April 11, 1958

Vol. 71, pp. 27-36

PROCEEDINGS

OF THE

BIOLOGICAL SOCIETY OF WASHINGTON

A NEW GECKO OF THE SPHAERODACTYLUS DECORATUS GROUP FROM_CUBA

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The geckonid lizards of the genus Sphaerodactylus are represented in Cuba by six forms: Sphaerodactylus decoratus torrei Barbour, S. cinereus Wagler, S. notatus Baird, S. scaber Barbour and Ramsden, S. oliveri Grant, and S. argus Gosse. The name S. nigropunctatus Gray has been shown recently by Grant (1957) to be only uncertainly applicable to any Cuban sphaerodactyl. In addition, S. gibbus Barbour has been reported; according to Grant (1956, pp. 247-248) the Cuban records of gibbus refer to male S. d. torrei, and thus S. gibbus is not part of the Cuban fauna. Of these lizards, some are known only from rather restricted areas: oliveri from the vicinity of Soledad, Las Villas Province, scaber from two isolated mountain ranges in Camagüey Province, and argus from the vicinity of Soledad, where it may have been introduced from Jamaica. On the other hand, notatus is widespread throughout the entire island, cinereus occurs from Pinar del Río Province to Camagüey Province, and torrei appears to be widespread in Oriente.

During the summer of 1957, herpetological collections were made in the provinces of Pinar del Río, Habana, Las Villas and Camagüey. Sixtythree Sphaerodactylus were collected, most of which are the widespread S. cinereus. In addition, seven individuals were taken in Habana Province which prove to be an undescribed form of the S. decoratus group. Barbour (1921, pp. 227-231) arranged as full species decoratus, gibbus, and torrei; these three forms are characterized by having granular dorsal scales which are not sharply keeled, these granules becoming anlarged on the flanks. Hecht (1954, p. 133) proposed that gibbus and torrei be regarded as subspecies of S. decoratus Garman (type locality, Rum Cay, Bahamas), so that the subspecies of S. decoratus, as presently defined, have the following distribution:

S. d. decoratus Garman-Bahama Islands-known from Rum Cay;

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Mangrove Cay, Andros Island; and Andros Island. That it is more widespread than these records indicate is shown by specimens in the American Museum of Natural History and Museum of Zoology, University of Michigan, from the following localities: Bimini, South Bimini, Cat Island, New Providence, Rose Island and Eleuthera, in the Bahamas.

S. d. torrei Barbour—western Cuba (Province of Oriente)—known from the type locality (Santiago de Cuba, Oriente Province), Cabo Cruz, Guantánamo (all from Barbour, op. cit., p. 278); Banes (Grant, loc. cit.); Rio Puerco, Boqueron, Puerto Portillo, and Río Yaleritas (Cochran, 1934, p. 12).

S. d. gibbus Barbour—known at present only from the type locality, Stocky Island, Exuma Cays, in the Bahamas. Grant (loc. cit.) has documented the erratic history of the recording of this species from Cuba, and, as presently understood, this subspecies does not occur on the large island. Alayo (1955, p. 4) records the taking of a specimen of S. gibbus among rocks on the beach at Allende, Matanzas Province. As will be shown below, this specimen is in all probability not S. gibbus but rather a representative of the form described herein.

To this complex may well be added in the future S. stejnegeri Cochran from Hispaniola (type locality, San Michel, Departement du Nord, Haiti). Barbour (op. cit., p. 230) regarded one specimen from Thomazeau, Haiti, as representing S. torrei, and Cochran (1941, pp. 111-12) remarked on the similarity between this species and S. torrei. Grant (1949, pp. 74-5) demonstrated that S. stejnegeri was sexually dimorphic in pattern, and thus resembles torrei and decoratus. Six specimens of S. stejnegeri from Haiti have been available to me for study; this species is certainly closely related to S. decoratus, but I am reluctant to regard them as conspecific at the present time.

