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MORPHOLOGICAL EVIDENCE OF SPECIATION IN CROAKING GECKOS (*ARISTELLIGER SPP*.)

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ABSTRACT

The Caribbean has been identified as a region containing cryptic diversity through the genetic analyses of numerous taxa. The croaking gecko species within the genus *Aristelliger* have been historically difficult to separate from one another, but phylogenetic analyses of mitochondrial DNA by Cloud (2013) revealed several distinct clades within the currently recognized species. Using these clades as a guide, this study seeks to discover if there is morphological evidence of speciation within the currently recognized species *Aristelliger praesignis* and *A. georgeensis*. By analyzing over 400 museum specimens using a suite of both conventional and unconventional body proportion, scalation, and pattern characteristics, potential species were morphologically diagnosed. We identified a total of eleven new species and suggest that *A. irregularis* and *A. nelsoni* be promoted to full species status again. At least one characteristic can be used to completely differentiate one species from another in 91% of pairings, with several slightly overlapping characters (<15%) being used for all other pairings. In many comparisons, there are several characteristics that provided complete separation in addition to numerous slightly overlapping characters. Additional phylogenetic analyses, especially of *A. praesignis nelsoni* and *A. georgeensis*, would be beneficial to support our proposed separation of species within the genus *Aristelliger*.

TABLE OF CONTENTS

LIST OF FIGURES

LIST OF TABLES

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Chapter 1

Introduction

Molecular studies of gecko populations have revealed many cryptic species unidentified by traditional morphology-based methods (Gamble et al., 2008). While nuclear and mitochondrial DNA (mtDNA) evolve rapidly in geckos, morphological changes are comparatively slow. Similarities in general morphology and habitats across genera coupled with the retention of ancestral traits and high intraspecific variability make visually identifying morphological differences challenging (Gamble et al., 2008; Rato & Harris, 2008; Perera & Harris, 2010). By using molecular techniques, cryptic diversity can be identified on a genetic level, revealing potential new species, which can then be morphologically compared and analyzed for diagnostic differences. It is known that among reptiles on Caribbean Islands cryptic diversity can be high (Thomas & Hedges, 2007; Hedges & Conn, 2012). *Aristelliger* is a Caribbean genus of croaking geckos. For decades researchers have noted variability between different geographic populations, but taxonomically separating the species within this genus, particularly based on morphological traits, has proven to be historically difficult. Due to the enigmatic taxonomy of the genus *Aristelliger*, it is a suitable hiding place for cryptic diversity.

The Genus *Aristelliger*

The lizard genus *Aristelliger* (croaking gecko) currently contains eight recognized species, inhabiting the Caribbean and eastern coast of Central and South America (Figure 1; Bauer & Russell, 1993a; Diaz & Hedges, 2009). Species of *Aristelliger* are characterized by the following traits: easily torn skin, mottled patterns of browns and tans, small granular scales, friction pads on at least two digits, undivided lamellae, all digits clawed, vertical pupils, bones in the hemipenes, oil droplets in the rods, and croaking calls (Cope, 1862; Underwood, 1954; Bauer & Russell, 1993a; Diaz & Hedges, 2009). Two subgenera exist within *Aristelliger* primarily separated by body size and the number of friction pads on the toes. *Aristelligella* (Noble & Klingel, 1932) is the smaller subgenus with a maximum snout-vent (SVL) length of 62 mm and friction pads on three fingers and two toes. *Aristelliger* (Cope, 1862) is the larger subgenus with a maximum SVL of 135 mm and friction pads on one finger and one toe (Hecht, 1951; Bauer & Russell, 1993a; Diaz & Hedges, 2009).

Subgenus *Aristelligella*

The subgenus *Aristelligella* is comprised of four species, including *Aristelliger cochranae, Aristelliger barbouri, Aristelliger expectatus,* and *Aristelliger reyesi*. *Aristelliger cochranae* (Cochran's croaking gecko) Grant, 1931 is found on Navassa Island off the coast of Haiti (Grant, 1931; Thomas, 1966).

Aristelliger barbouri (striped Caribbean gecko) Noble & Klingel, 1932 is found on the Inagua Islands in the Bahamas. Due to differences in the plates adjacent to the claw on several digits, *Aristelligella* (Noble & Klingel, 1932) was subsequently described as distinct from the genus *Aristelliger* and included *A. cochranae* and *A. barbouri*. Hecht (1951; 1952) later reduced *A. barbouri* from its own species to a subspecies of *A. cochranae* and *Aristelligella* to a subgenus under *Aristelliger*. Schwartz and Henderson (1991) and Bauer and Russell (1993b) have since elevated *A. barbouri* back to full species status.

Aristelliger expectatus (Hispaniolan desert gecko) Cochran,1933 inhabits Haiti and the southwestern Dominican Republic. It was reduced to a subspecies of *A. cochranae* by Mertens (1939), but elevated back to full species status based on morphology and improbable gene flow between Navassa Island and the mainland of Hispaniola by Powell et al. (1996).

Aristelliger reyesi (Reyes Caribbean gecko) Diaz and Hedges, 2009 is the most recently described species in the subgenus. It was discovered on the Peninsula de Hicacos in western Cuba, which is the only known locality.

Subgenus: *Aristelliger*

The subgenus *Aristelliger* is comprised of four species, including *Aristelliger lar, Aristelliger praesignis*, *Aristelliger georgeensis*, and *Aristelliger hechti*. *Aristelliger lar* (Hispaniolan giant gecko or spotted Caribbean gecko) Cope, 1862 is the type species for both the genus and subgenus. It inhabits the coasts of Hispaniola, particularly the lowland areas.

Aristelliger praesignis (croaking gecko or woodslave) Hallowell, 1856 was first described by as *Hemidactylus praesignis*. Cope (1862) later placed it in the genus *Aristelliger*. The two subspecies are *A. praesignis praesignis*, which inhabit Jamaica and the Cayman Islands, and *A. praesignis nelsoni*, which inhabit the Swan Islands off the coast of Honduras (Schwartz & Henderson, 1991; Bauer & Russell, 1993c). *Aristelliger praesignis nelsoni* was first described as its own species (*Aristelliger nelsoni* Barbour, 1914), but later reduced it to a subspecies by Hecht (1951).

Aristelliger georgeensis (St. George Island gecko) Bocourt, 1873 was first described as *Idiodactylus georgeensis*. Cope (1885) moved the species into the genus *Aristelliger* when he described *Aristelliger irregularis*. Soon after, Boulenger (1885) synonymized it with *A. praesignis*. Schmidt (1941) then synonymized the species described by Bocourt (1873) and Cope (1885) under the name *A. georgeensis*.

Aristelliger hechti (Hecht's gecko) Schwartz and Crombie, 1975 was discovered in 1951 by Hecht, but only formally described years later. It is restricted to the Caicos Islands (Schwartz & Henderson, 1991; Bauer & Russell, 1993d).

Cryptic Diversity

Through a phylogenetic analysis of mitochondrial DNA (mtDNA) focusing on *A. praesignis*, but including *A. georgeensis*, Cloud (2013) identified 16 lineages that represent hypothetical cryptic species. It was previously noted that multiple species are likely to exist within the currently recognized species of the genus, particularly *A. praesignis* and *A. georgeensis* (Schwartz & Crombie 1975). Crombie (1999) laments that "the genus is remarkably conservative and characters to distinguish between unquestionably different species are few, so analysis of intraspecific variation is meaningless using traditional meristic and morphological traits." While thus far investigations into the intraspecific variation have failed to produce new species, high amounts of intraspecific variation, especially when considering lamellae counts, average SVL, and minimum breeding size, tend to vary across localities in Jamaica. These initial observations, however, were dismissed due to small sample sizes (Hecht 1952). Nonetheless, Cloud's (2013) analysis of *A. praesignis* and *A. georgeensis* mtDNA supported distinct clades that separate based on the geographic region of Jamaica, with two clades occurring on the southern coast and four along the northern coast.

The phylogenetic analyses also pulled out two separate clades for the *A. praesignis* populations isolated on Cayman Brac and Little Cayman islands (Cloud 2013). Similarly to the other clades, morphological differences between *A. praesignis* populations in the Cayman Islands and Jamaica have been noted previously (Crombie 1999; Grant 1940).

Cloud (2013) also conducted limited morphological analyses. A discriminant function analysis revealed that 71% of the clades contained significantly (p=0.05) different morphologies based on the characters scored, but some clades remained difficult to separate. During these analyses, *A. georgeensis* specimens from San Andreas Island, Columbia and Quintana Roo, Mexico appeared to be morphologically distinct, suggesting that *A. georgeensis* may also form a complex of cryptic species (Cloud 2013).

Given the uncertainty from previous research in the ability to morphologically diagnose species in this lineage, this study seeks to discover if there is morphological evidence of speciation within *A. praesignis* and *A. georgeensis* and to compare those results to the molecular lineages of Cloud (2013). The phylogenetic analyses brought up a number of questions. Does *A. praesignis* comprise multiple species as has been tentatively suggested (Hecht, 1951; Schwartz & Crombie, 1975)? Is *A.praesignis nelsoni* a unique species from *A. praesignis*? Does *A. georgeensis* also comprise multiple species? Should *A. irregularis* be reevaluated as warranting full species status? These are just some of the questions that guided our morphological analyses.

When cryptic diversity is expected to be present in a genus, such as *Aristelliger*, phylogenetic analyses can be a tool vital for conducting morphological analyses. Thus, the hypothetical species clades identified by Cloud (2013) will be used as a guide while separating groups by morphological characters. In addition to morphology, geographic isolation of clades will be considered in determining if evidence of speciation is present. Ideally, each clade would be able to be identified from all others by a single diagnostic trait. Since there is strong genetic divergence between the hypothetical species clades, however, identifying a single or cluster of morphological characteristics and/or patterns to completely separate each clade from all others will be defined as evidence of speciation.

Chapter 2

Methods

We borrowed museum specimens of *A. georgeensis* and *A. praesignis* to construct a representative sample for both species. In total we examined 402 preserved specimens from 8 museums. Museum abbreviations are as follows: ANSP (Academy of Natural Sciences, Philadelphia, Pennsylvania, USA), FLMNH (University of Florida, Florida Museum of Natural History, Gainesville, Florida, USA), LACM (Natural History Museum of Los Angeles County, Los Angeles, California, USA), KU (University of Kansas, Museum of Natural History, Lawrence, Kansas, USA), MPM (Milwaukee Public Museum, Milwaukee, Wisconsin, USA), MSB (University of New Mexico, Museum of Southwestern Biology, Albuquerque, New Mexico, USA), UCM (University of Colorado Museum of Natural History, Boulder, Colorado, USA), and USNM (National Museum of Natural History, Washington, D.C., USA). Specimens collected by hand by Drs. S. B. Hedges and J. R. McCranie were also examined and have subsequently been donated to the USNM. Since the specimens have not yet been assigned USNM museum numbers, the initials of the collector (SBH or JRM) and field numbers will be used for identification.

All measurements were taken with digital calipers accurate to 0.05 mm. We scored a suite of 26 morphological characters: five body proportion characters, eleven scalation traits, and ten pattern and coloration features. Characters included those used in past studies as well as nontraditional or uncommonly used characters. While traditional characters could be used to diagnose some new taxa, nontraditional characters can be particularly useful to separate closely related and cryptic species. Since the chosen characters are efficient in diagnosing species and adequate to separate taxa, a discriminant function analysis (DFA) was not used.

Sex was determined through dissection and gonadal examination, which we attempted with all specimens for which we were given permission to dissect or which had previously been dissected. Some specimens were old and poorly preserved, making gonadal sex determination difficult. We sexed 57% of the specimens (60 females and 78 males), which was insufficient to make sex-based comparisons in all species or characters, particularly for those species with a limited number of specimens (n<10). For these reasons, we did not separate character data by sex.

Juvenile specimens (n=55) were examined, but are excluded from these analyses due to probable differences in body proportion relative to adults. When fewer than ten adult specimens were available, however, juvenile measurements are included.

Body Proportions

We measured four body proportion characters. Snout-vent length (SVL) was measured from the tip of snout to vent opening. Internasal zone width was defined as the distance between the medial margins of the nares. Head width represents the width of head at its widest point. Similarly, 4th toe pad width represents the width of 4th toe pad of the front foot at widest point with the measures of both toes combined. Many tails were broken or regenerated, limiting the value of tail length. Nonetheless, if available, this measurement was reported for holotypes and was taken from the vent opening to the tip of the tail.

Scalation

We measured ten scalation characters. Rostral height was measured from the base of the rostral scale to its highest point with the measures of both scales combined. Rostral groove height is the height taken at the center of the rostral scale from the base to the point where the two “halves” of the rostral scale meet. Rostral suture height represents the height of the suture between the rostral scale and the first supralabial scale. Postnasal height is defined as the height of largest postnasal scale. Internasals are the number of scales between the nasal scales. Postnasals are the total number of postnasal scales from both the left and right sides of the rostrum. Supralabials are the total number of supralabials from one side. Infralabials are the number of infralabials on one side. Typically the number of supralabials and infralabials was taken from the right side of a specimen unless damage inhibited an accurate count. Total labials are the number of supralabials and infralabials from both sides of the rostrum. The 4th toe pad lamellae represents the number of lamellae on the 4th toe pad. Total toe lamellae is the sum of toe lamellae from all twenty digits. If damage prevented an accurate count of the labial scales or toe lamellae on one side, the number of scales or lamellae on the undamaged side was substituted for the missing value.

Pattern and Coloration

We observed ten characteristics of pattern and coloration and noted their presence or absence (Figure 2). Stripes on snout denotes a stripe extending posteriorly from the nares to the middle of the eye. Pale snout speckling is the presence of pale-colored (typically white or cream) spots on the dorsal snout anterior to the eyes. Pale labial spot diameter was measured from the diameter of the largest pale-colored (typically white or cream) spot on the labial scales. Bandit eye is an extension of the stripes from the snout through the middle of the eye. Scapular spots are distinct spots on the scapula and may or may not contain dorsal ocelli, smaller and typically pale spotting on the scapular spot. Dorsal Y mark is created by stripes near the midline anterior to the scapula forming a Y shape. Dorsal rhombs are a series of rhombus-shaped spots down the midline of the dorsal spine. Ventral cream color refers to color of the ventral body surface. Striped toes are formed by a molted pattern on the dorsal toes, which appears as stripes. Toe pad color refers to the color of the toe pads relative to the color of the ventral body surface, noted as pale if there was no difference or dark if the toe pad color was darker than that of the ventral body surface.

Pattern and coloration varies within each species, but generally more variation exists between species. It is possible to describe and characterize a typical or representative pattern for each species, but it should be acknowledged that specimens may differ from this norm in some aspects, especially aged or poorly preserved specimens.

Chapter 3

Results and Discussion

The morphological analyses of two currently recognized *Aristelliger* species, *A. praesignis* and *A. georgeensis*, revealed a large degree of morphological diversity within the species (Table 1). Based on our data, we identified fifteen species exhibiting distinct morphologies and geographic distributions. While conventional characters were helpful in separating some new taxa, unconventional traits were integral to differentiating between closely related species. The most useful traits included total toe lamellae, rostral groove height, pale labial spot diameter, internasal zone width, postnasal height, 4th toe pad lamellae, number of postnasals, presence of crescent-shaped postnasal, and 4th toe pad width. Along with a handful of other characteristics, the fifteen species can be morphologically separated.

