyrinthicus?*); Anastasi et al. 1970; Andersson 1906 (*L. mystacinus*); Anonymous 1963, 1976, 1977, 1978, 1982, 1986, 1987, 1988, 1989, 1990, 1991, 1993, 1994, 1997, 1998; Arcay de Peraza and Tengler de McLure 1971 (*L. labyrinthicus?*); Arêa Leão et al. 1947; Báez and Gas-

parini 1977; Baker 1987; Baker and Vaucher 1988; Ballesteros Márquez 1945 (citations on p. 168); Barlow 1998 (Daly and Witkop 1971 citation on p. 745 is either *L. labyrinthicus* or *L. vastus*); Barnett et al. 2001; Bartlett and Bartlett 2003 (a combination of information for both *L. knudseni* and *L. pentadactylus*); Bastos 2007; Bateman 1897; Baumann 1912, 1917; Beddard 1907 (*L. hexadactylus* probably a lapsus for *L. pentadactylus* = *L. ?*, p. 337); Beebe 1946 (either *L. knudseni* or *L. turimiquensis*); Behler and Behler 2005 (color photo, p. 104); Beltrán 1941; Benninghoff 1921a,b; Ben Slimane and Durette-Desset 1996a,b; Bernarde 2007; Bernardi and Bernardi 1990; Bhaduri 1946, 1953 (information on p. 35-36 is for *L. savagei*, other citations of *L. pentadactylus* are ambiguous); Biegler 1966; Boettger 1894, 1895, 1897 (all probably *L. knudseni*); Bogart 1974 (data combined for *L. flavopictus* and presumably *L. pentadactylus*, pers. comm. J. Bogart); Bokermann 1956 (not *L. pentadactylus*, *L. ?*); Boldt 1911; Bolívar-García and Restrepo-Toro 2004; Born 1996 (reproductive mode information inferred from literature involving *L. knudseni* and/or *L. savagei*); Born and Gaucher 2001a (reproductive mode information inferred from literature involving *L. knudseni* and/or *L. savagei*), 2001b (*L. pentadactylus* breeding habitat and reproductive system information not based on original data/observations but inferred (incorrectly) from literature, probably based on *L. knudseni* or *L. savagei*); Boulenger 1882, 1887; Bourlière 1946; Bowler 1977; Braus 1919; Brazil and Vellard 1926; Breen 1974; Brodie et al. 1974; Brooks 1976 (probably *L. labyrinthicus*, possibly *L. flavopictus*); Brown 1988; Brum-Zorrilla and Saez 1968 (*L. knudseni* and/or *L. pentadactylus*); Brumpt 1949; Brygoo and Destombes 1976; Bursey et al. 2007 (*L. vastus* in part); Busack 1974; Caldwell and Vitt 1999 (most likely *L. knudseni*, but could include *L. pentadactylus*); Cannatella 1999; Carini 1909 (*L. flavopictus* and/or *L. labyrinthicus*), 1910, 1929a,b, 1930a,b, (all probably *L. labyrinthicus*), 1938, 1939 (probably *L. labyrinthicus*), 1943, 1945; Carrión 1950 (probably *L. labyrinthicus*); Carroll et al. 1999; Carvahlo [sic] et al. 2001; Carvalho et al. 1978 (probably *L. vastus*); Cei 1948, 1950 (p. 397 and 407 probably *L. labyrinthicus*), 1956, 1972, 1980; Cei and Erspamer 1965 (citations on p. 4, 6, 7), 1966; Cei et al. 1967; Cerda et al. 1979 (Table 1, Rivero 1961 citation); Champy and Coujard 1939; Chapuis 2003; Cihar 1987; Claessen 1991a,b; Coborn 1992; Cochran 1955 (*L. savagei* and probably *L. knudseni*, p. 322), 1961 (color photo p. 26, combination of *L. knudseni*, *L. pentadactylus*, and *L. savagei* on p. 62); Cochran and Goin 1970 (combination of *L. knudseni*, *L. pentadactylus*, and *L. rhodomerus*), Cole 1971; Coloma 1991 (combination of *L. pentadactylus* and *L. peritoaktites*); Comfort 1956; Conant and Hudson 1949; Conlon 2008; Conlon et al. 2006, 2009; Cooke 1989; Cope 1866, 1885 (not *L. pentadactylus*, probably either *L. knudseni* or *L. savagei*, p. 330), 1889, 1896; Corbett 1943; Cordeiro-Sousa et al. 2002, 2007a,b; Cortadas and Pavon 1982; Costa et al. 1973; Cox 1984 (a combination of *L. knudseni* and *L. savagei*); Crawford 1931; Crawford and Jones 1933