I have examined 21 adult specimens of S. decoratus from the Exuma Cays, Bahama Islands, B.W.I., recently collected by the Van Voast-American Museum of Natural History Bahama Islands Expedition, as follows (details of these localities may be found in Rabb and Hayden, 1957): Big Farmer's Cay, four males, six females; Warderick Wells Cay, one female; Leaf Cay, one male, one female; Darby Island, two males, six females. The type of S. gibbus is undoubtedly a male, although Barbour did not mention this fact. Of the seven males from the Exuma Cays, three agree in pattern with the plate and description of S. gibbus given by Barbour (op. cit., p. 229 and pl. 1, fig. 2). The remaining four specimens show gradation from a well spotted dorsum to an unspotted, uniform tan dorsum; this situation is strongly reminiscent of the condition in males of S. d. torrei as demonstrated by Grant (1956, loc. cit.). Male S. d. docoratus do not appear to show the same change in pattern nor the same variation; Barbour had described S. flavicaudus on the basis of a male S. d. decoratus, and noted (op. cit., pp. 225-6) that males of *decoratus* are pale cream, with the skin showing darker between the scales, giving a reticulate appearance, and having a yellow tail. I have examined four male S. d. decoratus (including a paratype of S. flavicaudus). Three of these are unicolor; the fourth, the largest of the lot (snout-vent length 32 mm.), has faint indications of transverse banding, typical of females of this subspecies. None has the prominent spotting of male S. d. gibbus. After examination of long series of S. d. decoratus and S. d. gibbus, I am unable to differentiate between

the banded females of these two forms. Likewise, there appear to be no constant scale differences, and the acceptance of S. d. gibbus seems to rest entirely upon the boldly spotted condition in the males.

On the north coast of Habana Province, with the assistance of Messrs. John R. Feick, William H. Gehrmann, and Sr. Aurelio Sanchez Agramonte, three adult males, two adult females, and two juvenile Sphaerodactylus were collected. These specimens, obviously representatives of the S. decoratus complex, are strikingly different from S. d. torrei from Cuba, as well as from the two Bahaman subspecies. This new subspecies may be known as

Sphaerodactylus decoratus drapetiscus, new subspecies

Type: American Museum of Natural History, No. 77759, an adult female, taken July 15, 1957, two miles east of Playa de Guanabo, Cueva de Rincon de Guanabo, Habana Province, Cuba, by W. H. Gehrmann, Jr., A. Sanchez Agramonte, and A. Schwartz. Original number 2771.

Paratypes: A.M.N.H. Nos. 77760-61; same data as type; A.M.N.H. Nos. 77762-65, same locality as type, but taken August 8, 1957, by J. R. Feick and A. Schwartz; A.N.S.P. No. 16359, Matanzas, Matanzas Province, Cuba, July 28, 1904, by H. A. Pilsbry.

Distribution: Known from the type locality and Matanzas; a specimen of S. gibbus, reported by Alayo (loc. cit.) from Playa de Allende in Matanzas, probably represents this form, rather than S. d. gibbus (which is now assumed not to occur in Cuba), or S. d. torrei which, as far as known, occurs only in Oriente.

Diagnosis: A sexually dichromatic Sphaerodactylus with granular dorsal scales becoming larger on sides, characterized, in females, by four transverse black bands with light center between the limbs, a black band with a light center on neck anterior to forelimbs, and a single black line just behind ear opening; snout and head longitudinally striped with no black band at level of eyes; in males, dorsum unicolor tan with relatively large, prominent, black spots from level of eyes posteriorly to dorsal three-quarters of dorsum of tail; snout longitudinally striped; juveniles patterned like adult females (see fig. 1).

Description of type: An adult female with the following measurements (all measurements in millimeters): snout-vent length, 31.4; tail absent; distance from snout to center of eye, 4.3; distance from center of eye to tympanic opening, 4.2; width of head, 5.5; dorsal scale rows in snout-eye distance, 19; ventral scale rows in snout-eye distance, 8; fourth toe lamellae, 9 plus terminal enlarged scale; supralabials, 4/4; infralabials, 4/3. Dorsal scales granular, not sharply keeled, enlarging on the sides between the limbs; dorsal surface of head with granular scales of same size as dorsal scales, slightly larger and more flattened on snout; rostral with a median groove, bordered posterior by the two supranasals and a central smaller azygous scale; enlarged supralabials 4/4, the first the longest; mental large, followed by three subequal scales; infralabials 4/3, the first the longest; superciliary spine relatively small, stout, and truncate, especially on left side; ventral scales smooth, large and imbricating on belly, becoming smaller and less imbricating on neck and throat, and gradually grading to non-imbricating granular lateral scales on sides of venter; scales on anterior faces of fore and hind limbs large,