When compared, there is at least one characteristic that can be used to completely differentiate one species from another in 91% of pairings (Table 2). Typically, there is more than one character to completely separate two species, as well as several with minimal (<15%) overlap. The other 9% of pairings can be diagnosed from one another based on multiple traits with minimal overlap. In those species identified by overlapping characteristics, pattern, coloration, and geographic location within the species are consistent. For several species outliers exist in an overlapping characteristic utilized to distinguish between species. These outliers will be noted in text when discussing differences between species, but have been omitted from tables. The outliers were measured by another researcher, but specimens were unable to be borrowed again to check their validity.

Eleven of the fifteen identified species are derivatives of *A. praesignis* and the remaining four of *A. georgeensis*. In addition to distinct geographic differences, the *A. georgeensis* species can be morphologically identified from *A. praesignis* species. In general, the most distinguishing characters of *A.*

georgeensis species are the large size (maximum SVL>90mm) and high number of total toe lamellae (236+). *A. praesignis* species are highly variable, but tend to be smaller on average (mean SVL 60mm) and have fewer total toe lamellae (mean maximum 220).

The proposed new species will be identified as *N.* sp. #. In summary, the character most often used to diagnose each species from others is as follows: *A. georgeensis*–total toe lamellae, *A. irregularis*–total toe lamellae, *A. nelsoni*–rostral groove height, *A. praesignis*– rostral groove height, *N.* sp. 1–total toe lamellae, *N.* sp. 2–spotted dorsal pattern, *N.* sp. 3–4th toe pad lamellae, *N.* sp. 4–total toe lamellae, *N.* sp. 5–pale labial spot diameter and total toe lamellae, *N.* sp. 6–total toe lamellae, *N.* sp. 7–snout-vent length, *N.* sp. 8–postnasal height, *N.* sp. 9– pale labial spot diameter, *N.* sp. 10–rostral groove height, and *N.* sp. 11–total toe lamellae (see Figures 3, 4, 5, and 6). Below those characters that provide complete separation—or overlapping separation as necessary—are discussed, but differences between pairings are not limited to these traits. Rather, many pairings can be separated completely or with some overlap by a number of characters. For simplicity, however, only the most distinguishing traits are discussed.

Jamaica, Swan Islands, and Cayman Islands

Through the morphological analyses, *A. praesignis* can be divided into eleven species, nine new species and two previously recognized species, *A. praesignis* and *A. nelsoni*. All but three of the species can be found on Jamaica. Along the northern coast from west to east the new species include new species 7 (*N.* sp. 7) in Saint James and Trelawny Parishes, new species 9 (*N.* sp. 9) primarily found in Discovery Bay of Saint Ann Parish, new species 1 (*N.* sp. 1) in Saint Ann Parish near Ocho Rios, new species 3 (*N.* sp. 3) in Saint Mary Parish, new species 8 (*N.* sp. 9) in Saint Mary and Portland Parishes. New species 5 (*N.* sp. 5) is found on the eastern most point of Jamaica in Saint Thomas Parish. Along the southern coast can be found new species 11 (*N.* sp. 11) clustered in Saint Catherine and Saint Andrew Parishes. *A. praesignis* has the widest geographic range, covering Clarendon, Hanover, Manchester, Saint Catherine, Saint Elizabeth, Saint James, and Westmoreland Parishes along the southern and western coasts as well as Grand Cayman Island (Figure 7A, Figure 7B). Each of the Cayman Island populations has been found to be distinct and containing its own species. New species 2 (*N.* sp. 2) inhabits Cayman Brac while new species 10 (*N.* sp. 10) occupies Little Cayman (Figure 3C). Finally, *A. nelsoni* can be found on the Swan Islands of Honduras (Figure 7D).

Jamaica

Morphologically differentiating between species on the island of Jamaica proved challenging. The majority of species comparisons that required overlapping characteristics to diagnose between two species involve those that inhabit Jamaica. Despite this, *A. praesignis* can be completely separated from almost all Jamaican species, except *N.* sp. 7 and *N.* sp. 11, due to its high rostral groove height. The *A. praesignis* topotype (ANSP 7444) and paralectotype (ANSP 7443) were examined to determine which Jamacian clade should be designated as *A. praesignis*. While both specimens have been poorly preserved, morphological analyses were performed, and, in combination with locality data, the clade inhabiting the southwestern coast of Jamaica was assigned *A. praesignis*. It differs from *N.* sp. 7 by two overlapping characters, including a higher rostral groove height (1.05–1.32 versus 1.30–1.70%SVL) and more total toe lamellae (182–238 versus 174–204). In general, *A. praesignis* has a larger internasal zone width than *N.* sp. 11 (31.08–51.84 versus 20.00–33.19% IN, with 56.52 outlier).

N. sp. 1 differs from *N.* sp. 3 by having a higher number of 4th toe pad lamellae (12–13 versus 10–11). When compared to *N.* sp. 5, it has a larger internasal zone width (3.62–3.92 versus 3.41–3.58% SVL) and a smaller pale labial spot diameter (0.60–0.78 versus 0.83–0.90mm). *N.* sp. 1 has a higher number of total toe lamellae than *N.* sp. 7 (209–224 versus 174–204). It has a smaller postnasal height than *N.* sp. 8 (23.31–27.42 versus 34.01–34.94%IN) and a lower number of postnasal scales than *N.* sp. 9 (4–6 versus 7–8). Differentiating *N.* sp. 1 from *N.* sp. 11 was accomplished using three additive, overlapping characters, including various combinations of the rostral scale height, rostral suture height, and posterior mental scale width.

N. sp. 3 differs from *N.* sp. 5 by having a smaller pale labial spot diameter (0.62–0.66 versus 0.83–0.90). Complete separation between *N.* sp. 3 and *N.* sp. 7 could only be achieved by adding the eye-naris distance and the internasal zone width, resulting in *N.* sp. 3 exhibiting a larger sum than *N.* sp. 7. When compared to *N.* sp. 8, it has smaller number of 4th toe pad lamellae (10–11 versus 12–13), higher rostral groove height (1.56–1.84 versus 1.35–1.54% SVL), and smaller postnasal height (21.98–26.79 versus 34.01–34.94% IN). It has a smaller pale labial spot diameter than *N.* sp. 9 (0.62–0.66 versus 0.80–0.85mm). Differentiating *N.* sp. 3 from *N.* sp. 11 was accomplished using overlapping characters. *N.* sp. 3 has a higher rostral groove height (1.56–1.84 versus 1.30–1.66% SVL) as well as a lower sum when rostral height and rostral suture height are combined (8.20–8.78, with 9.40 outlier, versus 9.14–12.24% SVL, with 8.32 outlier).

N. sp. 5 differs from *N.* sp. 8 by having a larger pale labial spot diameter (0.83–0.90 versus 0.57–0.77mm) and smaller postnasal height (27.98–30.73 versus 34.01–34.94% IN). When compared to *N.* sp. 9, it has a larger 4th toe pad width (6.61–7.21 versus 5.52–6.38% SVL). It has a larger postnasal height than *N.* sp. 11 (27.98–30.73 versus 12.70–27.04% IN).

N. sp. 7 is separated from all other Jamaican species by having, on average, the smallest adult body size (mean SVL 53.41mm). It differs from *N.* sp. 8 by having a smaller postnasal height (20.10–33.49 versus 34.01–34.94% IN). It is only distinguishable from *N.* sp. 9 through a slightly overlapping character. *N.* sp. 7 has a smaller internasal zone width compared to *N.* sp. 9 (24.51–35.00 versus 34.11–43.78% IN). *N.* sp. 7 is only distinguishable from *N.* sp. 5 and *N.* sp. 11 through pattern. The pattern of *N.* sp. 7 is extremely faded, while the pattern and coloration of *N.* sp. 5 and *N.* sp. 11 are vivid in comparison.

N. sp. 8 can separated by several species by its crescent-shaped postnasal scale. It differs from *N.* sp. 9 by having a smaller pale labial spot diameter (0.57–0.77 versus 0.80–0.85 mm) and fewer number of postnasal scales (4–6 versus 7–8). When compared to *N.* sp. 11, it has a larger postnasal height (34.01–34.94 versus 12.70–27.04% IN).

N. sp. 9 differs from *N.* sp. 11 through the internasal zone width. There is almost complete separation albeit one outlier. *N.* sp. 9 has a larger internasal zone width compared to *N.* sp. 11 (34.11–43.78 versus 20.00–33.19% IN, with 56.52 outlier).

Swan Islands

The clade assigned to *Aristelliger nelsoni* is based on the localities detailed when previously described as a full species as well as by where the currently recognized subspecies, *A. p. nelsoni,* occurs. *Aristelliger nelsoni* is similar to Jamaican species, but be separated from most, except *N.* sp. 11 and *A. praesignis*, due to its large rostral groove height (1.04–1.32 versus 1.35–1.95% SVL in those species). It is distinguished from *N.* sp. 11 using two slightly overlapping traits. Compared to *N.* sp. 11, *A. nelsoni* has a larger postnasal height (24.15–32.40 versus 12.70–27.04% IN) and larger rostral suture height (3.07–3.36 versus 3.60–4.63% SVL, with 3.27 and 5.04 outliers).

A. praesignis proved particularly difficult to separate from *A. nelsoni*, suggesting why *A. nelsoni* was first described as its own species then later reduced to the subspecies *A. praesignis nelsoni* (Barbour 1914; Hecht 1951). In Barbour's (1914) original description he observed that "in the Jamaican examples these are rough, shagreen-like granules, while in those from Swan Island the skin is much more finely granular and much smoother." Examining specimens for this marked difference in dorsal scales, it was most obvious on the snout and midsection (Figure 8). No specimens of *A. praesignis nelsoni* were included in Cloud's (2013) phylogenetic analyses. While the morphological evidence is minimal, in combination with the long-term geographic isolation and the amount of cryptic diversity present within the species currently recognized as *A. praesignis*, it could be hypothesized that *A. nelsoni* may warrant elevation back to full species status. Genetic data should be analyzed to confirm this.

Cayman Islands

In addition to geographic location, species of the Cayman Islands can be differentiated from each other, from Swan Island species, and from Jamaican species. *N.* sp. 2 can be diagnosed from all other species by its distinct pattern of dark to medium brown, irregular spots on the dorsal head, body, limbs, and tail (Figure 9). It is further differentiated from *N.* sp. 10 found on Little Cayman by having a larger postnasal height (27.63–32.51 versus 19.69–23.36% IN). The rostral groove height is greater in *N.* sp. 2 compared to the Swan Islands' *A. nelsoni* (1.38–1.94 versus 1.04–1.32% SVL).

Central and South America: Mexico, Belize, Honduras, and Columbia

Through the morphological analyses, *A. georgeensis* can be divided into four species, two new species and two previously recognized species, *A. georgeensis* and *A.irregularis*. The four species are scattered down the eastern coasts and islands of Central and South America. *A. georgeensis* occupies the eastern coasts and islands of Belize, *A. irregularis* is found in Quintana Roo, Mexico, new species 4 (*N.* sp. 4) inhabits the Gracias a Dios of Honduras, and new species 6 (*N.* sp. 6) is found on the San Andres and Providencia Islands of Columbia (Figure 7E). The clades assigned to *A. georgeensis* and *A. irregularis* are based on the given localities when first described and of type specimens.

There is no single characteristic that can separate *A. georgeensis* from all of its derivative species. It is most easily separated from *A. irregularis* by its larger pale labial spot diameter (0.60–0.77 versus 0.27–0.44mm). The *A. irregularis* outlier, UCM 16168, was an abnormally large specimen (SVL 94.22mm) compared to other specimens from Mexico (average SVL 67.75mm). *A. georgeensis* is distinct from *N.* sp. 4 based on four characters. It has a smaller rostral groove height (1.20–1.44 versus 1.59–1.95% SVL), larger internasal zone width (40.08–51.89 versus 25.39–33.33% IN), and larger pale labial spot diameter (0.60–0.77 versus 0.44–0.56 mm). *A. georgeensis* is also differentiated from *N.* sp. 6 by its higher number of total labial scales (28–31 versus 24-27).

Phylogenetics and Morphology

Our morphological results correspond with the nine distinct clades produced by Cloud's (2013) maximum likelihood phylogenetic tree developed from mtDNA analysis. Based on the localities and known species of the tissue samples utilized, it can be determined that Clade A corresponds to *A. praesignis*, Clade B to *N.* sp. 11, Clade C to *N.* sp. 5, Clade D to *N.* sp. 7, Clade E to *N.* sp. 3, Clade F to *N.* sp. 8, and the remaining three clades to *N.* sp. 4, *N.* sp. 10, and *N.* sp. 2 (Figure 10). This correspondence between our morphological analyses and Cloud's (2013) genetic analyses serve as further support to the suggested separations of species.

Cloud's (2013) phylogenetic analyses, however, focused on the *A. praesignis praesignis* subspecies and only included *A. georgeensis* tissue samples from Honduras. Further genetic analysis of the suggested new species detailed in this paper would help to further clarify the levels of speciation within this genus and validity of separating *A. praesignis* and *A. georgeensis* into multiple species. It would be particularly beneficial to add genetic evidence of speciation of the *A. georgeensis* derivatives, which are lacking from Cloud's (2013) analyses, as well as of identifying the genetic separation between those individuals currently recognized as *A. p. nelsoni* and *A. praesignis*.

Conclusion

Based on our morphological and geographic analyses in combination with the phylogenetic analyses of Cloud (2013), we suggest that a total of eleven new species are present within the genus *Aristelliger*. This includes evidence that identifies two previously described, but later synonymized, species, *A. irregularis* and *A. nelsoni*, as potentially warranting recognition as full species again. A manuscript describing these findings and discussing the proposed species is being prepared (Hedges, Rutter, Cloud, and Heinicke, in preparation).

The Caribbean region and Central America are rich in biodiversity. The discovery of cryptic species adds to the current understanding of speciation in this unique geographic region as well as to the wealth of its biodiversity. Future research should explore using a combination of molecular and morphological analyses to aid in uncovering the cryptic species hiding in plain sight.