(probably *L. knudseni*); Crim and Vigna 1983; Crump 1974 (combination of *L. knudseni* and *L. pentadactylus*), 2000, 2001 (*L. knudseni* or *L. savagei* at least in part); Daló and Larson 1991; Daltry 2002; Daly and Spande 1986; Daly and Witkop 1966, 1971; Darzins 1950, 1952a,b (all either *L. labyrinthicus* or *L. vastus*); Davis 1936; Davis et al. 2000 (*L. knudseni* and/or *L. savagei*); Day et al. 2003 (*Leptodactylus* photos on p. 1276, 1279, and 1282 are *L. knudseni*, *L. peritoaktites*, *L. savagei*, *L. rhodomerus*, or *L. pentadactylus*); Defler et al. 1999; de Lang 1970; Díaz Ungria 1960; Di Persia and Neiff 1986; Doan and Arizabal Arriaga 2002 (composite of *L. knudseni* and *L. pentadactylus* fide Duellman 2005:287); Dobbin, Jr. 1957; Donnelly and Crump 1998 (combination of *L. pentadactylus* and *L. savagei*); Doria et al. 2001 (combination of *L. flavopictus*, *L. labyrinthicus*, and either *L. knudseni* or *L. pentadactylus*); Dourado et al. 2007; Dubois 1938, 1970 (both probably *L. labyrinthicus*); Duellman 1978 (text information combination of *L. knudseni* and *L. pentadactylus*), 1989, 1990 (both composite of *L. pentadactylus* and *L. savagei*), 1999 (composite of *L. pentadactylus*, *L. peritoaktites*, *L. rhodomerus*, and *L. savagei*), 2001 (composite of *L. pentadactylus*, *L. rhodomerus*, and *L. savagei*), 2003a, 2005 (information on p. 14, 73, 93, 106, 167, 176, 384, and the male characteristics, food, reproduction, and tadpole sections on p. 286–287); Duellman and Trueb 1986; Dunn 1944 (composite of *L. pentadactylus*, *L. rhodomerus*, and *L. savagei*); Duplaix 2001; Du Preez et al. 2007; Dyer 1985, 1986, 1990; Dyer and Altig 1977a, b; Earl 1969 (not *L. pentadactylus*, perhaps *L. flavopictus*, more likely *L. labyrinthicus* or *L. vastus*); Eggermont 1988; Elkan 1968, 1976; Elkan and Philpot 1973; Elter 1981; Emerson 1979; Engler 1929; Ernst et al. 2007 (a combination of *L. pentadactylus* and *L. savagei*); Erspamer and Cei 1970; Erspamer 1954, 1958, 1971, 1994; Erspamer and Erspamer 1965; Erspamer and Vialli 1952; Erspamer et al. 1963, 1964a, b, 1986; Ettliger 1990; Evangelista et al. 2002a,b; Fabio and Izecksohn 2001; Fabrezi 2001; Fahel 1952; Fernández and Fernández 1921 (probably *L. labyrinthicus*); Finkers 1986; Flower 1925, 1936; Fontenele-Berto et al. 2007a,b; Frazer 1973 (probably *L. savagei*); Freed 1993a,b; Freiberg 1972 (photo is of *L. labyrinthicus*, text is combination of *L. pentadactylus* and *L. labyrinthicus*), 1975; C. Freitas 2003 (Fig. 3); J. Freitas 1955, 1956, 1959, 1960, 1963; Freitas and Lent 1942 (probably *L. labyrinthicus*); Freitas and Silva 2006 (*L. labyrinthicus* and/or *L. vastus*); Frost 1985 (composite species distribution statement); Furness et al. 2010; Gallardo 1964b, 1965, 1974 (p. 25, probably either *L. knudseni* or *L. labyrinthicus*); Gallopín 1962 (except *L. pentadactylus pentadactylus*, p. 164); Gardon et al. 2001; Garman 1888a; Gatzky 1975; Gavetti and Andreone 1993; Gibson and Buley 2004 (citation on p. 128 not *L. pentadactylus*, probably *L. savagei* and *L. turimiquensis*); Ginés 1959 (probably a combination of *L. knudseni*, *L. pentadactylus*, and *L. turimiquensis*); Gistel 1848; Goin and Goin 1962, 1971; Goin et al. 1978 (citations on p. 107 and 248); Goldberg et al. 2005, 2009b; González and Hamann 2008; Gopee et al. 2000; Gray 1993; Green 2001; Green and Harshbarger 2001; Green and Sessions 2007; Greene 1988; Grenand 1980; Griffiths 1954; Grillitsch et al. 2004 (probably *L. knudseni*); Guimarães et al. 1976 (either *L. labyrinthicus* or *L. vastus*); Günther 1858 (*L. fuscus* specimens on p. 28 a composite of *L. fallax*, *L. vastus*, *L. knudseni*, and *L. pentadactylus*); Günther and Boulenger 1888; Haas 1995, 1996; Haas and Richards 1998; Habermehl 1969, 1974, 1981; Habermehl and Preusser 1970; Hailman 1977; Hailman and Jaeger 1974; Halliday and Crombie 2001 (a combination of *L. knudseni* and *L. savagei*); Hansen et al. 2000 (color illustration not *L. pentadactylus* but most probably *L. savagei*, the text refers to *L. knudseni* and/or *L. savagei*); Hardy 1982 (except for *L. pentadactylus* Trinidad citation, p. 69), 1984; Harshbarger 1979; Hellmich 1932; Herrmann 2001; Herter 1955 (not *L. pentadactylus*, probably either *L. knudseni* or *L. savagei*); Heusser 1974a,b; Heyer 1968 (composite of *L. fallax*, *L. vastus*, *L. knudseni*, and *L. pentadactylus*), 1974 (composite of *L. savagei* and skeletons of unknown provenance, p. 4), 1979 (composite of *L. pentadactylus*, *L. peritoaktites*, *L. rhodomerus*, and *L. savagei*), 1994; Heyer and Diment 1974; Heyer and Maxson 1982a (relationship information a combination of *L. pentadactylus* and *L. savagei*), 1982b (composite of *L. pentadactylus*, *L. peritoaktites*, *L. rhodomerus*, and *L. savagei*); Heyer and Peters 1971 (information on p. 165); Hicklenton et al. 1996 (combination of *L. knudseni* and *L. pentadactylus*); Hiltzheimer and Haempel 1912 (not *L. pentadactylus*, probably *L. knudseni* and/or *L. savagei*); Hinsche 1928; Hödl 1977, 1986, 1997; Hödl and Gollmann 1986; Hoff et al. 1999 (*L. knudseni* or *L. savagei*); Honório-Júnior et al. 2007; Hoogmoed 1979 (composite of *L. knudseni*, *L. pentadactylus*, and *L. turimiquensis*); Hoogmoed and Gorzula 1979 (probably *L. knudseni*); Howes 1887; Howes and Ridewood 1888; Howland 1992 (not *L. pentadactylus*, probably *L. knudseni*); Hoyos 2003; Hvass 1964, 1975 (both probably *L. knudseni*); Ihering 1934, 1940 (composite of *L. labyrinthicus*, *L. pentadactylus*, and *L. vastus*); Jackson 2006 (a combination of *L. peritoaktites*, *L. rhodomerus*, *L. pentadactylus*, and *L. savagei*); Jaeger and Hailman 1973, 1976; Jim 1995 (probably *L. labyrinthicus* or *L. vastus*); Johnston 1975 (p. 532, probably *L. labyrinthicus*); Jones 