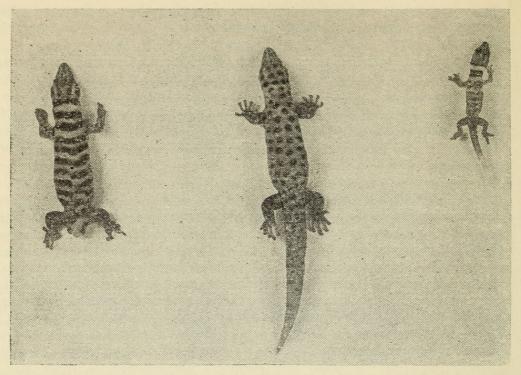


Figure 1. Adults and juvenile of *Sphaerodactylus decoratus drapetiscus*. Left to right; adult female, type (A.M.N.H. No. 77759); adult male, paratype (A.M.N.H. No. 77762); juvenile, paratype (A.M.N.H. No. 77764). Photography by Gary Stone.

smooth, imbricating; scales on posterior surfaces of limbs smaller and granular, comparable to lateral body scales; escutcheon absent.

Coloration of type (based on field notes and Kodachrome photographs): Dorsal ground color yellowish gray, brightest on neck and shoulders; ground color of dorsum of head pale yellowish gray; tail missing. Head with a black band, beginning on sides of neck and passing just posterior to tympanic opening, separated from next black band by a clear yellowish collar. A median black longitudinal stripe, beginning on rostrum, ending on forehead just posterior to orbits, with a central pale yellow enclosed diamond-shaped spot at level of anterior edge of orbits; a second black line, beginning on snout, passing dorsomedially through upper edge of eye and ending just anterior to transverse black band; a third black line on upper labials. Cheek with a gray patch, sending a gray line anteriorly to posterior edge of orbit, bounded ventrally by a yellowish gray band from posterior of eye to ventral side of neck; none of these black or gray head bands confluent with the first transverse black band. A pair of black transverse bands, enclosing a narrow yellowish gray band just anterior to forelimbs, the lighter enclosed band having a few scattered yellow dots just posterior to the anterior of the black bands. Four pairs of bands, black anteriorly grading to gray posteriorly, between limbs, the posterior two pairs incomplete dorsally; the light areas between these bands always with a few scattered yellow dots. Dorsal surface of limbs with yellowish gray ground color, much flecked and mottled with tan, giving a distinct spotted appearance. Venter grayish, with gray flecking on infralabials and on throat. Pre-

forelimb black bands continuous almost to ventral midline but not meeting. Scales of ventral surfaces of fore- and hindlimbs with black edges, giving a flecked or "dirty" appearance.

Variation: There are two females (A.M.N.H. No. 77763; A.N.S.P. No. 16359) which have the following measurements: snoutvent length, 33.9, 28.8; tail absent or broken on both; distance from snout to center of eye, 4.4, 4.5; distance from center of eye to tympanic opening, 4.0, 3.6; width of head, 5.5, 4.7; dorsal scale rows in snout-eye distance, 18, 17; ventral scale rows in snout-eye distance, 7, 10; fourth toe lamellae, 7, 13, plus terminal enlarged scale; supralabials, 4/4, 4/4; infralabials, 4/3, 4/4. The coloration and pattern of the larger female were much as those described for the holotype, except that both the sides of the body and the dorsal surfaces of the limbs were more yellowish. In all other details these two females agree; there seems to be a somewhat stronger tendency for the two posterior pairs of transverse body bands to be disrupted. Unfortunately, the tails of both fresh females were lost so that no statement of the coloration and pattern of this member can be made. The smaller female paratype, insofar as can be determined because of its time in preservative, possesses the identical pattern of the two fresh specimens. The tail is present but broken, and appears to be indistinctly banded proximally, these bands not extending onto the ventral surface of the tail.

