



Puerto Rico: An Island Enchanted by Frogs!

Rafael L Joglar
Department of Biology
University of Puerto Rico—Río Piedras
San Juan, Puerto Rico

THE ISLAND OF THE ENCHANTMENT

Attributes and characteristics

- Rainforests
- Waterfalls and river pools
- White sandy beaches, and crystal clear waters
- Spaniard forts and 500 years old cities:
- *Comida Criolla* (local food)
- Music- *bomba, plena, danza, and seis* .
- Drinks
- Fruits
- Biodiversity



THE ISLAND OF THE ENCHANTMENT

Attributes and characteristics

- Amazing cays and bigger islands
- An Island full of contrasts and diversity
- Blend of histories and cultures
- Art and art crafts
- *Parrandas, fiestas patronales, Navidades, octavitas*, festivals and other festivities
- Weather
- Other things and places



LETS ADD A NEW ENCHANTMENT:

- FROGS!



Puerto Rico is an island enchanted by frogs

- An island whose people are fascinated by frogs
- More species of frogs than in any other island!
- More frogs than anywhere in the world!
- More ways to have sex!...more ways to make more frogs!

An island where people are fascinated by frogs

- Different kinds of frogs in all stores: ceramic, plastic, wooden, etc.
- Frog art craft: T- shirts, neck laces, ear rings, key chains, etc., etc.
- Art forms: poems, songs, paintings, posters, etc.
- Frogs in houses: decorative frog in the living room and/or other room.



An island where people are fascinated by frogs

- San Juan: 17 companies or establishments "El Coqui" or "Coqui"
- Over 500 of such places and companies: gas stations, ice plants, car rentals, liquor stores, computer services, and garbage collection services.
- The coqui is the national emblem of Puerto Rico.
- Petroglyphs and pictographs: Taino Indians were fascinated by frogs



People will tell you strange stories about coquis

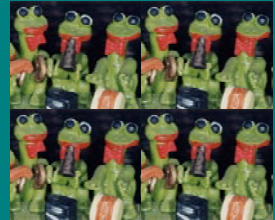
- Coquis are green
- One "kind" of coqui
- All coquis call and say: CO-QUI (CO-KEE)
- Coqui die or stop calling if they leave Puerto Rico
- Brown, light brown, many other colors
- 16 species in Puerto Rico (+/- 600)
- Only males call; only 2 spp call CO-QUI
- PR coquis in continental USA, Panama, Dominican Republic, Hawaii and Guam.

More species of frogs than in any other island!

	Native spp	Area (km ²)	Spp /10 ⁶ km ²
Cuba	52	110,922	468.7
Hispaniola	63	76,470	823.8
Jamaica	22	10,990	2,001.8
Puerto Rico	18	8,990	2,002.2
L. Antilles	10	5,840	1,712.3
Bahamas	2	11,296	177.0
Based on:	Hedges (1999)	and Duellman	(1999)

More frogs than anywhere in the world!

- 24,800 coquis per hectare (Stewart and Woolbright, 1996)
- Highest so far for frogs anywhere!



More ways to have sex!...more ways to make more frogs!

- Internal fertilization is extremely rare in anurans, occurring in very few species, two of them found in Puerto Rico: *Eleutherodactylus coqui* and *E. jasperi*

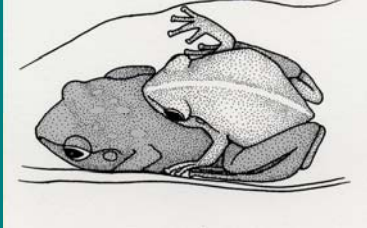


AMPLEXUS

- Male usually embraces female
- Ingingal, axillary, cephalic, straddle, glued or independent (Duellman and Trueb, 1994).
- Not In Puerto Rico!

Reverse hind leg clasp

- *E. coqui*
- Townsend and Stewart, 1986



Anuran major categories of reproductive modes

- Defined on the bases of site of egg deposition and/or development:
 - (1) aquatic eggs
 - (2) terrestrial or arboreal eggs
 - (3) eggs retained in oviducts (Duellman and Trueb, 1994).

Puerto Rico is one of the few places in the world, where you can observe these three modes among native amphibians



Females retain eggs on their oviducts

- In five out of 4,204 anurans species in the World (0.1 %)
- Puerto Rican *Eleutherodactylus jasperi*
- the other four species are African bufonids *Nectophrynoides*
- *E. jasperi* is considered ovoviviparous (and two species of *Nectophrynoides*)



Most anurans have a tadpole (or larval stage).

- Not in Puerto Rico!
- 16 out of 18 (88.9 %) are direct developers.



Parental care is not common among anurans.

- Several species of Puerto Rican *Eleutherodactylus* have parental care (*E. coqui*, *E. portoricensis*, *E. cooki*, *E. cochranae*, *E. hedricki*, and maybe others).
- Males of these species brood and /or guard egg clutches in order to avoid dehydration and predation



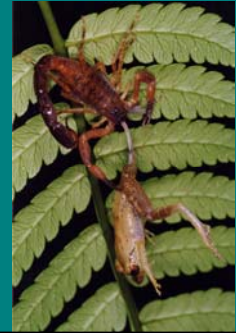
Coquis: most important nocturnal predators in Puerto Rico

- Abundant (24, 800 coquis per hectare)
- Prey predated per night (2.3 adults; 6 juv.)
- 114,000 preys / hectare (mostly insects)



Coquis: an important component of the Puerto Rican food web

- Biomass (3.7 kg/hectare) available for other trophic levels
- Abundant and important food source for many invertebrates and vertebrates



Coqui Predators

- Invertebrates 9
- Amphibians 4
- Reptiles 9
- Birds 17
- Mammals 3



Coqui Egg Predators

- Invertebrates 11
- Amphibians 3
- Reptiles 2



ARE WE LOSING THE ENCHANTMENT?

- Going...going...gone: Three species of endemic frogs are probably extinct!



Proposal for the creation of wildlife reserves for the conservation of coquis en Sierra de Pandura and Sierra de Cayey, Puerto Rico



Copyright:

- All photos
by Rafael L.
Joglar ©
Proyecto
Coquí