1967; Kaiser and Michl 1958; Kauri 1962 (not *L. pentadactylus*, either *L. knudseni*, *L. labyrinthicus*, *L. savagei*, or *L. vastus*); Kenny 1969a,b; Kicliter and Goytia 1995; M. King 1990; J.D. King et al. 2005, 2008; Klingelhöffer and Scherpner 1956 (a combination of information for *L. knudseni*, *L. labyrinthicus*, *L. pentadactylus*, *L. savagei*, and *L. vastus*, with most information and photo of either *L. labyrinthicus* or *L. vastus*, p. 137–138); Kloss 1974; Kluge and Farris 1969; Kohn and Santos 1989; Kohn et al. 1978; Kraus 2009; Kricher 1989, 1997; Kurabayashi and Sumida 2009; Kuramoto 1990; Lacey 1979 (probably *L. knudseni*); La Marca 1992 (distributional statement, p. 61, a combination of *L. pentadactylus* and *L. savagei*); Lamotte and Lescure 1977; Laurent 1986; Laurin et al. 2004; Leite et al. 2010; Lent et al. 1946; Leroy 1977; Lescure 1973, 1976 (combination of *L.*

knudseni and *L. pentadactylus*), 1977a,b, 1979a (information on p. 762, 765 first paragraph, and 771 is a combination of *L. knudseni* and *L. pentadactylus*), 1986b (p. 441, *L. knudseni* or *L. savagei*), 1986c, 1987 (combination of *L. pentadactylus* and *L. savagei*), 1994 (citation on p. 141 probably *L. knudseni*); Lescure and Letellier 1983 (*L. knudseni* and/or *L. savagei*); LeVering 1999 (citation 32 on p. 61); Levine and Nye 1977; Libério et al. 2011; Lidth de Jeude 1898; Limeses 1964, 1965a,b, 1969 (probably all *L. labyrinthicus*); Liner 1994; Liu 1935a,b; Lourenço and Cuellar 1995 (*L. knudseni* and/or *L. pentadactylus*); Love 1998 (photo is of a ranid); Lutz 1924, 1926a-d, 1927, 1928, 1929 (probably *L. labyrinthicus* or *L. vastus*), 1930b (probably *L. labyrinthicus* or *L. vastus*), 1933, 1948; Lutz and Kloss 1952 (either *L. knudseni* or *L. pentadactylus*); Lydekker 1906, 1913; Lynch 1966, 1971 (all specimens examined, p. 227, are from Costa Rica and Panama {e-mail message from J. Simmons, 5 viii 2003}, hence = *L. savagei*, fossil occurrences p. 192–194 either *L. labyrinthicus*, *L. pentadactylus*, or possibly *L. flavopictus*), 1979 (composite of *L. flavopictus*, *L. knudseni*, *L. pentadactylus*, *L. peritoaktites*, *L. rhodomerus*, and *L. savagei*), 1998; Lynch and Suárez-Mayoraga 2004 (= *L. savagei* and *L. rhodomerus*); Mañé-Garzón and González 1978; Martins and Haddad 1988; Mata-López et al. 2005; Mattison 2007 (text, p. 109); Mauro and Campos 2000; Maxson and Daugherty 1980; Mayer 1835 (all names except *Rana pachypus bilineata*); McCranie et al. 1980; Mello Leitão 1937, 1947; Menéndez-Guerrero 2001 (probably *L. savagei*); Metcalf 1940; Meyer 1960; Michl and Kaiser 1963; Miranda-Ribeiro 1922 (*L. labyrinthicus* and *L. vastus*); Mok and Carvalho 1984, 1985; Mok et al. 1983 (Table 2), 1987; Molin 1858 (*Cystignathus gigas* = *L. pentadactylus* = *L. ?