Three of the paratypes (A.M.N.H. Nos 77760, 77762, 77765) are adult males; data on these specimens follow: snout-vent length, 34.9, 31.6, 30.9; length of tail, -, 28.7, 31.0; distance from snout to center of eye, 4.5, 4.1, 4.1; distance from center of eye to tympanic opening, 4.0, 4.0, 4.0; width of head, 6.5, 5.5, 5.5; dorsal scale rows in snout-eye distance, 18, 16, 16; ventral scale rows in snout-eye distance, 8, 10, 8; fourth toe lamellae, 7, 9, 9, all plus enlarged terminal scale; supralabials, 4/4, 4/5, 4/4; infralabials, 4/4, 4/3, 4/3. All the males are heavily spotted with very dark brown above, on a light yellowish tan ground color. The head is distinctly more yellowish than the body, and the ground color of the tail is bright yellow. The head pattern is reminiscent of that of the females; the same longitudinal lines are present, but a bit more obscure, and in the largest male these lines have become obsolete, being reduced rather to a series of dark brown dots. The hindlimbs are pale yellow, and both fore-and hindlimbs are dotted with brown; the dorsal surface of the tail is also spotted with individual brown scales, sometimes arranged in discrete groups, the coloration becoming fainter toward the tip of the tail, which is immaculate yellow. Although not perceptible in life, after preservation there is a faint indication of transverse banding on the dorsa of the two smaller males, corresponding, as nearly as can be determined, to the banding in the females. An escutcheon is present, and restricted to the abdomen anterior to the vent, with no branches extending onto the legs. The ventral scalation of the tail has no transversely elongate median scales, but rather is made up of rounded scales about the size of those covering the belly.

The two juveniles (A.M.N.H. Nos. 77761 and 77764) are very small with snout-vent length of 17.9 and 16.6. The pattern is an intensification of that described for adult females, and is exactly similar except for the absence of yellow dots within the light areas. The ground color of the juveniles is pale yellowish gray dorsally, with the head dull yellow,

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somewhat lighter on the snout. The light interbands on the dorsum are much grayer than in the adult females, and thus the four pairs of black transverse bands between the limbs are more pronounced. The tail is vivid yellow with a completely white tip; one juvenile shows a faint indication of three transverse gray bands on the proximal half of the dorsum of the tail. The belly is grayish, and the first yellow transverse band behind the tympanic openings continues ventrally as a yellow collar onto the neck.

Comparisons: S. d. drapetiscus requires comparison principally with S. d. torrei from western Cuba. The females of the two subspecies are readily separable on the basis of pattern. S. d. torrei typically has two or three wide transverse black bands on the dorsum between the legs; with increasing size of the lizard, these bands become lighter centrally, forming two or three pairs of transverse bands. S. d. drapetiscus has four pairs of transverse dark bands between the limbs. Even more striking is the head pattern. All females of torrei have a black band immediately posterior to the eyes, and this band is joined to the longitudinal lines on the head and snout; such a postocular black band is absent in drapeticsus. There is likewise a black band, in larger individuals lighter centrally, in the center of which lies the tympanic opening. This condition in torrei differs from that of drapetiscus, where this wide tympanic band is absent, being replaced rather by a narrow band lying just posterior to the ear opening. The postocular, tympanic, and preforelimb bands of torrei continue ventrally onto the throat and neck as well defined units, whereas the neck and throat of *drapetiscus* are devoid of such continuations of the dorsal bands. These comments on females of the two races are equally applicable to the juveniles, which possess the adult female pattern.

I have examined five adult male Sphaerodactylus which, on the basis of scalation, I refer unquestionably to S. d. torrei; these are U.S.N.M. No. 81727 (Puerto Portillo, Oriente); A.M.N.H. Nos. 61604-05 (Marcane, Oriente); U.M.M.Z. No. 90725 (La Socapa, Santiago de Cuba, Oriente); and U.M.M.Z. No. 90726 (Castillo del Morro, Santiago de Cuba, Oriente). There are other specimens from Oriente in these collections which are identified as torrei, but for various reasons I doubt that they are correctly assigned to this form. Of the five males under consideration here, four resemble males of S. d. drapetiscus, except that No. 81827 is more densely spotted than its fellows or the extant male drapetiscus. The fifth male (No. 90725) has the head densely spotted, but the dorsum of the body is completely unicolor. All differ from male drapetiscus in having the throat heavily punctate with discrete brown spots. Grant's (1956, p. 247) plate of 12 male torrei shows a ventral view of one individual; this specimen appears to lack throat spots; it is possible that throughout the range of S. d. torrei this character is not constant. The nine females likewise figured in this plate show very well the pattern variations typical of their sex.

From the two Bahaman subspecies, S. d. drapetiscus females differ strikingly. Females of both decoratus and gibbus are characterized by having four pairs of transverse bands between the limbs, and in this character resemble the new Cuban subspecies. But both demonstrate postocular and tympanic transverse bars as well, and in this character resemble torrei rather than drapetiscus. The pre-forelimb band in both

decoratus and gibbus typically has also a pair of light ocelli in its center; so far as known, this does not occur in drapetiscus.