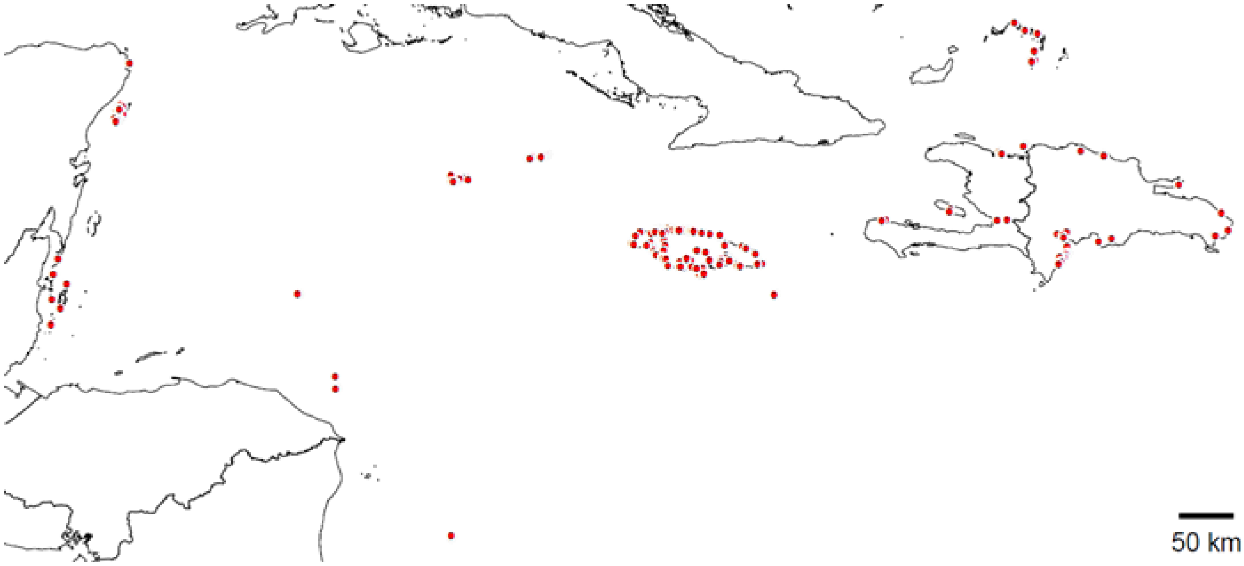

Figure 1. Localities of *Aristelliger spp.*

Aristelliger spp. inhabit the Caribbean, including Turks and Caicos, Hispaniola, Jamaica, the Swan Islands, and the Cayman Islands, as well as the eastern coast of Central and South America, primarily on islands of Mexico, Belize, Honduras, and Columbia.

Figure 2. Observed characteristics of pattern and coloration

Pattern and coloration characteristics shown on *N.* sp. 1 (KU 229056). (A) Dorsal view of head, illustrating the stripe on snout and dorsal Y mark; (B) lateral view of head, illustrating bandit eye and pale labial spots; and (C) dorsal view of body, illustrating stripe on snout, dorsal Y mark, scapular spots, dorsal rhombs, and striped toes.

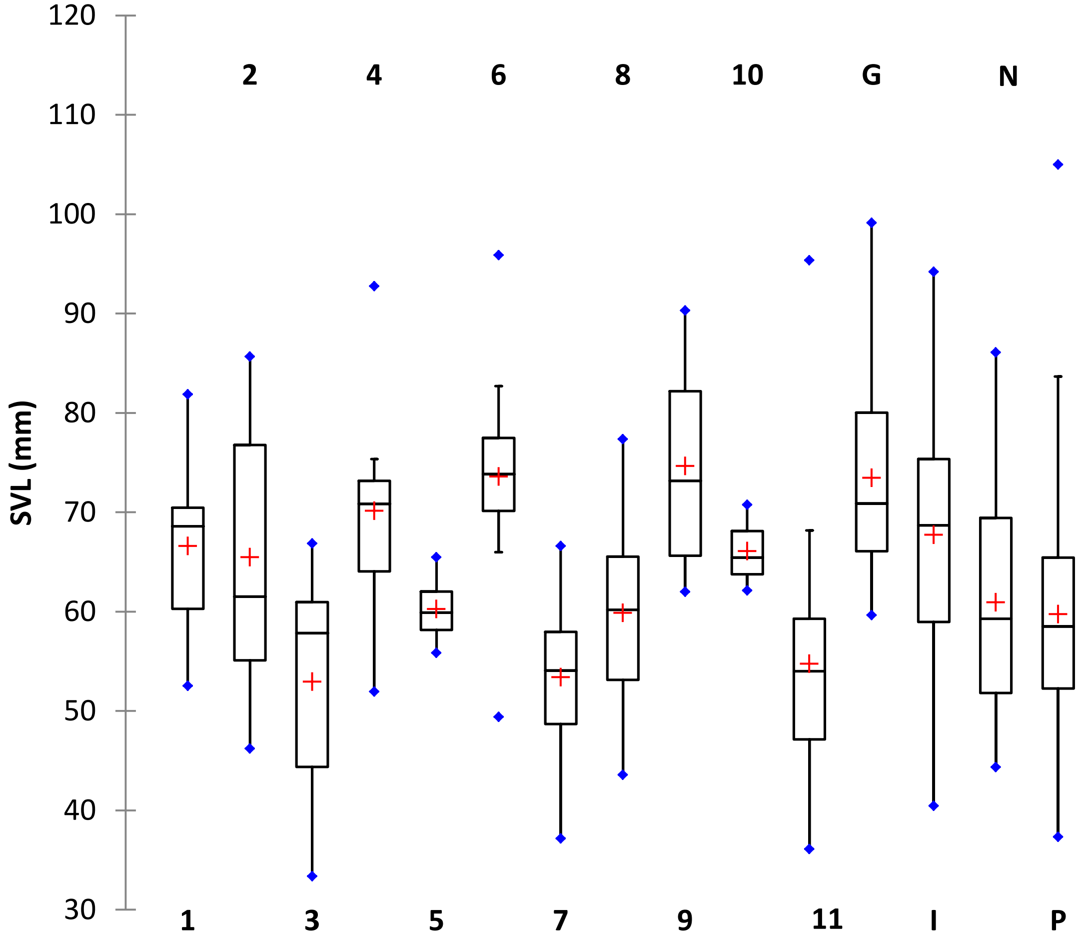

Figure 3. SVL plot

A box-and-whisker plot of the snout-vent length of all 15 species. New species are identified solely by their number (e.g., *N.* sp. 1 as 1), and other species are identified by the first letter in the specific epithet (e.g., *A. georgeensis* as G). Blue dots indicate maximum and minimum values, while red crosses identify the mode.

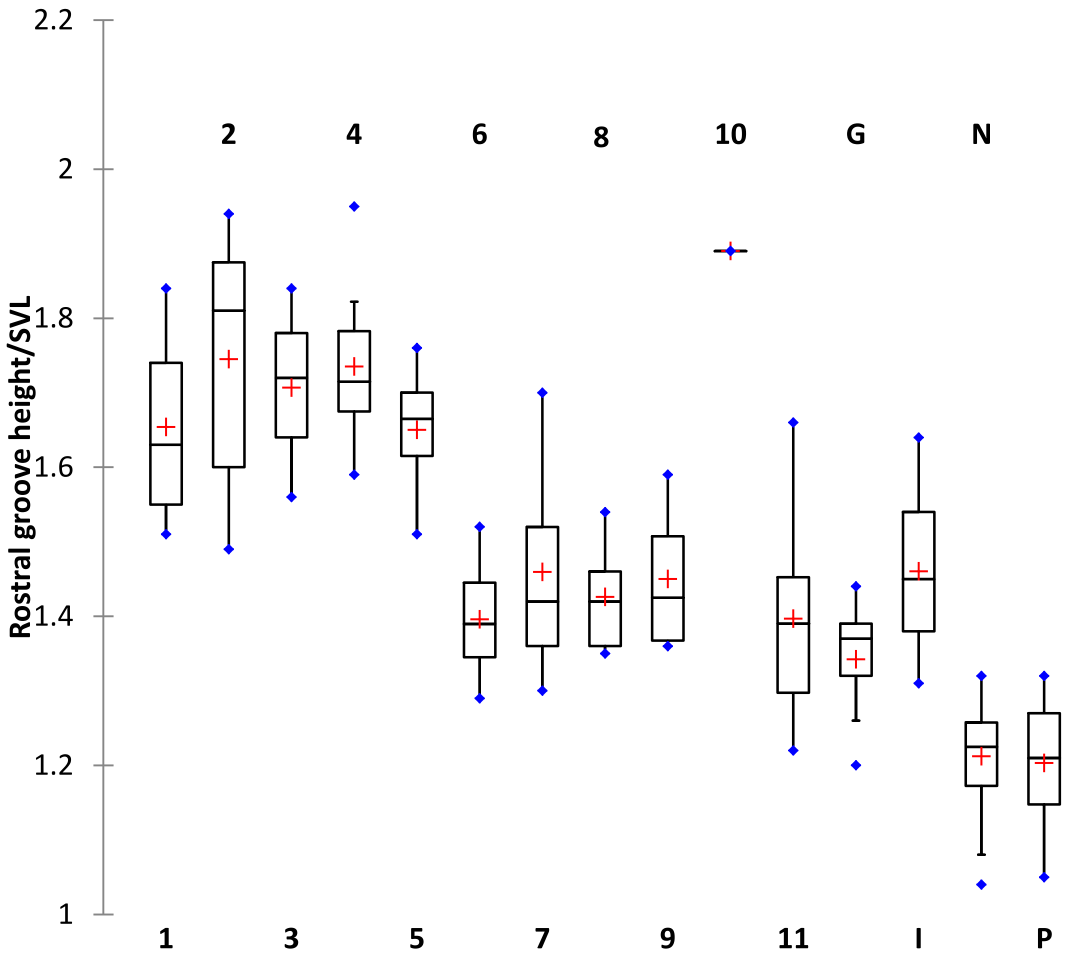

Figure 4. Rostral groove height plot

A box-and-whisker plot of the rostral groove height of all 15 species. New species are identified solely by their number (e.g., *N.* sp. 1 as 1), and other species are identified by the first letter in the specific epithet (e.g., *A. georgeensis* as G). Blue dots indicate maximum and minimum values, while red crosses identify the mode.

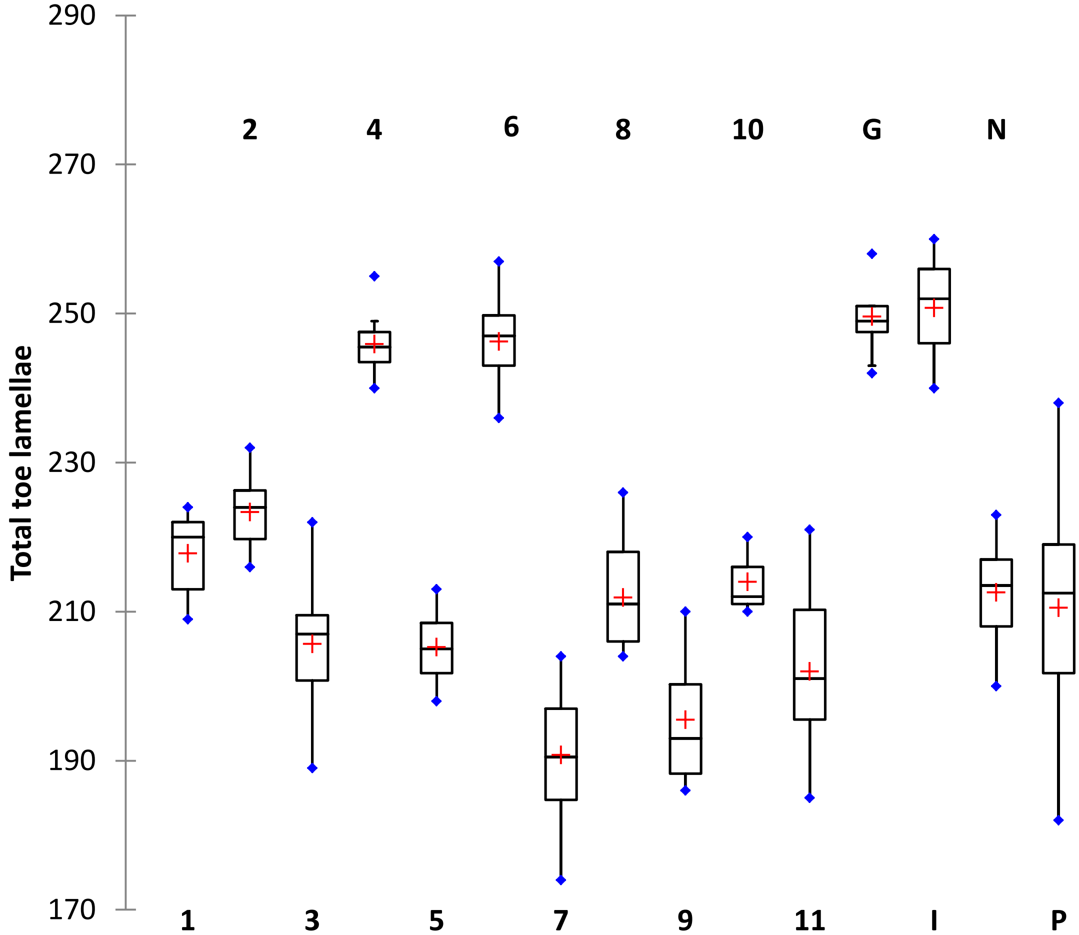

Figure 5. Total toe lamellae plot

A box-and-whisker plot of the total toe lamellae of all 15 species. New species are identified solely by their number (e.g., *N.* sp. 1 as 1), and other species are identified by the first letter in the specific epithet (e.g., *A. georgeensis* as G). Blue dots indicate maximum and minimum values, while red crosses identify the mode.

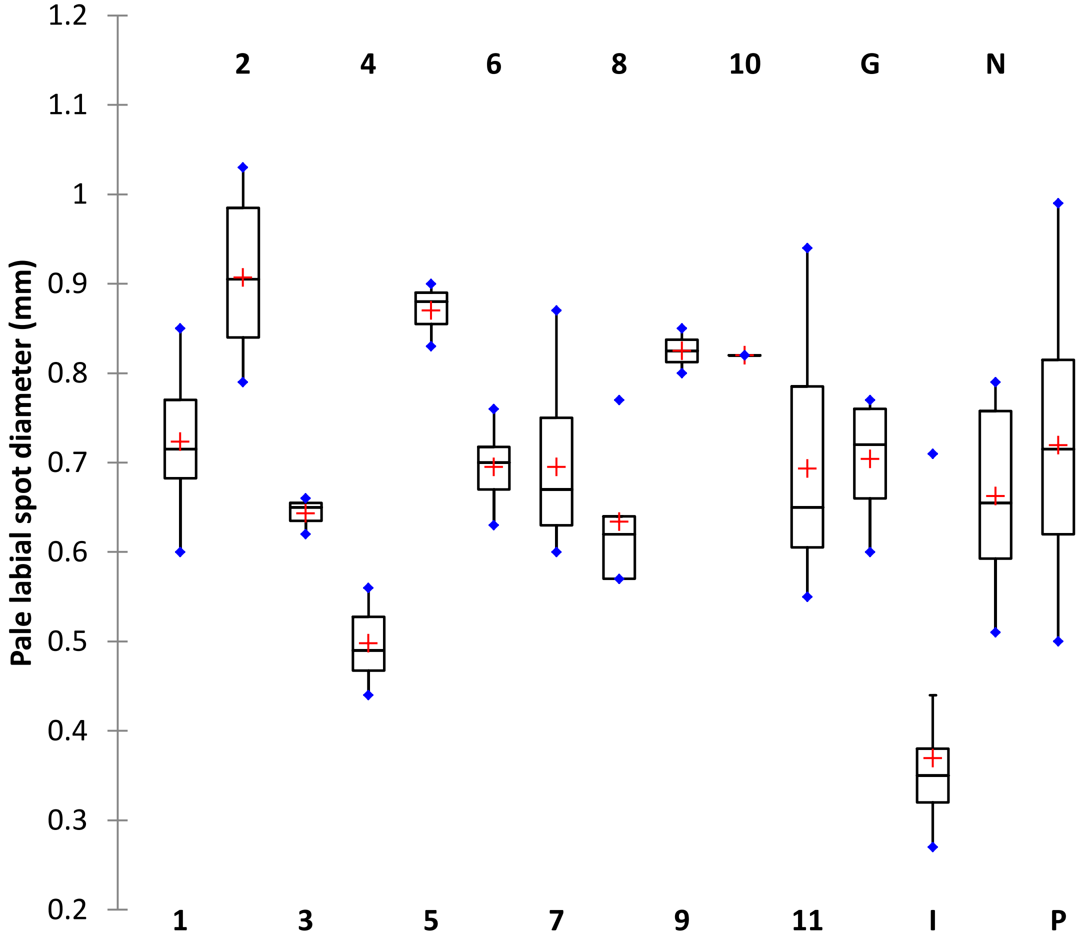

Figure 6. Pale labial spot diameter plot

A box-and-whisker plot of the pale labial spot diameter of all 15 species. New species are identified solely by their number (e.g., *N.* sp. 1 as 1), and other species are identified by the first letter in the specific epithet (e.g., *A. georgeensis* as G). Blue dots indicate maximum and minimum values, while red crosses identify the mode.