*); Morescalchi 1970a,b; Morescalchi et al. 1968; Moussatché 1945; F. Müller 1892; L. Müller 1912; M. Müller 2003; P. Müller 1971 (p. 26), 1974 (p. 11), 1980 (p. 27); Nace et al. 1971; Nakajima 1981; Nascimento 2007; Nascimento et al. 2007; Nasir and Diaz 1970; Naya et al. 2008; Negroni 1991; Negroni and Farina 1993; Nicéforo María 1930 (probably *L. knudseni*); Nicholls 1916; Nichols 1979; Nieden 1923 (p. 473 composite of at least *L. fallax*, *L. knudseni*, and *L. savagei*); Nietzke 1969, 1980; Noble 1922, 1923, 1931; Nomura 1998; Obst et al. 1984 (combination of *L. pentadactylus* and *L. savagei*), 1988; Odening 1960; Odlaug 1937; Oltmanns 1952; O'Shea and Halliday 2002; Ozorio de Almeida et al. 1940, 1943 (both probably *L. labyrinthicus*), 1944 (probably either *L. flavopictus* or *L. labyrinthicus*); Padial et al. 2006; Páez et al. 2002 (*L. rhodomerus* or *L. savagei*); Parsons and Williams 1962; Patzelt 1989; Pawley 1971; Pearson 1959; Pearson and Davin 1921; Peracca 1904 (*L. knudseni* and/or *L. pentadactylus*); Pereira et al. 1973 (probably *L. labyrinthicus*); Pessôa 1970; Pessôa and Cunha Neto 1967 (*L. labyrinthicus* or *L. vastus*); Petzold 1974, 1977 (text), 1982, 1983; Pinto 1925; Pinto and Noronha 1972 (probably *L. labyrinthicus*); Pocai 1941; Poisson 1953 (*L. flavopictus* and/or *L. labyrinthicus*); Poll 2009; Porter 1972; Pough 1989; Pough et al. 1998, 2004 (both probably *L. savagei*); Prado et al. 2002 (combination of *L. pentadactylus* and *L. savagei*); Preusser et al. 1975, 1976; Procter 1921, 1923; Prudhoe and Bray 1982; Purgue 1995; Rabello 1970 (Brum-Zorilla and Saez 1968 citation, p. 47); Rada de Martínez 1976 (*L. flavopictus* and *L. pentadactylus* data combined); Raillet 1916 (*Cystignathus gigas* = *L. pentadactylus* = *L. ?*); Ramus 1999 (either *L. knudseni* or *L. savagei*); Rand 1983 (p. 412); Rastogi et al. 2005; Rau and Gatenby 1923; Razo-Mendivil and León-Règagnon 2001 (p. 690 Sullivan 1977 citation a combination of *L. labyrinthicus* and *L. vastus*); Règo 1962, 1973; Reichenbach-Klinke 1961 (probably either *L. labyrinthicus* or *L. vastus*); Reichenbach-Klinke and Elkan 1965, 1972 (both probably either *L. labyrinthicus* or *L. vastus*); Reig 1972; Renjifo 1997; Rettig et al. 2003; Richter 2000 (probably *L. knudseni*); Ritter 1965; Rivero 1961 (*L. pentadactylus* and/or *L. knudseni*), 1964b (probably *L. knudseni*), 1968 (p. 145), 1969 (probably *L. knudseni*), 1971, 1994; Rivero-Blanco and Dixon 1979 (probably not *L. pentadactylus*, certainly *L. turimiquensis* and perhaps *L. knudseni*); Rocha and Magnusson 1985 (probably *L. knudseni*); Rocha et al. 1984 (probably *L. knudseni*); Rodrigues et al. 1978, 1982 (both not *L. pentadactylus*, either *L. labyrinthicus* or *L. flavopictus*); Roseghini et al. 1986; Rowlett and Roe 1966; Rueda-Almonacid 1994; Ruiz-Carranza et al. 1996 (composite of *L. pentadactylus*, *L. rhodomerus*, and *L. savagei*); Ruiz Pérez and Buitrago Vannini 2003; Rundquist 1994 (not *L. pentadactylus*, probably either *L. knudseni* or *L. savagei*); Salthe and Mecham 1974; Sanchiz 1998; Santana and Menin 1997; Santos 1942, 1994; Satel and Wassersug 1981 (probably *L. savagei*); Scharf 1971; Schenberg 1956; Schlüter 2005 (probably a combination of *L. knudseni* and *L. pentadactylus*); Schmidt 1984; Schneider et al. 1988; Schreiber and Melucci 1949; Schulte 1984; Schwartz et al. 2007; Scorza and Dagert Boyer 1956 (probably *L. labyrinthicus*); Sebben