I have examined seven male S. d. gibbus (A.M.N.H. No. 76240, from Leaf Cay, Exuma Cays; four A.M.N.H. untagged specimens (field nos. 1254-57) from Big Farmer's Cay, Exuma Cays; U.M.M.Z. No. 117017 and one untagged specimen (field no. 1284) from Darby Island, Exuma Cays). The Big Farmer's Cay specimens show the transition from an almost unicolor dorsal pattern with a very few, widely scattered dorsal brown dots, to one individual which is typical of the race gibbus as described by Barbour (op. cit., pp. 228-9), displaying course large brown dots over the dorsum. The single individual from Leaf Cay is darker in preservative than the Big Farmer's specimen, and is entirely dark tan dorsally, without any indication of dorsal spotting. The two specimens from Darby Island are heavily spotted. As noted previously, no male S. d. decoratus show the bold dots of gibbus.

If S. stejnegeri is regarded in the future as a subspecies of S. decoratus, females of this species and S. d. drapetiscus are readily separable on the basis of the former having but two transverse dark bars, rather than four as in drapetiscus, and the patterns of the two are thus quite distinct. However, stejnegeri has the single posttympanic dark transverse bar which is typical of drapetiscus, and lacks the postocular bar of decoratus, gibbus, and torrei. Males of S. stejnegeri are apparently unicolor light to medium brown (Grant, 1949, p. 74).

Three specimens (U.M.M.Z. Nos. 117019 and one untagged specimen; U.M.M.Z. No. 117020) from Long Island in the Bahamas deserve special mention. Long Island lies off the eastern end of the Exuma Cays, between Exuma, and North and Fish Cays. I have seen no Sphaerodactylus from the latter localities (which I presume are inhabited by S. d. decoratus) nor from Exuma itself (which I presume to be inhabited by S. d. gibbus). The three Long Island individuals are one female and two males; the female resembles closely occasional females of decoratus (i.e., U.M.M.Z. No. 79444 from Cat Island) in having the dark edges of the transverse bands much fragmented. A poorly defined ocellus is present on the left side. The two males are banded, the smaller (snout-vent length 26.8 mm.) distinctly so, the larger (snout-vent length 30.8) indistinctly, with a strong tendency for the edges of the transverse bands to form large dark spots over the entire dorsum except on the snout. Neither male is unicolor (as are males of *decoratus*) and they more closely resemble male gibbus except that no other male gibbus examined shows the presence of transverse banding. I cannot allocate these specimens with any security; the spotted male is smaller than the large male decoratus (U.M.M.Z. No. 79444), which shows faint traces of transverse banding and no spotting, from Cat Island. It seems preferable at this time, pending the collection of more sphaerodactyls from the Bahaman area, to hold the subspecific determination of the Long Island populations in abeyance.

In summary, the females of the four races of *S. decoratus* show varying degrees of differentiation. The races *torrei* and *drapetiscus* are easily distinguished from each other, and from *decoratus* and *gibbus* treated together. Female *decoratus* and *gibbus* appear to me to be indistinguishable from each other on the basis of pattern. The females of these four races are all readily distinguishable from female *S. stejnegeri* from

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Hispaniola. Males of torrei, drapetiscus, and gibbus are all strikingly alike, except that male torrei may have a heavily punctate throat, and even this character is open to doubt. Male decoratus are poorly known, but are usually considered unicolor (or possibly faintly banded), as are males of S. stejnegeri; if this is true, males of these two forms can be distinguished from adult males of the three heavily spotted forms.

Scale characters (see Table 1) of the four races of *S. decoratus* show that *drapetiscus* differs from the remaining three subspecies in average lower number of dorsal and ventral scales in the snout-eye distance, as well as a lower average number of fourth toe lamellae. Differences between *torrei*, *gibbus*, and *decoratus* are not striking; the two Bahaman forms average less ventral scales than the Cuban *torrei*, but the difference is likewise not trenchant.

Remarks: The type locality of *S. d. drapetiscus* is an exposed limestone outcropping along the north coast of Habana Province. The cliff is penetrated by one large and two smaller caves, all locally known as the Cueva de Rincon de Guanabo; however, none of the geckoes was taken within the caves. All were found under rocks on the ground at the base of the cliffs, and in cavities on the cliff face itself. The lizards were extremely agile, seeking escape by running into the many solution holes in the fallen pieces of rock, which were often sponge-like in appearance, and offered an excellent asylum for the lizards. At least three other individuals were seen at the type locality, but all escaped in rocky piles or holes in the fallen rocks. The cliff area is readily visible from the La Habana-Matanzas superhighway which is presently under construction; the vegetational cover is typical tropical deciduous woods with scattered palms. The Matanzas specimen is recorded as having been taken "under a rock."