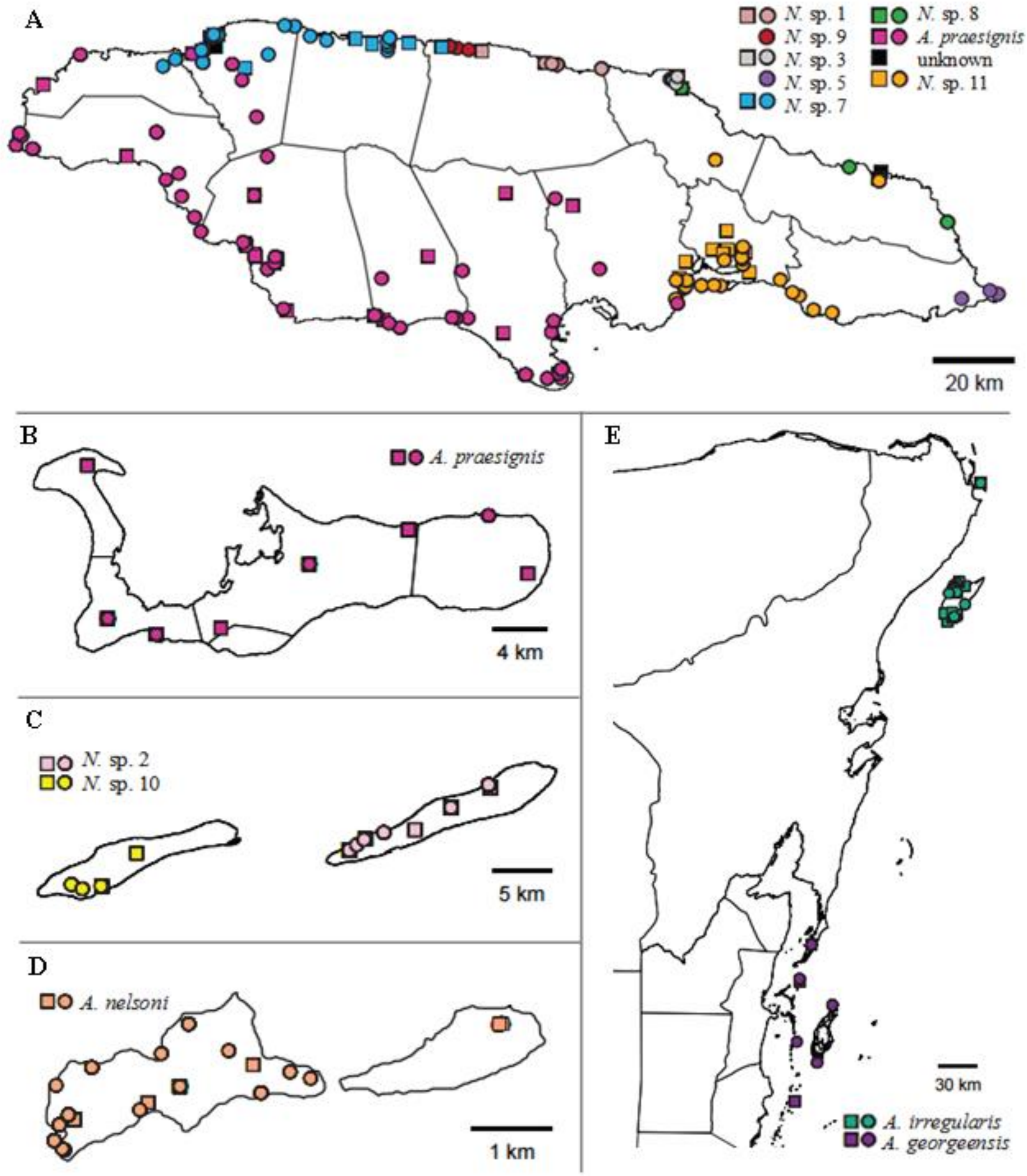

Figure 7. Detailed localities of *Aristelliger spp.*

Circles illustrate the localities of examined specimens, and squares show the localities of specimens associated with that species but not examined. (A) *A. praesignis*, *N.* sp. 1, *N.* sp. 3, *N.* sp. 5, *N.* sp. 7, *N.*

sp. 8, *N.* sp. 9, and *N.* sp. 11 occupy the coasts of Jamaica. (B) *A. praesignis* can also be found on Grand Cayman. (C) *N.* sp. 2 inhabits Cayman Brac and *N.* sp. 10 occupies Little Cayman. (D) *A. nelsoni* lives on the Swan Islands. (E) *A. irregularis* is primarily found in Quintana Roo, Mexico, while *A. georgeensis* is scatter along the eastern coast and islands of Belize.

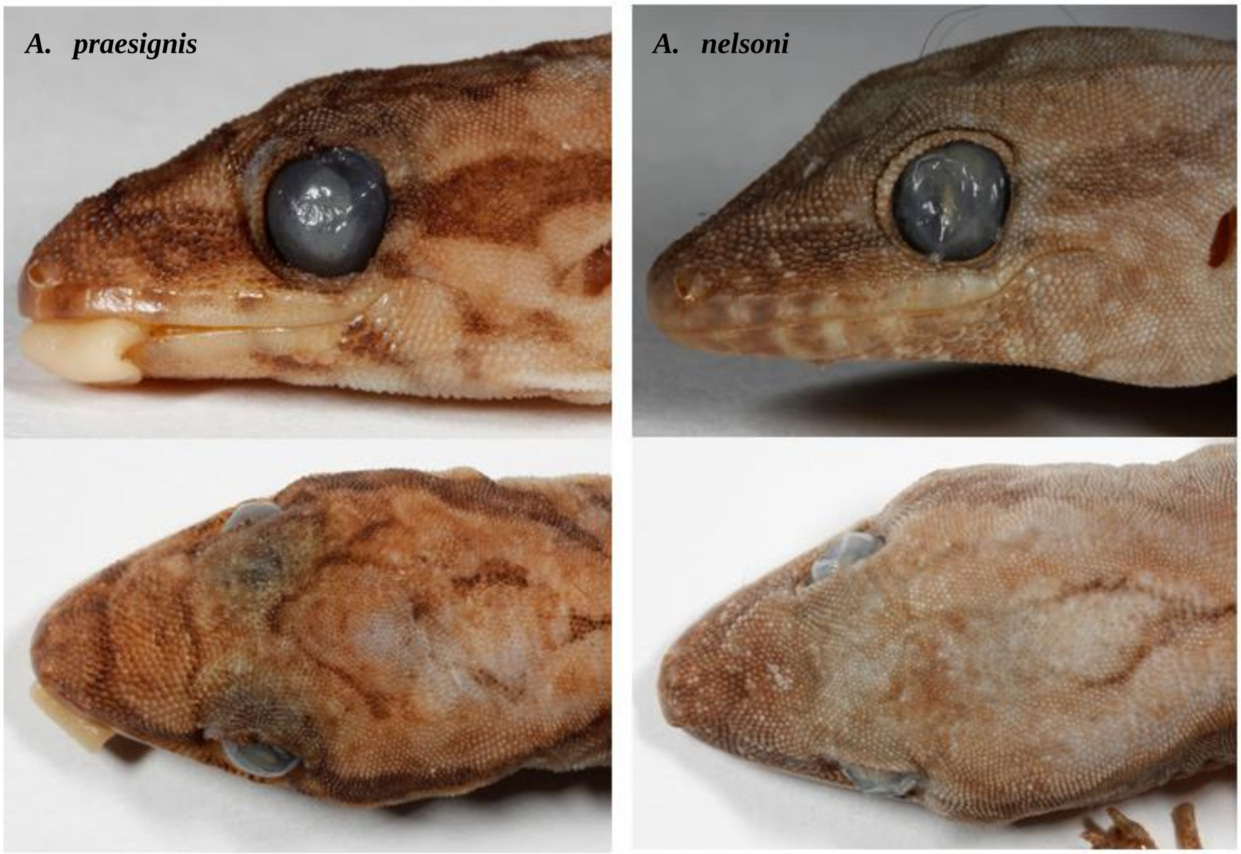

Figure 8. Dorsal scale comparisons of *A. praesignis* and *A. nelsoni*

Lateral and dorsal views of *A. praesignis* (KU 229125 pictured) and *A. nelsoni* (KU 223832 pictured). Specimens of *A. praesignis* exhibit rough, shagreen-like scales, especially on the snout, versus the finely granular and smoother scales of *A. nelsoni*.

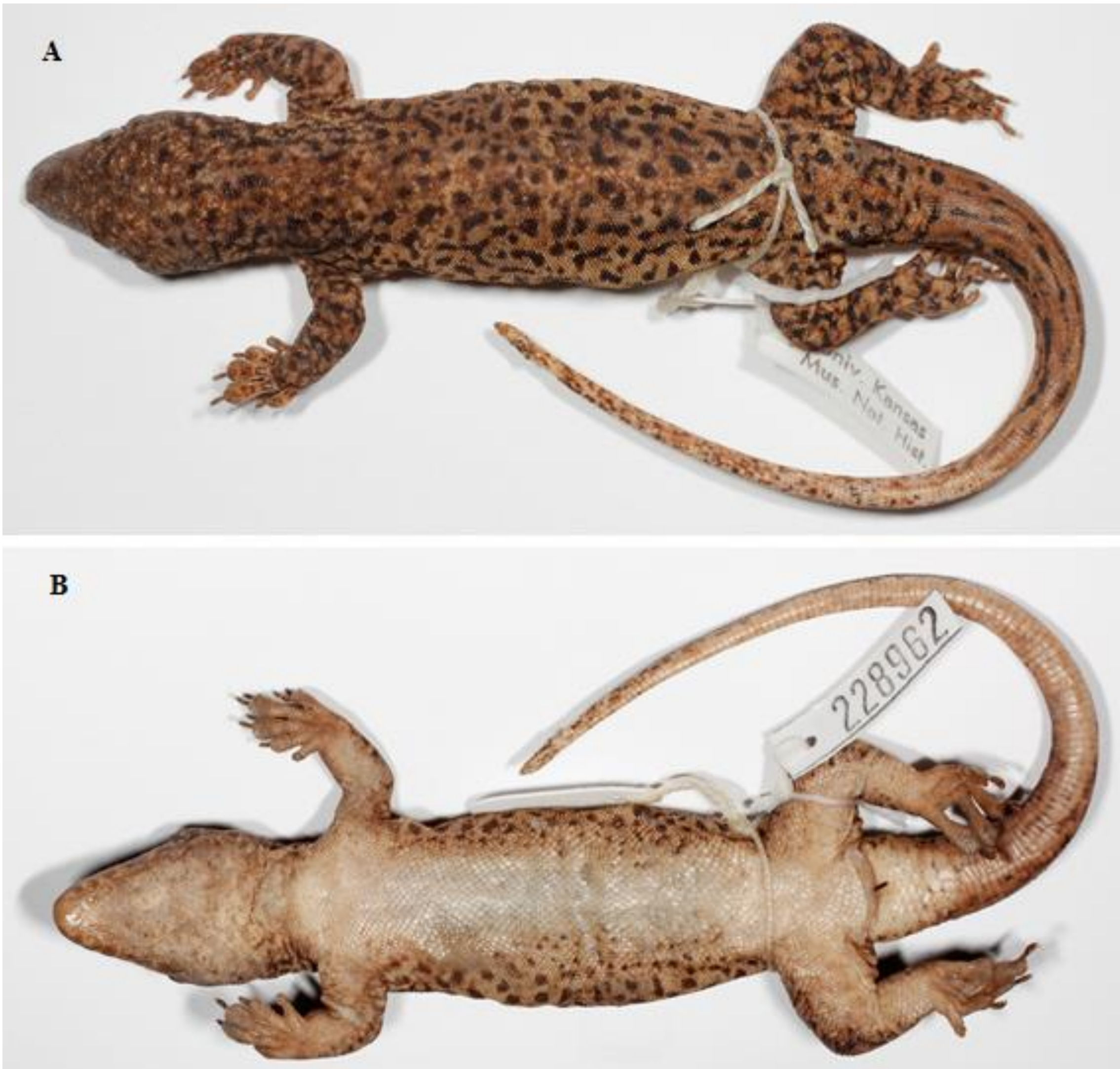

Figure 9. Distinct pattern of *N.* sp. 2

N. sp. 2(KU 228962 pictured) can be diagnosed by its distinct pattern of dark to medium brown, irregular spots on the dorsal head, body, limbs, and tail. (A) dorsal view; (B) ventral view.