et al. 1993; Secor 2005a,b; Segura-Solís and Bolaños 2009; Senfft 1935; Shea 2002; Shepard and Caldwell 2005; Shine 1979; Simon 1975; Simon and Toft 1991 (probably a combination of *L. knudseni* and *L. pentadactylus*); Simons 2008; Skrijabin and Antipin 1962 (probably *L. labyrinthicus*); Slavens 1976, 1980, 1984, 1989; Slavens and Slavens 1993, 1994; Smales 2007; Smith 1929; Snider and Bowler 1992; Sousa et al. 2009 (citation on left column, p. 24); Souza 1998 (*L. pentadactylus* and/or *L. knudseni*); Souza et al. 1991; Spieler 1999a,b; Stadie 1962; Stuart et al. 2008 (combination of *L. pentadactylus*, *L. peritoaktites*, *L. rhodomerus*, and *L. savagei*); Stultifer 1970 (combination of *L. pentadactylus* and *L. savagei*); B. Sullivan 1974 (probably *L. labyrinthicus*); J. Sullivan 1977 (*L. vastus* and perhaps *L. labyrinthicus*); Suriano 1968 (probably *L. labyrinthicus* and/or *L. vastus*), 1970 (p. 221, 231 citations); Sustare 1977; Svava and Chaparro 2002 (combination of *L. knudseni* and *L. pentadactylus*); Switak 2006; Taylor 2001; Taylor et al. 2001; Teixeira and Vrcibradic 2003; Telford 1984 (probably *L. labyrinthicus*); Terent'ev 1961, 1965; Thatcher 1993 (citations on p. 188 and 191); Thorpe 1963; Toft and Duellman 1979 (probably *L. knudseni*

and *L. pentadactylus*); Tokita and Iwai 2010; Toledo and Jared 1989 (probably *L. labyrinthicus*); Trader and Frieden 1966 (probably *L. labyrinthicus*); Travassos 1927 (*L. labyrinthicus* at least in part), 1928, 1929, 1947 (*L. flavopictus* or *L. labyrinthicus*); Travassos and Freitas 1942 (probably *L. labyrinthicus*); Travassos et al. 1969; Trombeta 2008; Trueb 1973 (*L. knudseni* or *L. savagei*); Turner 1962; Une et al. 2008; Urdaneta-Morales and McLure 1972 (probably *L. insularum*); van Rekum 1960; van Santen 2006 (probably *L. savagei*); Vanderstraeten 1986; Vaz 1933 (*L. flavopictus* and/or *L. labyrinthicus*), Vaz-Ferreira and Gehrau 1975; Vellard 1947; Vera Candioti 2007; Vera Candioti and Altig 2010; Vialli 1966, 1967; Vicente and Jardim 1980; Vicente et al. 1991 (citations on p. 579, 607, 613; citation on p. 596 is *L. ocellatus*); Vidal 1999; Vieira 1980 (*L. labyrinthicus?*); Vieira et al. 2007 (combination of *L. pentadactylus* and *L. savagei*); Viertel and Richter 1999; Vigle 2000; Villa 1980 (combination of *L. pentadactylus* and *L. savagei*); Villa et al. 1982; Vitt and Caldwell 2001 (probably *L. knudseni*); Vizotto 1964, 1979, 1984 (p. 43); Vogel 1961 (*L. knudseni* or *L. savagei*), 1966 (*L. knudseni* and/or *L. pentadactylus*); Vogel and Vevers 1964; D. Vogt and Wermuth 1972; R. Vogt 2004 (combination of *L. pentadactylus* and *L. savagei*); Volkert 2002; Wagler 1830 (*Rana pachypus* Spix, p. 203); Walton 1933, 1935, 1938a–c, 1940, 1946, 1953a,b, 1962, 1964a,b); Warkentin 2000 (probably *L. knudseni*); Watermolen 1995; Weldon et al. 1993; Wells 2007 (p. 717, photograph D); Wenyon 1926 (probably *L. labyrinthicus*); Werner 1907 (not *L. pentadactylus*, probably either *L. knudseni* or *L. savagei*), 1908 (not *L. pentadactylus*, probably either *L. knudseni* or *L. savagei*), 1910 (not *L. pentadactylus*, probably