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Description of a New Subspecies of the Frog *Eleutherodactylus ricordi* from the Bahama Islands

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The members of the Van Voast-American Museum of Natural History Expedition to the Bahama Islands in 1953 collected *Eleutherodactylus* from many of the islands from which heretofore very few or no specimens were known. Mr. George B. Rabb, who is undertaking the study of the herpetological material collected, has very kindly suggested that I report on the frogs of this genus. A total of 441 frogs collected by these workers, plus material already available in museums, makes possible a reëvaluation of this group in the Bahamas. Although I earlier (Goin, 1947, p. 42) stated the belief that *planirostris* might be simply a feral waif in the Bahamas, in the light of this rather extensive recent material I do not believe that this position is any longer tenable.

The frogs from the islands in the lower portion of Great Bahama Bank, comprising as they do a rather homogeneous lot, are rather different from those of the other islands and should be named. I take pleasure in naming this new form for Prof. J. Speed Rogers, who has constantly encouraged me in my studies of *Eleutherodactylus*.

Eleutherodactylus ricordi rogersi, new subspecies

Type: A.M.N.H. No. 57564, adult female, collected January 18, 1953, on Darby Island, Exuma Cays, Bahama Islands, latitude 23° 50′ S., longitude 76° 11′ W., by George B. Rabb and Leonard Giovannoli.

PARATYPES: Forty-eight, as follows[1]: Darby Island, Exuma Cays: U.M.M.Z. No. 110103. Bell Island, Exuma Cays, latitude 24° 19′ S., longitude 76° 32′ W.: A.M.N.H. Nos. 57565–57569; U.M.M.Z. No. 110102 (5). Cat Island: A.M.N.H. Nos. 57581–57584; M.C.Z. Nos. 21420, 21421; U.M.M.Z. No. 110107 (3). Long Island: A.M.N.H. Nos. 57570–57575; U.M.M.Z. Nos. 110104 (3), 110105 (2). San Salvador (Watling Island): A.M.N.H. Nos. 57576–57580; C.M. Nos. 20452, 20453; M.C.Z. No. 24585; U.M.M.Z. No. 110106 (5); U.S.N.M. Nos. 66250–66253.

DIAGNOSIS: An *Eleutherodactylus* allied to *planirostris,* with the vomerine teeth in two long, arched series; with the pads of the two outer fingers larger than those of the inner fingers; and with a pattern of minute, pale brown specks uniformly distributed on a ground color of light tan. It differs from *ricordi ricordi* of Cuba in having the top of the head much lighter than the dorsum and from *planirostris* and *caspari* in lacking bands on the hind legs and any appreciable amount of chin or throat pigment. Although no differences between *rogersi* and *planirostris* can be noted in mensural characteristics, the former gives the impression of being a heavier-bodied frog with a thicker body and legs.

DESCRIPTION OF TYPE: Head slightly broader than distance from snout to occiput; snout somewhat rounded, upper jaw slightly projecting; diameter of eye about equal to distance between eye and nostril; nostril very near tip of snout; interorbital space greater than diameter of individual eye; upper eyelids and top of head smooth; dorsum smooth medially, becoming faintly rugose towards the sides; diameter of tympanum equal to about half of the diameter of the eye; distance from eye to tympanum equal to about half of the diameter of the tympanum. Digital discs present on the tips of all fingers and toes, the discs of the two outer fingers larger than those of the two inner fingers, width of disc of second toe about equal to one-third of diameter of tympanum. Fingers slender, unwebbed, 3-4-2-1 in order of decreasing length; subarticular tubercles well developed. Toes slender, unwebbed, 4-3-5-2-1 in order of decreasing length. Heels not quite in contact when legs are flexed with femora held at right angles to body; knees and elbows in contact when limbs are pressed along sides; heel extending to about middle of orbit when leg is pressed along body. Venter smooth in center,

[1] A.M.N.H., the American Museum of Natural History.
C.M., Carnegie Museum.
M.C.Z., Museum of Comparative Zoölogy.
U.M.M.Z., University of Michigan Museum of Zoology.
U.S.N.M., United States National Museum.

becoming more rugose towards the sides. Under surface of thighs somewhat rugose. Belly disc fairly well developed, with a distinct chest fold extending between the axillae and a distinct fold across the belly slightly anterior to the hind limbs. Tongue oval, not notched, free behind; great-