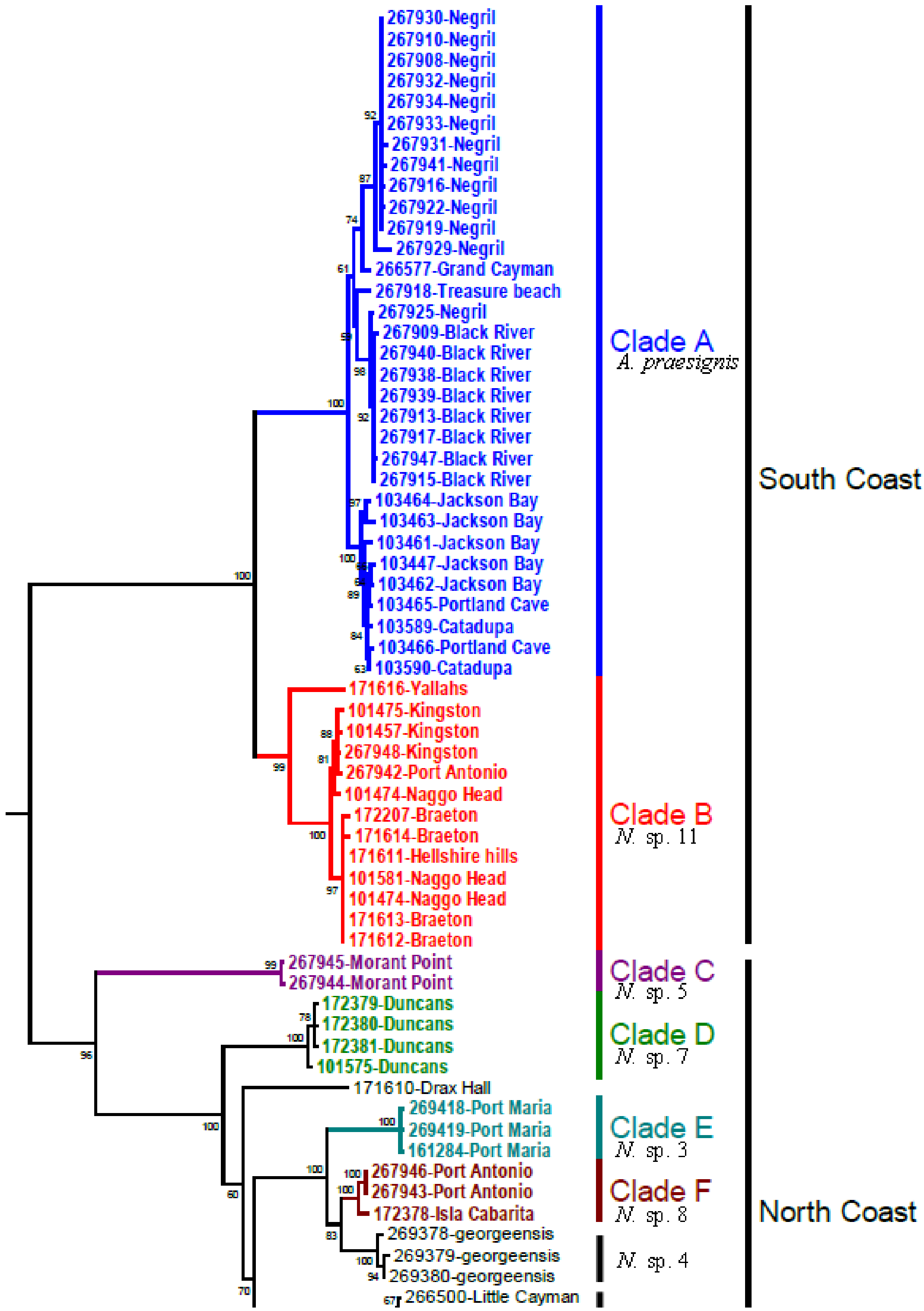

Figure 10 **(continued on next page)**

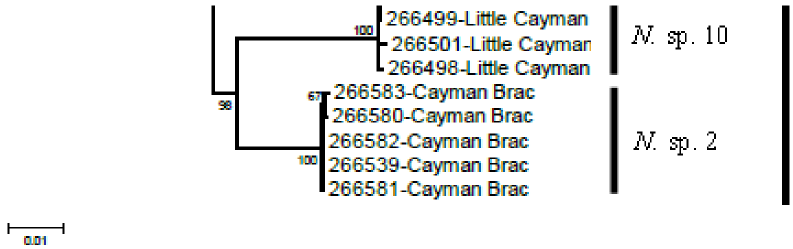

Figure 10. Genetic clades labeled by corresponding species

Clades identified by a maximum likelihood tree developed from mtDNA analysis of *A. praesignis* and *A. georgeensis* tissue samples labeled with the corresponding species based on morphology and locality data (figure modified from Cloud 2013).

Table 1. Summary of morphological characteristics and pattern

Summary of morphological data for all species and specimens measured. Characters presented as relative to snout-vent length (%SVL) or to internasals (%IN) were calculated from raw measurements taken in mm. Characters not labeled as "mm", "%SVL", or "%IN" are scale counts. Patterns are marked as present (X) or absent (O).

	n	MAX SVL (mm)	ROSTRAL HEIGHT (%SVL)	ROSTRAL SUTURE HEIGHT (%SVL)	INTERNASAL ZONE WIDTH (%IN)	POSTNASAL HEIGHT (%IN)	HEAD WIDTH (%SVL)
N. sp. 1	17	81.9	3.92–5.69	2.91–3.75	26.57–34.75	23.31–27.42	18.5–20.9
N. sp. 2	28	85.7	4.40–5.45	3.23–3.70	28.49–44.53	27.63–32.51	19.5–21.9
N. sp. 3	6	66.9	5.02–5.55	3.19–4.00	29.74–36.36	21.98–26.79	19.0–21.6
N. sp. 4	11	92.8	4.58–5.68	2.67–3.76	25.39–33.33	25.81–32.64	19.8–22.2
N. sp. 5	4	65.5	4.83–5.77	3.58–4.32	27.06–35.55	27.98–30.73	16.8–22.4
N. sp. 6	12	95.9	4.49–6.11	3.51–5.89	36.81–42.91	29.09–32.97	18.5–23.1
N. sp. 7	73	66.6	3.51–5.89	2.40–3.71	24.51–35.00	20.10–33.49	17.4–22.8
N. sp. 8	11	77.4	5.28–6.40	3.29–4.36	30.53–39.74	34.01–34.94	19.6–23.5
N. sp. 9	6	90.3	5.37–6.72	3.08–4.07	34.11–43.78	21.35–28.09	19.9–22.7
N. sp. 10	5	70.8	4.90–5.81	3.18–4.00	25.00–29.13	19.69–23.36	21.0–22.0
N. sp. 11	30	95.4	5.05–7.61	3.27–4.63	20.42–33.19	12.70–27.04	18.1–25.6
A. georgeensis	11	99.1	4.76–6.40	3.33–4.09	40.08–51.89	21.86–26.95	19.2–22.8
A. irregularis	22	94.2	4.83–6.09	2.92–4.50	37.32–47.59	23.45–31.40	20.1–22.9
A. nelsoni	48	86.1	5.05–5.46	3.07–3.36	26.16–44.83	24.15–32.40	19.2–22.1
A. praesignis	118	105.0	4.23–6.44	2.40–4.58	31.08–51.84	19.68–30.73	18.0–24.5

(continued on next page)

	4TH TOE PAD WIDTH (%SVL)	INTER-NASALS	POST-NASALS	SUPRA-LABIALS	INFRA-LABIALS	TOTAL LABIALS
N. **sp. 1**	6.11–7.48	2–4	4–6	7–8	6–7	27–30
N. **sp. 2**	4.60–6.02	2–4	6–10	6–9	6–7	25–31
N. **sp. 3**	6.24–7.52	2–3	6–8	7–8	6	26–28
N. **sp. 4**	5.44–6.17	1–3	6–8	7–8	6–8	27–31
N. **sp. 5**	6.61–7.21	2–4	6–8	7–9	6–7	28–31
N. **sp. 6**	6.35–7.41	2–4	5–8	6–7	6–7	24–27
N. **sp. 7**	4.84–8.35	2–4	5–9	7–9	6–8	26–34
N. **sp. 8**	6.40–8.47	2–4	4–6	7–8	6–7	27–30
N. **sp. 9**	5.52–6.38	2–3	7–8	7–8	6–7	26–30
N. **sp. 10**	4.50–6.45	1–2	8	7–9	6	27–29
N. **sp. 11**	1.15–8.02	2–4	5–9	6–8	5–7	24–30
A. georgeensis	6.62–7.81	2–5	8–9	7–8	6–8	28–31
A. irregularis	5.19–7.65	2–4	4–10	7–9	7–8	29–31
A. nelsoni	5.20–6.69	2–3	4–9	7–9	6–8	27–32
A. praesignis	3.37–8.25	2–5	5–10	6–9	6–8	25–31

(continued below)

	4TH TOE LAMELLAE	TOTAL LAMELLAE	PALE LABIAL SPOT DIAMETER (mm)	SNOUT STRIPES	PALE SNOUT SPECKLING	BANDIT EYE
N. **sp. 1**	12–13	209–224	0.60–0.85	X	O	X
N. **sp. 2**	12–14	216–232	0.79–1.03	O	X	X
N. **sp. 3**	10–11	189–210	0.62–0.66	O	O	X
N. **sp. 4**	13-15	240–255	0.44–0.56	X	O	X
N. **sp. 5**	11–13	198–213	0.83–0.90	X	O	X
N. **sp. 6**	13-15	236–257	0.46–0.76	X	O	O
N. **sp. 7**	10–13	174–204	0.60–0.87	X	O	X
N. **sp. 8**	12–13	204–226	0.57–0.77	X	O	X
N. **sp. 9**	10–12	186–210	0.80–0.85	O	O	X
N. **sp. 10**	12–13	210–220	0.61–0.82	X	X	X
N. **sp. 11**	10–16	185–221	0.55–0.94	X	O	X
A. georgeensis	13-14	242–258	0.60–0.77	O	X	O
A. irregularis	13-15	240–260	0.27–0.44	X	O	X
A. nelsoni	10–13	203–223	0.51–0.79	X	O	X
A. praesignis	10–15	182–238	0.50–0.99	X	O	X

(continued on next page)

	SCAPULAR SPOTS	DORSAL Y MARK	DORSAL RHOMBS	VENTRAL CREAM COLOR	STRIPED TOES	TOE PAD COLOR
N. sp. 1	X	X	X	O	X	X
N. sp. 2	O	O	O	O	X	X
N. sp. 3	X	O	X	X	X	X
N. sp. 4	X	X	X	X	X	O
N. sp. 5	X	X	O	X	X	X
N. sp. 6	X	O	X	O	X	X
N. sp. 7	X	X	X	O	X	X
N. sp. 8	X	X	X	X	X	X
N. sp. 9	X	O	O	X	X	O
N. sp. 10	X	O	X	X	X	X
N. sp. 11	X	X	X	X	X	X
A. georgeensis	X	O	X	X	X	X
A. irregularis	X	O	X	O	X	X
A. nelsoni	X	X	X	O	X	X
A. praesignis	X	X	X	X	X	X

Table 2. Distinguishing characteristics and pattern

Morphological characters and patterns that provide complete separation between species. New species (*N.* sp. #) are simply represented by the corresponding number. The characters are as follows: RGH = rostral groove height (%SVL); INZW = internasal zone width (%IN); PNH = postnasal height (%IN); 4TPW = 4th toe pad width (%SVL); PN = number postnasal scales; 4TPL = 4th toe pad lamellae; TTL = total toe pad lamellae; LSD = labial spot diameter; C PN = crescent shaped postnasal scale; OR = Other characteristics and/or patterns; OL = Only overlapping characters.

	RGH	INZW	PNH	4TPW	PN	4TPL	TTL	LSD	C PN	OR	OL
1 – 2			X	X							
1 – 3						X					
1 – 4							X	X			
1 – 5		X						X			
1 – 6		X					X				
1 – 7							X				
1 – 8			X								
1 – 9					X						
1 – 10					X					X	
1 – 11											X
1 – *A. georgeensis*	X	X			X		X				
1 – *A. irregularis*		X					X				
1 – *A. nelsoni*	X										
1 – *A. praesignis*	X										
2 – 3						X		X			
2 – 4							X	X			
2 – 5							X				
2 – 6							X				
2 – 7							X				
2 – 8			X					X			
2 – 9											X
2 – 10					X						
2 – 11					X						
2 – *A. georgeensis*							X				
2 – *A. irregularis*							X	X			
2 – *A. nelsoni*	X										
2 – *A. praesignis*	X										
3 – 4						X	X	X			
3 – 5								X			
3 – 6	X	X				X	X				
3 – 7										X	
3 – 8	X		X	X					X		

(continued on next page)

	RGH	INZW	PNH	4TPW	PN	4TPL	TTL	LSD	C PN	OR	OL
3 − 9								X			
3 − 10		X				X					
3 − 11											X
3 − ***A. georgeensis***	X					X	X				
3 − ***A. irregularis***		X				X	X	X			
3 − ***A. nelsoni***	X									X	
3 − ***A. praesignis***	X										
4 − 5							X	X			
4 − 6		X						X			
4 − 7							X	X			
4 − 8	X						X	X	X		
4 − 9		X				X	X	X			
4 − 10			X				X	X			
4 − 11							X				
4 − ***A. georgeensis***	X	X						X			
4 − ***A. irregularis***		X									
4 − ***A. nelsoni***	X						X				
4 − ***A. praesignis***	X						X				
5 − 6							X				
5 − 7										X	
5 − 8			X					X	X		
5 − 9				X							
5 − 10			X	X							
5 − 11			X								
5 − ***A. praesignis***	X									X	
5 − ***A. nelsoni***	X									X	
5 − ***A. georgeensis***	X	X					X				
5 − ***A. irregularis***		X					X				
6 − 7		X					X				
6 − 8							X				
6 − 9						X	X	X			
6 − 10	X	X	X				X				
6 − 11							X				
6 − ***A. praesignis***											X
6 − ***A. nelsoni***							X				
6 − ***A. georgeensis***										X	
6 − ***A. irregularis***										X	
7 − 8			X								
7 − 9											X

(continued on next page)

			RGH	INZW	PNH	4TPW	PN	4TPL	TTL	LSD	C PN	OR	OL
7	**−**	**10**	X						X				
7	**−**	**11**										X	
7	**−**	***A. praesignis***											X
7	**−**	***A. nelsoni***											X
7	**−**	***A. georgeensis***		X					X				
7	**−**	***A. irregularis***		X					X				
8	**−**	**9**					X			X	X		
8	**−**	**10**	X		X		X	X			X		
8	**−**	**11**			X								
8	**−**	***A. praesignis***	X										
8	**−**	***A. nelsoni***	X		X								
8	**−**	***A. georgeensis***		X			X		X		X		
8	**−**	***A. irregularis***			X				X				
9	**−**	**10**	X	X									
9	**−**	**11**											X
9	**−**	***A. praesignis***	X										
9	**−**	***A. nelsoni***	X							X			
9	**−**	***A. georgeensis***						X	X	X			
9	**−**	***A. irregularis***							X				
10	**−**	**11**	X									X	
10	**−**	***A. praesignis***	X	X									
10	**−**	***A. nelsoni***	X		X								
10	**−**	***A. georgeensis***	X	X					X				
10	**−**	***A. irregularis***	X						X				
11	**−**	***A. praesignis***											X
11	**−**	***A. nelsoni***			X								
11	**−**	***A. georgeensis***							X				
11	**−**	***A. irregularis***							X				

Appendix A

Morphological Data

All measurements are in mm. Morphological data is presented as follows: *Species*, museum number, country/island, (latitude, longitude, elevation), adult or juvenile (A or J), SVL, rostral height/SVL, rostral groove height/SVL, rostral suture height/SVL, internasal zone width/IN, postnasal height/IN, head width/ SVL, 4th toe pad width/SVL, internasals, postnasals, total labials, 4th toe lamellae, total toe lamellae, pale labial spot diameter. The letter "N" is used is data were not available.