either *L. knudseni* or *L. savagei*), 1912 (not *L. pentadactylus*, probably *L. savagei*), 1920, 1922 (not *L. pentadactylus*, probably either *L. knudseni* or *L. savagei*), 1930; Whitaker 2001; Whitaker and Wright 2001; Witenberg and Gerichter 1944; Wright 2001a (p. 10),b,c,d, 2006; Wright and Whitaker 2001a,b; Wrobel 2004; Yamaguti 1958, 1961, 1971 (p. 346 citation); Young et al. 2004; Zimmerman 1983, 1991; Zimmerman and Bierregaard 1986; Zimmerman and Rodrigues 1990 (combination of *L. knudseni* and *L. pentadactylus*); Zimmerman and Simberloff 1996; Zimmermann 2000; Zwinenberg 1978 (not *L. pentadactylus*, probably either *L. labyrinthicus* or *L. vastus*).

• **NOMENCLATURE HISTORY.** Laurenti (1768) based the name *Rana pentadactyla* on at least two specimens. One specimen was figured in Seba (1734, plate 75, figure 1), with the locality given as “Virginia.” The second specimen was from “Indiis.” Over time, the herpetological community applied the names *Rana pentadactyla*, *Cystignathus pentadactylus*, and *Leptodactylus pentadactylus* to the following currently recognized valid taxa: *L. fallax*, *L. flavopictus*, *L. knudseni*, *L. labyrinthicus*, *L. myersi*, *L. paransis*, *L. peritoaktites*, *L. rhodomerus*, *L. savagei*, *L. stenodema*, *L. turimiquensis*, and *L. vastus*. Several of these taxa are morphologi-

cally similar to each other and are best identified from tadpole or advertisement call data. Heyer (2005) wished to designate the specimen Seba illustrated as the lectotype of *Rana pentadactyla* Laurenti, 1768. Heyer (2005) contacted all museum collections known to have Seba specimens. The only Seba specimen still extant in the Academy of Sciences, St. Petersburg, Russia, is ZIL 274, which WRH examined and found to be *L. knudseni*; the Seba figure clearly indicates a complete dorsolateral fold from the eye to the groin, thus ZIL 274 could not be the specimen Seba illustrated. Heyer (2005) therefore designated as neotype for *Rana pentadactyla* Laurenti, 1768, specimen RMNH 29559, an adult male, from Suriname, the likely origin of Seba’s figured specimen (Bauer 2002:9; Heyer 1979:13). Boldt (1911:83) used the name *Leptodactylus pachypus* gigas. It is unclear to what current species this name applies – *L. pachypus* is usually a synonym of *L. ocellatus* and *L. gigas* is a synonym of *L. pentadactylus*. Frost (2009) included *Doryphoros gigas* Mayer, 1835 in the synonymy of *Leptodactylus pentadactylus*. It is impossible to associate the individual figures of Mayer’s plate 3 with currently recognized species of *Leptodactylus*. Plate 3, figure 1 (identified as *Rana Pachypus Gigas*) cannot be *Leptodactylus pentadactylus*, as the figure clearly illustrates a hypertrophied arm that is much bulkier than the arms of male *L. pentadactylus*. Plate 3, figure 2 illustrates the skeleton of the hand of *Pachypus gigas*; the figure could be one of several species of *Leptodactylus*. Plate 3, figure 8 of *Doryphoros gigas* illustrates the anatomy of the hyoid, larynx, and lungs of a male; the figure can not be positively associated with any species of *Leptodactylus*.