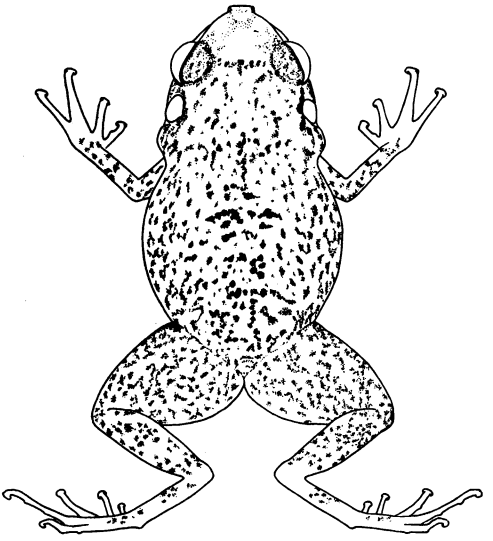

FIG. 1. Dorsal view of the type of *Eleutherodactylus ricordi rogersi* (A.M.N.H. No. 57564), showing details of pattern. × 1.5. Drawn by Esther Coogle.

est width of tongue about two-thirds of that of mouth opening. Vomerine teeth in two long, arched series, extending laterally beyond the level of the choanae, nearly in contact in the middle.

COLORATION OF TYPE: A narrow, dark band between the eyes separating the pale, tannish color of the top of the head from that of the dorsum. Ground color of dorsum and dorsal surfaces of front and hind limbs very pale tan, more or less uniformly covered with minute, uniformly distributed flecks of darker brown. Above the axillae and just anterior to the sacral hump these flecks tend to become confluent, thus forming two indistinct, short, narrow, dark bars across the back. Flecks uniformly distributed over upper surface of hind legs. Margin of lower lip uniform, chin and throat immaculate to naked eye, although scattered, minute pigment cells can be seen under magnification. Belly immaculate.

MEASUREMENTS OF TYPE (IN MILLIMETERS): Snout-to-vent length, 31.8; head width, 12.3; tip of snout to posterior margin of tympanum, 11.2; diameter of eye, 3.5; diameter of tympanum, 2.0; hind leg (vent to tip of longest toe), 40.8; hind leg (vent to heel), 24.2.

VARIATION: In *rogersi,* as in the other races of *ricordi,* individuals with dorsolateral stripes occur. Of the 48 paratypes, dorsolateral stripes are found on two from Long Island and three from Bell Island, Exuma Cays. In these individuals the dorsolateral stripes seem to be simply pigmentless areas, and the stripes are not pronouncedly bordered with dark as they are in some species of *Eleutherodactylus.*

There seems to be some ontogenetic change in coloration; some immature individuals have very indistinct bars on the hind legs. In none of the paratypes that are subadult or larger, however, have these bars persisted; all these have the dorsal surface of the thighs speckled rather than barred. The same is true of the dorsal pigment. In tiny individuals it seems to be more concentrated in larger blotches, so that they resemble mottled *planirostris.* In larger specimens the pigment is so distributed as to give a definite speckled pattern. Although even in the large individuals there is some confluence of pigment above the shoulders, all specimens of the population nonetheless are pale, speckled frogs that do not show the darker mottled condition obtained in *planirostris.*

All in all, the population in the southern and eastern portions of the Great Bahama Bank seems to be rather a homogeneous group of pale, speckled frogs.

The populations occupying Andros and Eleuthera Islands and Bimini, while included in the range of *rogersi,* are intentionally omitted from the list of paratypes. While these populations seem referable to *rogersi,* some individuals from them approach *planirostris* more closely. I believe this is due to a gene flow, probably from near-by New Providence in the case of Andros and Eleuthera and perhaps from Florida in the case of Bimini.

EVOLUTION OF SPECIES IN BAHAMA ISLANDS: It is now apparent that *E. ricordi,* in one form or another, is widely distributed in the Bahamas south and east to the Crooked Island Passage.

Specimens from the lower portion of the Great Bahama Bank (*rogersi*) are pale tannish or yellowish frogs, speckled with pale brown. I believe that evolution has also been taking place in the population of the Little Bahama Bank, although I do not feel the need to recognize the form taxonomically at the present time. Specimens from Grand Bahama Island and Great Abaco are dark gray in ground color, with rather large, discrete, dark spots scattered over the backs. One thing that impels me to refrain from naming this population now is the fact that the bulk of the fresh material I have examined from this bank is from a single locality, Marsh Harbour, Great Abaco. I do not believe this form should be named until it is demonstrated by adequate fresh material from several

localities that the Marsh Harbour specimens do not represent a restricted, local population. In between these two populations of Great Bahama Bank and Little Bahama Bank we have the type locality of *planirostris* (New Providence), which is occupied by a frog population essentially indistinguishable from the widespread populations of Cuba and Florida and like the frogs of neither the northern nor the southern Bahamas. Thus we have a rather curious situation, with the population of a comparatively small island in the middle of the Bahamas being like the Cuba and Florida populations while on the islands both to the north and south of this, speciation or incipient speciation has occurred.