N. sp. 1, KU 229052, Jamaica, (18.426241, -77.163415, 21 m), A, 69.44, 5.03, 1.51, 3.56, 3.61, 0.26, 20.15, 6.68, 2, 6, 30, 24, 220, 0.85

N. sp. 1, KU 229053, Jamaica, (18.426241, -77.163415, 21 m), A, 53.6, 5.15, 1.55, 2.91, 3.86, 0.24, 18.96, 6.34, 3, 6, 30, 26, 223, 0.78

N. sp. 1, KU 229054, Jamaica, (18.426241, -77.163415, 21 m), J, 34.94, N, N, N, N, N, N, N, N, N, N, N, N, N

N. sp. 1, KU 229055, Jamaica, (18.426241, -77.163415, 21 m), J, 32.64, N, N, N, N, N, N, N, N, N, N, N, N, N

N. sp. 1, KU 229056, Jamaica, (18.426241, -77.163415, 21 m), A, 58.31, 5.25, 1.63, 3.64, 3.89, 0.27, 18.47, 6.17, 3, 6, 30, 24, 210, 0.74

N. sp. 1, KU 229057, Jamaica, (18.426241, -77.163415, 21 m), J, 31.58, N, N, N, N, N, N, N, N, N, N, N, N, N

N. sp. 1, KU 229058, Jamaica, (18.426241, -77.163415, 21 m), J, 28.17, N, N, N, N, N, N, N, N, N, N, N, N, N

N. sp. 1, KU 229075, Jamaica, (18.417238, -77.064762, 41 m), A, 81.89, 4.97, 1.84, 3.19, 3.79, 0.27, 20.87, 7.27, 4, 4, 26, 24, 213, 0.6

N. sp. 1, KU 229076, Jamaica, (18.417238, -77.064762, 41 m), A, 60.27, 5.18, 1.74, 3.48, 3.92, 0.23, 19.15, 6.7, 3, 6, 30, 25, 223, 0.68

N. sp. 1, USNM 251821, Jamaica, (18.429419, -77.189956, 40 m), A, 65.05, 5.03, N, 3.2, N, N, 19.62, 6.87, N, N, N, N, 217, N

N. sp. 1, USNM 251822, Jamaica, (18.429419, -77.189956, 40 m), A, 68.6, 5.03, N, 3.62, N, N, 19.05, 6.57, N, N, N, N, 222, N

N. sp. 1, USNM 251823, Jamaica, (18.429419, -77.189956, 40 m), A, 69.24, 5.62, N, 3.19, N, N, 19.74, 6.76, N, N, N, N, 209, N

N. sp. 1, USNM 251824, Jamaica, (18.429419, -77.189956, 40 m), A, 52.53, 5.69, N, 3.41, N, N, 20.03, 7.04, N, N, N, N, 224, N

N. sp. 1, USNM 251825, Jamaica, (18.429419, -77.189956, 40 m), A, 70.65, 5.17, N, 3.48, N, N, 20.08, 7.28, N, N, N, N, 221, N

N. sp. 1, USNM 251826, Jamaica, (18.429419, -77.189956, 40 m), A, 80.13, 5.65, N, 3.24, N, N, 20.78, 7.48, N, N, N, N, 222, N

N. sp. 1, USNM 251827, Jamaica, (18.429419, -77.189956, 40 m), A, 70.47, 5.45, N, 3.75, N, N, 19.53, 7.18, N, N, N, N, 213, N

N. sp. 1, USNM 328192, Jamaica, (18.427588, -77.174709, 24 m), A, 65.8, 3.92, N, 3.05, 3.62, 0.25, 19.74, 6.11, 2, 6, 30, 24, 215, 0.69

N. sp. 2, KU 228919, Cayman Brac Island, (19.695639, -79.872105, 10 m), A, 60.51, 4.96, 1.55, 3.4, 3.52, 0.29, 19.55, 5.26, 2, 8, 27, 24, 224, 0.99

N. sp. 2, KU 228920, Cayman Brac Island, (19.691701, -79.877779, 10 m), A, 80.92, 4.97, 1.58, 3.34, 3, 0.33, 20.66, 5.14, 2, 8, 29, 28, 227, 1.01

N. sp. 2, KU 228921, Cayman Brac Island, (19.691701, -79.877779, 10 m), A, 78.9, 4.4, 1.61, 3.32, 3.31, 0.29, 21.32, 5.98, 2, 8, 28, 24, 224, 0.97

N. sp. 2, KU 228922, Cayman Brac Island, (19.691701, -79.877779, 10 m), A, 69.73, 5.16, 1.94, 3.7, 3.46, 0.32, 21.88, 5.41, 3, 8, 28, 24, 225, 0.84

N. sp. 2, KU 228923, Cayman Brac Island, (19.691701, -79.877779, 10 m), A, 66.57, 5.17, 1.83, 3.53, 3.33, 0.29, 21.2, 6.02, 2, 8, 28, 24, 224, 0.85

N. sp. 2, KU 228944, Cayman Brac Island, (19.740399, -79.773444, 6 m), A, 77.87, 5.11, 1.86, 3.6, 3.18, 0.28, 21.36, 5.64, 3, 9, 26, 26, 229, 1.03

N. sp. 2, KU 228945, Cayman Brac Island, (19.704782, -79.8519, 6 m), A, 54.71, 5.08, 1.92, 3.24, 3.49, 0.3, 20.33, 5.41, 2, 8, 27, 24, 224, 0.99

N. sp. 2, KU 228946, Cayman Brac Island, (19.704782, -79.8519, 6 m), A, 49.72, 5.13, 1.61, 3.56, 3.4, 0.32, 20.51, 5.19, 2, 8, 30, 24, 225, 1.03

N. sp. 2, KU 228947, Cayman Brac Island, (19.740399, -79.773444, 6 m), A, 82.61, 5.16, 1.55, 3.27, 3.10, 0.29, 21.14, 5.96, 3, 8, 29, 24, 220, 1.03

N. sp. 2, KU 228948, Cayman Brac Island, (19.740399, -79.773444, 6 m), A, 71.26, 4.91, 1.49, 3.23, 3.44, 0.32, 19.63, 4.94, 3, 8, 31, 26, 228, 0.95

N. sp. 2, KU 228949, Cayman Brac Island, (19.740399, -79.773444, 6 m), A, 60.28, 5.13, 1.86, 3.48, 3.82, 0.29, 21.05, 5.77, 2, 6, 28, 24, 219, 0.9

N. sp. 2, KU 228950, Cayman Brac Island, (19.740399, -79.773444, 6 m), A, 60.38, 5.33, 1.79, 3.61, 3.46, 0.3, 20.88, 5.61, 4, 10, 27, 26, 228, 0.81

N. sp. 2, KU 228951, Cayman Brac Island, (19.740399, -79.773444, 6 m), A, 55.21, 4.8, 1.88, 3.46, 3.24, 0.3, 20.16, 4.6, 2, 8, 28, 24, 229, 0.8

N. sp. 2, KU 228952, Cayman Brac Island, (19.740399, -79.773444, 6 m), A, 56.8, 5.07, 1.88, 3.38, 3.12, 0.31, 19.88, 5.21, 2, 8, 28, 24, 216, 0.84

N. sp. 2, KU 228953, Cayman Brac Island, (19.69965, -79.866578, 10 m), A, 73.74, 5.19, 1.6, 3.69, 3.59, 0.29, 21.83, 5.42, 2, 8, 28, 26, 223, 0.93

N. sp. 2, KU 228962, Cayman Brac Island, (19.691701, -79.877779, 10 m), A, 82.34, 4.66, 1.53, 3.42, 3.13, 0.29, 19.66, 5.85, 3, 6, 28, 26, 226, 0.82

N. sp. 2, KU 228963, Cayman Brac Island, (19.691701, -79.877779, 10 m), A, 76.41, 5.3, 1.81, 3.68, 3.36, 0.28, 20.17, 5.9, 2, 8, 30, 25, 220, 1.02

N. sp. 2, KU 228964, Cayman Brac Island, (19.691669, -79.877882, 10 m), A, 54.68, 5.36, 1.81, 3.53, 3.62, 0.29, 20.19, 5.08, 3, 8, 28, 24, 219, 0.79

N. sp. 2, KU 228965, Cayman Brac Island, (19.691701, -79.877779, 10 m), A, 54.55, 5.04, 1.87, 3.48, 3.32, 0.29, 19.54, 4.95, 2, 8, 30, 24, 217, 0.91

N. sp. 2, KU 228966, Cayman Brac Island, (19.691701, -79.877779, 10 m), A, 47.45, 5.06, 1.6, 3.44, 3.84, 0.3, 21.31, 4.76, 3, 8, 28, 24, 218, 0.83

N. sp. 2, KU 228980, Cayman Brac Island, (19.740399, -79.773444, 6 m), A, 85.67, 4.93, 1.58, 3.63, 3.29, 0.28, 21.48, 5.84, 4, 8, 28, 26, 222, 0.96

N. sp. 2, KU 228981, Cayman Brac Island, (19.740399, -79.773444, 6 m), A, 61.56, 5.02, 1.82, 3.44, 3.83, 0.28, 20.14, 5.02, 2, 8, 26, 24, 226, 0.86

N. sp. 2, KU 228982, Cayman Brac Island, (19.740399, -79.773444, 6 m), A, 78.63, 5.16, 1.89, 3.41, 3.69, 0.3, 21.04, 5.74, 3, 8, 29, 24, 224, 0.85

N. sp. 2, KU 228983, Cayman Brac Island, (19.740399, -79.773444, 6 m), A, 53.82, 5.02, 1.67, 3.53, 3.38, 0.29, 20.2, 5.04, 2, 8, 27, 24, 217, N

N. sp. 2, KU 228984, Cayman Brac Island, (19.740399, -79.773444, 6 m), A, 46.23, 5.45, 1.88, 3.61, 3.7, 0.3, 21.48, 5.34, 2, 6, 30, 24, 224, 0.8

N. sp. 2, KU 228985, Cayman Brac Island, (19.740399, -79.773444, 6 m), A, 61.42, 4.97, 1.9, 3.65, 3.47, 0.3, 19.88, 5.54, 3, 8, 27, 25, 227, 0.92
N. sp. 2, KU 228994, Cayman Brac Island, (19.740399, -79.773444, 6 m), A, 56.99, 5.32, 1.81, 3.4, 3.51, 0.3, 20.27, 5.05, 4, 6, 27, 24, 217, 0.85
N. sp. 2, UNSM 107933, Cayman Brac Island, (19.723533, -79.801657, 27 m), A, 74.6, 4.89, N, 3.26, N, N, 21.76, 7.61, N, N, 25, 24, 232, N

N. sp. 3, KU 229072, Jamaica, (18.394549, -76.904196, 176 m), A, 58.24, 5.08, 1.84, 3.59, 3.98, 0.22, 18.97, 7.07, 2, 8, 27, 22, 206, 0.66
N. sp. 3, KU 229073, Jamaica, (18.390848, -76.901905, 147 m), A, 57.42, 5.02, 1.72, 3.19, 3.64, 0.27, 20.39, 7.19, 3, 8, 26, 20, 199, 0.65
N. sp. 3, KU 229074, Jamaica, (18.395076, -76.908598, 191 m), J, 33.36, 5.55, 1.56, 3.24, 4.05, 0.24, 20.14, 6.24, 3, 6, 28, 20, 189, 0.62
N. sp. 3, USNM 251828, Jamaica, (18.38523, -76.89544, 10 m), A, 61.87, 5.08, N, 3.3, N, N, 19.4, 7.27, N, N, N, N, 222, N
N. sp. 3, USNM 251829, Jamaica, (18.38523, -76.89544, 10 m), A, 40.02, 5.4, N, 4, N, N, 21.59, 7.52, N, N, N, N, 208, N
N. sp. 3, USNM 328209, Jamaica, (18.400667, -76.892205, 5 m), A, 66.88, 5.22, N, 3.26, N, N, 21.49, 7.12, N, N, N, N, 210, N

N. sp. 4, JRM 253775, Honduras, (15.849209, -83.299946, 0 m), A, 72.77, 4.58, 1.8, 2.67, 3.39, 0.32, 20.39, 6.17, 2, 6, 28, 26, 245, 0.46
N. sp. 4, JRM 253776, Honduras, (15.849209, -83.299946, 0 m), A, 68.95, 4.63, 1.73, 3.76, 3.39, 0.27, 20.04, 5.44, 3, 6, 31, 28, 243, 0.55
N. sp. 4, JRM 253778, Honduras, (15.849209, -83.299946, 0 m), A, 72.88, 5.09, 1.67, 3.25, 3.51, 0.31, 20.01, 6.15, 2, 6, 31, 28, 246, 0.49
N. sp. 4, JRM 253779, Honduras, (15.849209, -83.299946, 0 m), A, 51.96, 5.68, 1.69, 3.19, 3.93, 0.31, 22.17, 6.12, 2, 6, 30, 26, 242, 0.45
N. sp. 4, JRM 253783, Honduras, (15.849209, -83.299946, 0 m), A, 92.75, 5.27, 1.82, 2.94, 3.27, 0.27, 20.91, 5.88, 2, 8, 30, 28, 249, 0.49
N. sp. 4, JRM 253784, Honduras, (15.849209, -83.299946, 0 m), A, 75.35, 4.78, 1.59, 3.07, 3.52, 0.26, 19.83, 5.87, 3, 8, 30, 30, 255, 0.44
N. sp. 4, JRM 253785, Honduras, (15.849209, -83.299946, 0 m), J, 32.13, N, N, N, N, N, N, N, N, N, N, N, N, N
N. sp. 4, JRM 253793, Honduras, (15.829614, -83.304344, 0 m), A, 62.68, 4.71, 1.72, 3.41, 3.56, 0.28, 20.77, 5.87, 2, 6, 27, 28, 240, 0.53
N. sp. 4, JRM 253795, Honduras, (15.829614, -83.304344, 0 m), A, 73.25, 5.5, 1.71, 3.04, 3.81, 0.26, 20.64, 6.08, 3, 8, 27, 28, 248, 0.52
N. sp. 4, JRM 253796, Honduras, (15.829614, -83.304344, 0 m), A, 62.69, 4.96, 1.95, 3.13, 3.53, 0.31, 20.91, 5.79, 2, 6, 30, 28, 246, 0.56
N. sp. 4, JRM 253797, Honduras, (15.829614, -83.304344, 0 m), A, 68.13, 5.06, 1.67, 2.82, 3.55, 0.33, 21.91, 5.83, 1, 6, 28, 28, 245, 0.49

N. sp. 5, KU 229078, Jamaica, (17.907741, -76.264981, 38 m), A, 60.85, 4.83, 1.68, 3.58, 3.58, 0.28, 16.81, 6.61, 3, 6, 30, 26, 213, 0.83
N. sp. 5, KU 229079, Jamaica, (17.925362, -76.202053, 8 m), A, 58.92, 5.77, 1.65, 4.01, 3.58, 0.3, 19.65, 7.09, 3, 8, 28, 22, 203, N
N. sp. 5, SBH 267944, Jamaica, (17.918408, -76.184381, 7 m), A, 65.49, 5.54, 1.51, 4.32, 3.41, 0.3, 21.68, 7.21, 4, 6, 28, 24, 207, 0.88

N. sp. 5, SBH 267945, Jamaica, (17.918408, -76.184381, 7 m), A, 55.84, 5.01, 1.76, 3.65, 3.44, 0.31, 22.4, 6.91, 3, 6, 31, 22, 198, 0.9