• **REMARKS.** The proposed English name for *Leptodactylus pentadactylus* is Smoky Jungle Frog, the proposed Portuguese name is Rã-Defumada-da-Selva, and the proposed Spanish name is Rana Ahumada de la Jungla (see <http://learning.richmond.edu/Leptodactylus>). Published common names include Apel-Lapli (Lescure and Marty 2000), Amazonian Bullfrog (Bartlett 2000), Femfingerpadda (Loman 1976), Fünffingeriger Pfeiffrosch (Ananjeva et al. 1988), Fünfzehnpfeiffrosch (Krintler, 1996), Grenouille-Flûte (Ananjeva et al. 1988), Grenouille Taur-eau (Ananjeva et al. 1988), Gualag Frog (Coloma and Ron 2001), Hatun-Hambato (Jiménez de la Espada 1875), Hua (Schlüter 1980), Hualo (Schlüter 1984; Sichhar Valdez et al. 1995; Souza and Rivera Gonzáles 2006a), Jojo (Yáñez-Muñoz and Venegas 2008a,b), Jungle-chicken Frog (Rosenberg 1987 as *L. pentadactylus dengleri*), Krapo-Lapli (Lescure and Marty 2000), La Grenouille Géante (Spix 1824), Lep-todactyle Géant (Lescure and Marty 2000), Mawa (Lescure and Marty 2000), Mountain Chicken (Felix and Sahdew 2006; Tammesar et al. 2004), Mulu (Lescure et al. 1980; Lescure and Marty 2000), Muru (Lescure and Marty 2000), Ooti (Rojas Zolezzi 2002), Rã-Caçote (Souza and Cardoso 2002), Rã-pimenta (São Pedro et al. 2009), Rain Frog (Krintler 1996), Rana Gualag (Coloma and Ron 2001), Rã-Que-

Chama-Chuva (Souza and Cardoso 2002), Riesen-Pfeiffrosch (Schlüter 1984), Reuzen Fluitkikker (Felix and Sahdew 2006), Sapo-Toro Común (Barrio Amarós 1998; Heyer et al. 2008a), Slender-fingered Bladder Frog (Ananjeva et al. 1988), Smoky Jungle Frog (Ananjeva et al. 1988; Bartlett 2000; Behler and Behler 2005; Cochran 1940; Heyer 2005; McAllister et al. 2010a,b; Rosenberg 1987; Wright 2001a), South American Bullfrog (Ananjeva et al. 1988; Arak 1986; Behler and Behler 2005; Blankenship 1990; Bursley et al. 2001; Frank and Ramus 1995; McAllister et al. 2010a,b; Rosenberg 1987), Südamerikanischer Ochsenfrosche (Ananjeva et al. 1988; Schlüter 1984; Switak 2006), Todo (Felix and Sahdew (2006), Whooping Frog (Castner 2000), Yai Jojó (Ormaza and Bajaña 2008).

• **ETYMOLOGY.** The specific name *pentadactyla* is Latin, meaning five-digit. Seba's (1734) Figure 1 on Plate 75 clearly shows five fingers on each hand. As there are no extant frogs known to have five fingers, the illustrator apparently exercised some artistic license in its execution.

• **ACKNOWLEDGMENTS.** Ronald G. Altig, Marinus Hoogmoed, David Kizirian, and Kentwood Wells provided information clarifying puzzling identifications. Leandro Ferreira, Ulisses Galatti, and Claude Gascon pinpointed localities we were unable to find with any precision. Kristian Fauchald and Jirí Moravec provided translations of passages that Yahoo Babel Fish completely mangled. Research for this account was supported by NSF award DEB-0342918 to RdS and WRH.

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Additions to the account were closed on 31 December 2010.

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Primary editor for this account, Andrew H. Price.

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