I believe that this rather queer circumstance can be readily explained by a combination of geologic and historic events.

It would seem to me that at some time in the geologic past, *planirostris* (or its progenitor) reached the Bahamas from Cuba and evolved at two centers, the Little Bahama group and the Great Bahama group. The thesis presented so vividly by Barbour and Shreve (1935) that such events might have occurred during Pleistocene times when the Bahamas were a few large land masses rather than archipelagos of small islands would certainly be consistent with this idea. With the elevation of sea level, these frogs would then be broken up into small island populations that were more or less isolated.

To my mind, *E. r. planirostris* is a frog that lends itself to human transportation, as witness its relatively recent spread and its present wide distribution in Florida and Jamaica.

There seems to be no doubt that New Providence has been the chief port of entry to the Bahamas since the first English settlement at Nassau was founded about 1630. It is also known that much of the early travel was from Cuba to Nassau, as it was from Havana that several of the earlier Spanish raiding expeditions set sail. At intervals during the next century the Spaniards were from time to time in control of Nassau, at one time for as much as 20 consecutive years (Wright, 1905, p. 422).

If man entered the picture and introduced *planirostris* to New Providence from Cuba, *planirostris* might swamp the New Providence population while the frogs on the other islands were rather free from gene flow. As this introduction to New Providence may have occurred more than once, or is perhaps even a continuing process, it would be readily understandable that the frogs from this small island in the middle of the Bahamas are like those from Cuba and Florida, while the frogs on the other, more isolated, islands have been relatively free from gene flow and have remained differentiated.

The populations of Eleuthera and Andros probably have been polluted in part from neighboring New Providence; hence it would be natural for them to exhibit *planirostris* influence.

The population of Bimini likewise shows some indication of gene flow.

Although Shreve (1945, p. 117) recently pointed out that *ricordi, planirostris,* and *caspari* really represent a group of closely allied forms, no direct comparison of them has been published. I therefore take this opportunity to present a key to the subspecies of *ricordi.*

KEY TO THE SUBSPECIES OF *Eleutherodactylus ricordi*

1. Top of head with pale triangular area which is definitely lighter than the dorsum 2
   Top of head without a triangular area definitely lighter than the dorsum; top of head and dorsum vermiculated or marbled with chocolate brown (the highlands of Oriente, Cuba) . . . . . *E. r. ricordi*
2. Edge of lower lip mottled; chin and throat with faint to pronounced pigment flecks; pigment on upper surface of thighs often arranged in definite cross bands in adults 3
   Edge of lower lip pale; chin and throat essentially immaculate; dorsum and upper surface of thighs with numerous, more or less uniformly scattered, minute, pale brown specks (islands of the Great Bahama Bank except New Providence) . . . . . *E. r. rogersi*
3. One or two pairs of distinct, chocolate brown, dark spots just above and anterior to the groin (the Trinidad Mountains in Las Villas, Cuba) . . . . . *E. r. caspari*
   No pronounced, distinct, chocolate brown spots just above the groin (New Providence, Cuba, Isle of Pines, peninsular Florida, parts of Jamaica, Grand Cayman, Cayman Brac, and provisionally Grand Bahama and Great Abaco . . . . . *E. r. planirostris*

MATERIAL: In addition to material previously recorded in the literature and the type and paratypes listed above, I have recently examined the following specimens from the Bahama Islands. The specimens with the Van Voast-American Museum of Natural History field numbers are to be divided between the American Museum of Natural History and the University of Michigan Museum of Zoology. Eleuthera, New Portsmouth (Rock Sound): Van Voast-A.M.N.H. Nos. 2431–2451, 2517, 2518. New Providence, near Nassau: Van Voast-A.M.N.H. No. 2686; Bay Street, Nassau: Van Voast-A.M.N.H. Nos. 2708–2736. Andros, south shore, entrance, Fresh Creek: Van Voast-A.M.N.H. Nos. 2871–2873, 2889–2893. Grand Bahama, west end: Van Voast-A.M.N.H. Nos. 3427–3430. Great Abaco, Marsh Harbour: Van Voast-A.M.N.H. Nos. 3501–3806. South Bimini, east end: C.M. Nos. 32560–32562; near Nixon's Harbour: C.M. Nos. 32611, 32612.

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