N. sp. 6, FLMNH 126373, Providencia Island, (13.356133, -81.378422, 112 m), A, 95.9, 6.11, 1.46, 3.83, 3.33, 0.31, 21.03, 7.41, 3, 8, 24, 30, 257, 0.74
N. sp. 6, FLMNH 126374, San Andres Island, (12.545015, -81.707579, 10 m), A, 73.16, 5.4, 1.35, 3.36, 3.76, 0.29, 19.03, 6.97, 3, 8, 25, 28, 252, 0.71
N. sp. 6, LACM 38229, San Andres Island, (12.593723, -81.704395, 4 m), J, 29.06, N, N, N, N, N, N, N, N, N, N, N, N, N
N. sp. 6, LACM 38230, San Andres Island, (12.548108, -81.720769, 48 m), A, 71.52, 4.49, 1.33, 3.2, 3.47, 0.31, 18.46, 7.35, 2, 5, 25, 26, 237, 0.64
N. sp. 6, LACM 38442, San Andres Island, (12.545015, -81.707579, 10 m), J, 38.9, 5.32, 1.34, 3.78, 4.04, 0.31, 22.34, 6.35, 2, 8, 25, 28, 245, 0.46
N. sp. 6, UNM 46902, San Andres Island, (12.545015, -81.707579, 10 m), J, 36.85, 6.19, 1.36, 3.91, 4.04, 0.28, 20.49, 6.54, 2, 6, 26, 26, 238, 0.63
N. sp. 6, UNM 46924, Providencia Island, (13.356133, -81.378422, 112 m), A, 75.72, 5.11, 1.37, 3.31, 3.68, 0.31, 20.6, 7.07, 4, 6, 27, 28, 248, 0.76
N. sp. 6, UNM 57895, Providencia Island, (13.356133, -81.378422, 112 m), A, 65.97, 5.59, 1.52, 3.5, 3.96, 0.31, 23.06, 6.62, 2, 6, 26, 26, 245, 0.71
N. sp. 6, UNM 57896, Providencia Island, (13.356133, -81.378422, 112 m), A, 74.51, 5.17, 1.41, 3.54, 3.64, 0.32, 19.9, 6.56, 3, 6, 26, 26, 246, 0.69
N. sp. 6, UNM 57897, Providencia Island, (13.356133, -81.378422, 112 m), A, 82.71, 5.48, 1.29, 3.47, 3.32, 0.3, 19.54, 6.76, 3, 8, 27, 26, 249, 0.68
N. sp. 6, UNM 57898, Providencia Island, (13.356133, -81.378422, 112 m), A, 49.41, 5.22, 1.44, 3.18, 3.68, 0.33, 20.16, 6.44, 2, 6, 26, 26, 236, 0.63
N. sp. 6, UNM 58025, Providencia Island, (13.356133, -81.378422, 112 m), J, 27.47, N, N, N, N, N, N, N, N, N, N, N, N, N

N. sp. 7, KU 229064, Jamaica, (18.431124, -77.946773, 222 m), A, 61.77, 5.08, 1.68, 3.76, 3.42, 0.3, 19.69, 6.62, 3, 5, 28, 23, 189, 0.65
N. sp. 7, KU 229065, Jamaica, (18.431124, -77.946773, 222 m), A, 60.35, 4.84, 1.39, 3, 3.73, 0.24, 19.6, 8.1, 4, 8, 27, 21, 182, 0.75
N. sp. 7, KU 229066, Jamaica, (18.431124, -77.946773, 222 m), A, 49.19, 5.65, 1.69, 3.35, 3.7, 0.25, 22.02, 6.93, 3, 7, 27, 22, 196, 0.6
N. sp. 7, KU 229067, Jamaica, (18.431124, -77.946773, 222 m), A, 63.49, 4.65, 1.43, 2.99, 3.56, 0.24, 19.18, 7.43, 3, 8, 30, 22, 197, 0.65
N. sp. 7, KU 229068, Jamaica, (18.431124, -77.946773, 222 m), A, 56.53, 5.52, 1.36, 3.33, 3.43, 0.29, 19.49, 6.97, 4, 6, 30, 26, 203, 0.72
N. sp. 7, KU 229069, Jamaica, (18.431124, -77.946773, 222 m), A, 50.45, 4.72, 1.35, 2.97, 3.57, 0.27, 19.88, 6.78, 2, 8, 28, 22, 196, 0.74
N. sp. 7, KU 229070, Jamaica, (18.431124, -77.946773, 222 m), A, 60.82, 4.88, 1.32, 3.24, 3.62, 0.24, 19.71, 6.43, 4, 6, 30, 21, 192, N
N. sp. 7, KU 229071, Jamaica, (18.448963, -77.801373, 159 m), A, 53.73, 5.84, 1.49, 3.59, 3.54, 0.26, 18.83, 6.68, 2, 8, 30, 25, 186, 0.75
N. sp. 7, KU 229080, Jamaica, (18.480028, -77.535285, 37 m), A, 54.7, 5.05, 1.35, 3.66, 3.75, 0.25, 18.74, 6.62, 3, 8, 27, 20, 195, 0.74
N. sp. 7, KU 229081, Jamaica, (18.480028, -77.535285, 37 m), A, 47.14, 5.71, 1.36, 3.82, 3.97, 0.26, 21, 6.55, 2, 8, 29, 20, 180, 0.67
N. sp. 7, KU 229082, Jamaica, (18.480028, -77.535285, 37 m), A, 49.45, 5.2, 1.38, 3.2, 4.04, 0.29, 18.42, 5.66, 3, 6, 30, 22, 186, 0.81

N. sp. 7, KU 229083, Jamaica, (18.480028, -77.535285, 37 m), A, 64.17, 4.75, 1.4, 3.19, 3.41, 0.26, 20.12, 6.39, 2, 8, 28, 20, 184, 0.6

N. sp. 7, KU 229084, Jamaica, (18.480028, -77.535285, 37 m), A, 54.18, 5.39, 1.35, 3.32, 3.69, 0.25, 18.83, 5.87, 4, 7, 31, 20, 197, 0.63

N. sp. 7, KU 229085, Jamaica, (18.480028, -77.535285, 37 m), A, 57.21, 4.84, 1.4, 3.51, 3.78, 0.26, 19.42, 6.48, 2, 6, 30, 20, 203, N

N. sp. 7, KU 229086, Jamaica, (18.480028, -77.535285, 37 m), J, 23.25, N, N, N, N, N, N, N, N, N, N, N, N, N

N. sp. 7, KU 229087, Jamaica, (18.480028, -77.535285, 37 m), A, 52.26, 5.49, 1.45, 3.83, 3.73, 0.29, 19.96, 6.49, 3, 8, 28, 20, 199, N

N. sp. 7, KU 229088, Jamaica, (18.480028, -77.535285, 37 m), A, 54.12, 5.16, 1.39, 3.44, 3.7, 0.27, 18.24, 4.84, 3, 8, 30, 20, 188, 0.6

N. sp. 7, KU 229089, Jamaica, (18.480028, -77.535285, 37 m), A, 43.65, 5.52, 1.49, 3.53, 4.24, 0.3, 20.23, 6.03, 3, 6, 26, 20, 190, 0.64

N. sp. 7, KU 229090, Jamaica, (18.467778, -77.536666, 135 m), A, 60.53, 5.72, 1.5, 3.72, 3.63, 0.33, 20.25, 6.91, 2, 6, 30, 22, 195, 0.76

N. sp. 7, KU 229091, Jamaica, (18.467778, -77.536666, 135 m), A, 55.97, 5.25, 1.3, 3.36, 3.88, 0.24, 18.51, 6.11, 4, 9, 28, 20, 188, 0.67

N. sp. 7, KU 229092, Jamaica, (18.467778, -77.536666, 135 m), A, 54.03, 5.65, 1.52, 3.83, 3.98, 0.33, 19.3, 6.22, 2, 6, 27, 20, 194, 0.63

N. sp. 7, KU 229093, Jamaica, (18.467778, -77.536666, 135 m), A, 49.74, 5.17, 1.61, 3.82, 3.9, 0.25, 19.1, 6.41, 3, 6, 27, 20, 180, 0.62

N. sp. 7, KU 229094, Jamaica, (18.467778, -77.536666, 135 m), A, 44.89, 5.64, 1.47, 3.81, 4.23, 0.25, 20.85, 7.02, 3, 6, 26, 20, 187, 0.65

N. sp. 7, KU 229095, Jamaica, (18.467778, -77.536666, 135 m), A, 47.02, 5.4, 1.36, 3.4, 4.17, 0.3, 19.29, 5.32, 3, 6, 28, 20, 180, 0.63

N. sp. 7, KU 229096, Jamaica, (18.467778, -77.536666, 135 m), J, 32.62, N, N, N, N, N, N, N, N, N, N, N, N, N

N. sp. 7, KU 229097, Jamaica, (18.467778, -77.536666, 135 m), A, 56.17, 5.84, 1.34, 3.65, 3.45, 0.2, 21.03, 6.73, 3, 8, 30, 20, 196, 0.81

N. sp. 7, KU 229098, Jamaica, (18.467778, -77.536666, 135 m), A, 54.7, 5.72, 1.32, 3.56, 3.58, 0.26, 17.37, 6.6, 2, 6, 31, 20, 176, 0.7

N. sp. 7, KU 229099, Jamaica, (18.467778, -77.536666, 135 m), A, 55.74, 5.58, 1.52, 3.75, 3.39, 0.3, 18.51, 6.15, 3, 6, 29, 21, 182, N

N. sp. 7, KU 229100, Jamaica, (18.467778, -77.536666, 135 m), A, 53.25, 4.92, 1.52, 3.61, 3.74, 0.31, 17.9, 5.8, 2, 6, 30, 20, 184, N

N. sp. 7, KU 229101, Jamaica, (18.467778, -77.536666, 135 m), A, 54.32, 5.15, 1.33, 3.76, 3.81, 0.22, 22.85, 6.59, 2, 8, 27, 20, 181, 0.6

N. sp. 7, KU 229102, Jamaica, (18.467778, -77.536666, 135 m), A, 49.23, 5.65, 1.65, 3.76, 3.82, 0.24, 18.48, 5.59, 2, 6, 27, 20, 177, 0.75

N. sp. 7, KU 229103, Jamaica, (18.467778, -77.536666, 135 m), A, 45.49, 6.11, 1.69, 3.58, 4.48, 0.21, 21.68, 6.22, 3, 9, 28, 22, 204, 0.76

N. sp. 7, KU 229104, Jamaica, (18.467778, -77.536666, 135 m), A, 48.12, 5.22, 1.7, 3.18, 3.78, 0.24, 19.41, 6.13, 2, 6, 29, 20, 184, 0.61

N. sp. 7, KU 229105, Jamaica, (18.467778, -77.536666, 135 m), A, 46.4, 5.5, 1.42, 3.38, 4.09, 0.25, 19.59, 5.84, 3, 6, 26, 20, 195, 0.78

N. sp. 7, KU 229106, Jamaica, (18.467778, -77.536666, 135 m), A, 45.37, 5.44, 1.7, 3.59, 4.12, 0.27, 20.63, 6.63, 2, 6, 27, 20, 186, N

N. sp. 7, KU 229107, Jamaica, (18.467778, -77.536666, 135 m), J, 25.62, N, N, N, N, N, N, N, N, N, N, N, N, N

N. sp. 7, KU 229108, Jamaica, (18.467778, -77.536666, 135 m), J, 27.19, N, N, N, N, N, N, N, N, N, N, N, N, N

N. sp. 7, KU 229109, Jamaica, (18.467778, -77.536666, 135 m), J, 24.62, N, N, N, N, N, N, N, N, N, N, N, N, N

N. sp. 7, KU 229110, Jamaica, (18.467778, -77.536666, 135 m), J, 26.32, N, N, N, N, N, N, N, N, N, N, N, N, N

N. sp. 7, KU 229111, Jamaica, (18.467778, -77.536666, 135 m), J, 24.83, N, N, N, N, N, N, N, N, N, N, N, N, N

N. sp. 7, KU 229112, Jamaica, (18.467778, -77.536666, 135 m), J, 25.43, N, N, N, N, N, N, N, N, N, N, N, N, N

N. sp. 7, KU 229113, Jamaica, (18.480028, -77.535285, 37 m), A, 50.34, 5.4, 1.43, 3.89, 4.03, 0.24, 19.96, 6.69, 2, 8, 28, 20, 191, 0.69

N. sp. 7, KU 229114, Jamaica, (18.511028, -77.742976, 3 m), A, 50.76, 5.54, 1.52, 3.66, 4.02, 0.33, 18.91, 6.7, 2, 6, 27, 20, 184, 0.66

N. sp. 7, KU 229115, Jamaica, (18.511028, -77.742976, 3 m), A, 52.04, 4.8, 1.44, 3.15, 3.82, 0.29, 20.31, 6.46, 2, 6, 26, 23, 180, N

N. sp. 7, KU 229116, Jamaica, (18.489007, -77.708159, 20 m), A, 57.98, 5.24, 1.4, 3.1, 3.83, 0.23, 20.01, 6.85, 3, 8, 30, 22, 189, 0.87

N. sp. 7, LACM 61450, Jamaica, (18.457159, -77.537051, 239 m), A, 48.89, 5.91, 1.64, 3.66, 3.91, 0.23, 19.84, 5.32, 3, 8, 26, 20, 202, N

N. sp. 7, USNM 108340, Jamaica, (18.458643, -77.949098, 3 m), A, 43.34, 5.95, N, 4.59, N, N, 19.66, 6.67, N, N, 31, 20, 192, N

N. sp. 7, USNM 108341, Jamaica, (18.458643, -77.949098, 3 m), A, 66.61, 5.89, N, 3.71, N, N, 19.01, 8.35, N, N, 26, 23, 204, N

N. sp. 7, USNM 108342, Jamaica, (18.458643, -77.949098, 3 m), A, 57.53, 6.21, N, 3.81, N, N, 18.77, 9.56, N, N, 31, 23, 203, N

N. sp. 7, USNM 108343, Jamaica, (18.458643, -77.949098, 3 m), A, 58.97, 5.61, N, 3.41, N, N, 20.98, 7.04, N, N, 30, 23, 201, N

N. sp. 7, USNM 251774, Jamaica, (18.438278, -78.006895, 190 m), A, 61.13, 4.51, N, 3.68, N, N, 19.42, 8.16, N, N, 34, 21, 186, N

N. sp. 7, USNM 251775, Jamaica, (18.422427, -78.034797, 255 m), A, 63.94, 5.58, N, 3.61, N, N, 19.57, 8.07, N, N, 29, 23, 199, N

N. sp. 7, USNM 251777, Jamaica, (18.492076, -77.913313, 99 m), A, 57.88, 5.25, N, 3.39, N, N, 18.57, 7.03, N, N, 30, 20, 185, N

N. sp. 7, USNM 251778, Jamaica, (18.492076, -77.913313, 99 m), A, 48.05, 5.72, N, 3.91, N, N, 19.52, 7.62, N, N, 30, 20, 188, N

N. sp. 7, USNM 251779, Jamaica, (18.492076, -77.913313, 99 m), A, 55.2, 5.4, N, 3.91, N, N, 21.03, 7.63, N, N, 30, 22, 199, N

N. sp. 7, USNM 251780, Jamaica, (18.492076, -77.913313, 99 m), A, 57.94, 5.63, N, 3.75, N, N, 20.3, 7.28, N, N, 32, 22, 192, N

N. sp. 7, USNM 251781, Jamaica, (18.492076, -77.913313, 99 m), A, 61.33, 5.35, N, 3.78, N, N, 19.7, 7.42, N, N, 29, 20, 179, N

N. sp. 7, USNM 251782, Jamaica, (18.492076, -77.913313, 99 m), A, 59.71, 4.81, N, 2.96, N, N, 19.54, 6.43, N, N, 30, 23, 197, N

N. sp. 7, USNM 251787, Jamaica, (18.492457, -77.922552, sea level), A, 64.48, 5.85, N, 3.58, N, N, 20.6, 7.48, N, N, 28, 22, 188, N