Alayo's (loc. cit.) record of S. gibbus from Matanzas should almost certainly be referred to drapetiscus. This specimen probably represents a male of the latter race, since the males of gibbus and drapetiscus are very similar; likewise, there is no evidence that gibbus occurs in Cuba, and the Matanzas specimen would thus be assignable either to drapetiscus or torrei. Since torrei is at present unknown from the provinces of Camagüey and Las Villas, provinces which lie between Oriente and Matanzas, it is much more probable that the Matanzas specimen is referrable to drapetiscus than to torrei. The paratype from Matanzas tends to confirm this supposition.

I have had the opportunity to examine material for comparison of the races of S. *decoratus* from several collections. For their courtesies in allowing me to borrow specimens for the present study, I wish to thank

 Table 1. Scale counts (means and extremes) of four races of

 Sphaerodactylus decoratus

	Number and sex	Dorsal scales	Fourth-toe lamellae	Ventral scales
torrei	38,79	21.4(17-26)	12.1(9-15)	11.6(8.15)
drapetiscus	38,39	17.3 (16-19)	9.0 (7-13)	8.5 (7-10)
gibbus	58,89	19.7 (16-26)	11.8 (9-13)	9.4 (7-11)
decoratus	18,59	21.7 (15-29)	11.2(8-14)	9.6 (8-12)

the following: Dr. Doris M. Cochran, United States National Museum (U.S.N.M.); Dr. Norman E. Hartweg and Mr. Richard Etheridge, Museum of Zoology, University of Michigan (U.M.M.Z.); Dr. Richard G. Zweifel and Mr. Charles M. Bogert, American Museum of Natural History (A.M.N.H.); Dr. James Boehlke, Academy of Natural Science of Philadelphia (A.N.S.P.).

Specimens examined: S. d. decoratus: Bahamas, B.W.I., Bimini, 5 (A.M.N.H. Nos. 73489, 73493-96); South Bimini, 7 (A.M.N.H. Nos. 75873, 68806 (2), 68807 (2), 68808 (2)); Hatchet Bay, Eleuthera, 3 (A.M.N.H. Nos. 69245-46, 69249); Mangrove Cay, Andros Island, 5 (A.M.N.H. No. 24715; U.S.N.M. No. 62344; U.M.M.Z. Nos. 107614; 117022 (2)); Andros Island, Driggs Hill Shore, 2 (U.M.M.Z. No. 117023 (2)); Rose Island, near New Providence, 1 (U.M.M.Z. No. 117021); Nassau, New Providence, 1 (U.M.M.Z. No. 100741); Cat Island, Orange Creek, 1.5 miles northwest Arthurs Town, 9 (U.M.M.Z. Nos. 79444 (5), 79445 (4)).

S. d. gibbus: Bahamas, B. W. I., Big Farmer's Cay, Exuma Cays, 13 (A.M.N.H. Nos. 76232-36, plus eight untagged specimens); Leaf Cay, Exuma Cays, 6 (A.M.N.H. Nos. 76238-43); Warderick Wells Cay, Exuma Cays, 1 (A.M.N.H. No. 76237); Darby Island, Exuma Cays, 8 (U.M.M.Z. Nos. 117017, 117018 (7)).

S. d. torrei: Cuba, Oriente Province, Marcane, 7 (A.M.N.H. Nos. 61604-10); Belig, near Manzanillo, 1 (A.M.N.H. No. 32301); Santiago de Cuba, 11 (A.M.N.H. Nos. 42546, 42583-90; U.M.M.Z. Nos. 90725-26); Boqueron, 1 (U.S.N.M. No. 81822); Puerto Portillo, 2 (U.S.N.M. Nos. 81827-28).

S. d. drapetiscus: Cuba, Habana Province, two miles east of Playa de Guanabo, Cueva de Rincon de Guanabo, 7 (A.M.N.H. Nos. 77759-65, type and paratypes); Matanzas Province, Matanzas, 1 (A.N.S.P. 16359, paratype).

S. decoratus incertae sedis: Bahamas, B. W. I., Long Island Clarence Town, 2 (U.M.M.Z. No. 117019); Long Island, Deadman's Settlement, 1 (U.M.M.Z. No. 117020).

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