N. sp. 7, USNM 251789, Jamaica, (18.492457, -77.922552, sea level), A, 58.84, 5, N, 3.64, N, N, 18.73, 6.14, N, N, 28, 22, 190, N

N. sp. 7, USNM 251790, Jamaica, (18.492457, -77.922552, sea level), A, 53.75, 5.41, N, 4, N, N, 20.82, 7.81, N, N, 30, 22, 203, N

N. sp. 7, USNM 251791, Jamaica, (18.492457, -77.922552, sea level), A, 51.09, 5.83, N, 3.66, N, N, 20.38, 6.44, N, N, 27, 23, 200, N

N. sp. 7, USNM 251793, Jamaica, (18.492457, -77.922552, sea level), A, 37.17, 6.13, N, 3.63, N, N, 20.26, 7.91, N, N, 30, 26, 192, N

N. sp. 7, USNM 251794, Jamaica, (18.492739, -77.922313, 6 m), A, 55.18, 5.35, N, 3.81, N, N, 20.77, 7.58, N, N, 30, 22, 199, N

N. sp. 7, USNM 251795, Jamaica, (18.492739, -77.922313, 6 m), A, 40.12, 6.11, N, 3.61, N, N, 20.11, 7.33, N, N, 30, 22, 190, N

N. sp. 7, USNM 251796, Jamaica, (18.512736, -77.765292, 25 m), A, 41.6, 6.92, N, 4.3, N, N, 19.86, 7.67, N, N, 26, 26, 182, N

N. sp. 7, USNM 251799, Jamaica, (18.480125, -77.672407, 90 m), A, 64.94, 5.28, N, 3.5, N, N, 20.51, 7.3, N, N, 30, 20, 197, N

N. sp. 7, USNM 328187, Jamaica, (18.485585, -77.532748, 5 m), A, 43, 6.23, 1.53, 3.07, 4.02, 0.24, 20.14, 5.53, 3, 8, 28, 21, 199, N

N. sp. 7, USNM 328188, Jamaica, (18.485585, -77.532748, 5 m), A, 46.11, 4.73, 1.41, 2.82, 3.8, 0.31, 19.28, 5.01, 2, 6, 30, 22, 195, N

N. sp. 7, USNM 328189, Jamaica, (18.485585, -77.532748, 5 m), A, 56.87, 5.03, 1.39, 2.66, 3.62, 0.29, 18.53, 6, 4, 6, 27, 20, 192, 0.85

N. sp. 7, USNM 328190, Jamaica, (18.476554, -77.537546, 80 m), A, 52.1, 3.51, 1.4, 2.4, 3.4, 0.23, 18.58, 5.43, 2, 6, 27, 20, 185, 0.71

N. sp. 7, USNM 328191, Jamaica, (18.476554, -77.537546, 80 m), A, 47.18, 5.21, 1.36, 3.07, 4.15, 0.25, 20.43, 5.51, 3, 8, 27, 20, 174, 0.64

N. sp. 8, KU 229046, Jamaica, (18.077634, -76.295648, 41 m), A, 53.24, 5.99, 1.35, 3.68, 3.93, 0.35, 21.26, 6.69, 4, 6, 30, 25, 226, 0.57

N. sp. 8, KU 229047, Jamaica, (18.077634, -76.295648, 41 m), A, 63.85, 5.94, 1.46, 3.29, 3.66, 0.34, 21.1, 6.91, 4, 4, 27, 24, 219, 0.57

N. sp. 8, SBH 267943, Jamaica, (18.169457, -76.446961, 16 m), A, 71.48, 6.02, 1.54, 3.72, 3.67, 0.35, 22.34, 7.09, 2, 4, 30, 24, 218, 0.77

N. sp. 8, SBH 267946, Jamaica, (18.169457, -76.446961, 16 m), A, 43.59, 5.71, 1.42, 4.36, 3.81, 0.35, 23.74, 6.4, 2, 4, 30, 24, 212, 0.64

N. sp. 8, USNM 233874, Jamaica, (18.374218, -76.884714, 0 m), A, 53.07, 5.65, N, 3.6, N, N, 21.52, 8.39, N, N, N, N, 206, N

N. sp. 8, USNM 233875, Jamaica, (18.374218, -76.884714, 0 m), A, 60.18, 5.53, N, 3.39, N, N, 19.64, 8.47, N, N, N, N, 205, N

N. sp. 8, USNM 233876, Jamaica, (18.374218, -76.884714, 0 m), A, 66.32, 5.41, N, 3.62, N, N, 20.82, 7.75, N, N, N, N, 204, N

N. sp. 8, USNM 233877, Jamaica, (18.374218, -76.884714, 0 m), A, 64.74, 5.28, N, 3.57, N, N, 19.79, 7.74, N, N, N, N, 206, N

N. sp. 8, USNM 233878, Jamaica, (18.374218, -76.884714, 0 m), A, 53.2, 6.28, N, 4.15, N, N, 20.79, 7.44, N, N, N, N, 211, N

N. sp. 8, USNM 233879, Jamaica, (18.374218, -76.884714, 0 m), A, 77.37, 6.4, N, 3.88, N, N, 21.3, 8.27, N, N, N, N, 206, N

N. sp. 8, USNM 251831, Jamaica, (18.199385, -76.514273, 15 m), A, 51.52, 5.67, 1.36, 3.63, 3.82, 0.34, 20.9, 7.22, 3, 4, 29, 24, 218, 0.62

N. sp. 9, KU 229051, Jamaica, (18.458977, -77.35709, 2 m), J, 28.74, 6.72, 1.57, 4.07, 4.38, 0.27, 22.65, 6.16, 3, 8, 26, 20, 201, 0.51

N. sp. 9, KU 229129, Jamaica, (18.463086, -77.382895, 12 m), J, 28.36, 6.49, 1.48, 3.88, 4.23, 0.25, 21.58, 5.57, 3, 8, 26, 22, 200, 0.4

N. sp. 9, LACM 109078, Jamaica, (18.466667, -77.4, 8 m), A, 79.48, 5.37, 1.36, 3.18, 3.54, 0.21, 20.89, 6.01, 3, 8, 30, 24, 210, N
N. sp. 9, LACM 109079, Jamaica, (18.466667, -77.4, 8 m), A, 90.3, 6.05, 1.59, 3.63, 3.31, 0.28, 20.12, 6.38, 2, 8, 29, 22, 197, 0.8
N. sp. 9, LACM 109080, Jamaica, (18.466667, -77.4, 8 m), A, 62.01, 5.74, 1.37, 3.08, 3.61, 0.27, 21.34, 5.52, 3, 8, 30, 20, 186, 0.85
N. sp. 9, LACM 109081, Jamaica, (18.466667, -77.4, 8 m), A, 66.83, 5.43, 1.48, 3.34, 3.49, 0.24, 19.89, 5.76, 3, 8, 30, 22, 189, N

N. sp. 10, KU 229019, Little Cayman Island, (19.662984, -80.077572, 7 m), A, 70.77, 4.9, 1.89, 3.18, 3.17, 0.22, 21.36, 6.01, 2, 8, 29, 26, 220, 0.82
N. sp. 10, KU 229020, Little Cayman Island, (19.666273, -80.085593, 7 m), J, 33.76, 5.81, 1.75, 3.47, 3.76, 0.2, 21.33, 4.5, 2, 8, 28, 24, 214, 0.64
N. sp. 10, KU 229021, Little Cayman Island, (19.666273, -80.085593, 7 m), J, 32.49, 5.79, 1.94, 3.57, 4.22, 0.23, 21.02, 5.17, 1, 8, 28, 24, 219, 0.61
N. sp. 10, USNM 236625, Little Cayman Island, (19.665141, -80.062491, 4 m), A, 62.13, 5.21, N, 3.67, N, N, 21.28, 6.08, N, N, 27, 26, 210, N
N. sp. 10, USNM 236626, Little Cayman Island, (19.665131, -80.063406, 4 m), A, 65.42, 5.46, N, 4, N, N, 22.01, 6.45, N, N, 29, 25, 212, N

N. sp. 11, FLMNH 126386, Jamaica, (17.949952, -76.666671, 105 m), A, 59.68, 5.73, 1.39, 3.6, 3.89, 0.23, 21.8, 7.26, 3, 6, 26, 22, 192, 0.85
N. sp. 11, KU 229048, Jamaica, (17.936766, -76.841106, 4 m), A, 56.39, 5.87, 1.33, 3.81, 3.39, 0.23, 20.94, 6.51, 2, 8, 28, 22, 189, 0.73
N. sp. 11, KU 229049, Jamaica, (17.936766, -76.841106, 4 m), A, 64.71, 5.89, 1.41, 3.8, 3.2, 0.26, 22.16, 6.31, 2, 6, 30, 21, 188, 0.83
N. sp. 11, KU 229050, Jamaica, (17.938068, -76.813394, 5 m), A, 50.93, 5.85, 1.53, 3.91, 3.81, 0.2, 22.09, 6.83, 2, 8, 26, 22, 208, 0.67
N. sp. 11, KU 229059, Jamaica, (17.935265, -76.875567, 17 m), A, 53.75, 5.53, 1.45, 3.63, 3.22, 0.21, 19.24, 6.14, 2, 8, 29, 22, 192, 0.61
N. sp. 11, KU 229077, Jamaica, (17.914036, -76.624609, 100 m), A, 51.75, 5.7, 1.22, 3.73, 3.63, 0.26, 18.11, 6.72, 2, 5, 30, 20, 203, 0.65
N. sp. 11, SBH 171616, Jamaica, (17.876839, -76.551714, 92 m), J, 23.45, 6.27, 1.24, 3.84, 4.73, 0.23, 21.62, 7.08, 2, 8, 28, 20, 195, 0.62
N. sp. 11, SBH 267942, Jamaica, (18.168341, -76.447059, 18 m), A, 95.37, 6.87, 1.59, 3.8, 3.49, 0.2, 21.68, 7.41, 4, 7, 27, 24, 211, 0.83
N. sp. 11, SBH 267948, Jamaica, (N), A, 57.29, 6.89, 1.66, 3.72, 3.42, 0.27, 25.55, 7.21, 3, 8, 26, 22, 205, 0.6
N. sp. 11, USNM 31005, Jamaica, (17.94772, -76.874337, 14 m), A, 58.05, 5.05, N, 3.27, N, N, 21.98, 1.15, N, N, 26, 28, 211, N
N. sp. 11, USNM 36647, Jamaica, (18.022662, -76.749523, 206 m), A, 79.09, 6.06, N, 3.64, N, N, 22.91, 7.62, N, N, 28, 25, 198, N
N. sp. 11, USNM 83709, Jamaica, (17.984016, -76.749704, 413 m), A, 53.83, 5.33, N, 3.81, N, N, 20.55, 6.26, N, N, 30, 31, 217, N
N. sp. 11, USNM 83710, Jamaica, (17.984016, -76.749704, 413 m), A, 38.13, 6.22, N, 4.35, N, N, 23.58, 7.53, N, N, 25, 30, 205, N
N. sp. 11, USNM 83711, Jamaica, (17.984016, -76.749704, 413 m), A, 36.12, 6.56, N, 5.04, N, N, 23.45, 7.23, N, N, 28, 31, 216, N
N. sp. 11, USNM 106297, Jamaica, (17.94772, -76.874337, 14 m), A, 61.42, 5.5, N, 3.68, N, N, 22.76, 6.46, N, N, 28, 20, 199, N

N. sp. 11, USNM 108128, Jamaica, (18.215346, -76.810299, 44 m), A, 36.28, 7.61, N, 4.63, N, N, 22.82, 8.02, N, N, 24, 23, 203, N
N. sp. 11, USNM 108129, Jamaica, (18.215346, -76.810299, 44 m), A, 64.11, 5.99, N, 3.67, N, N, 21.43, 7.41, N, N, 26, 24, 221, N
N. sp. 11, USNM 115426, Jamaica, (17.992832, -76.790635, 62 m), A, 52.21, 7.2, N, 4.08, N, N, 24.88, 7.09, N, N, N, N, 212, N
N. sp. 11, USNM 218574, Jamaica, (17.92183, -76.639637, 81 m), A, 68.18, 6.23, N, 4.21, N, N, 20.9, 7.38, N, N, 26, 28, 212, N
N. sp. 11, USNM 251832, Jamaica, (17.936088, -76.798798, 3 m), A, 56.43, 5.72, 1.29, 3.93, 3.49, 0.25, 20.82, 5.58, 2, 8, 26, 22, 197, N
N. sp. 11, USNM 328193, Jamaica, (17.948027, -76.897118, 9 m), A, 45.88, 6.26, 1.26, 3.81, 3.71, 0.21, 19.94, 6.23, 2, 8, 27, 24, 192, 0.55
N. sp. 11, USNM 328194, Jamaica, (17.948027, -76.897118, 9 m), J, 27.71, N, N, N, N, N, N, N, N, N, N, N, N, N
N. sp. 11, USNM 328195, Jamaica, (17.907029, -76.898711, 30 m), A, 51.83, 5.85, 1.37, 3.7, 3.88, 0.22, 19.56, 6.06, 3, 6, 26, 20, 185, N
N. sp. 11, USNM 328196, Jamaica, (17.932091, -76.879038, 15 m), A, 54.5, 6, 1.41, 3.96, 4.04, 0.19, 20.4, 6.09, 2, 9, 26, 20, 195, 0.74
N. sp. 11, USNM 328197, Jamaica, (17.932091, -76.879038, 15 m), A, 43.08, 6.2, 1.39, 3.88, 3.81, 0.22, 19.17, 6.04, 2, 6, 27, 23, 207, 0.94
N. sp. 11, USNM 328198, Jamaica, (17.897225, -76.894478, 5 m), A, N, N, N, N, N, 0.26, N, N, 3, 8, 26, 20, N, 0.59
N. sp. 11, USNM 328211, Jamaica, (17.995775, -76.751332, 210-245 m), A, 42.43, 5.92, 1.3, 3.72, 3.91, 0.2, 20.88, 6.6, 2, 8, 26, 22, 198, 0.58
N. sp. 11, USNM 328212, Jamaica, (17.995775, -76.751332, 210-245 m), J, 28.82, N, N, N, 4.48, 0.23, N, N, 2, 8, N, N, N, N
N. sp. 11, USNM 328213, Jamaica, (17.882806, -76.593176, 25 m), A, 37.9, 6.81, 1.29, 3.77, 4.25, 0.2, 23.77, 6.02, 4, 7, 26, 22, 199, 0.62
N. sp. 11, USNM 337563, Jamaica, (17.998514, -76.75204, 175 m), A, 54.17, 5.69, 1.46, 3.86, 3.64, 0.21, 19.25, 6.13, 4, 8, 25, 22, 197, 0.61
N. sp. 11, USNM 337564, Jamaica, (17.998514, -76.75204, 175 m), J, 22.84, N, N, N, 5.52, 0.13, N, N, 3, 8, N, N, N, N

A. georgeensis, MPM 7500, Belize, (17.170227, -87.904594, 4 m), A, 72.43, 5.4, 1.38, 3.76, 3.89, 0.27, 22.79, 7.81, 3, 8, 30, 28, 247, 0.73
A. georgeensis, MPM 7501, Belize, (17.170227, -87.904594, 4 m), A, 59.64, 5.55, 1.44, 4.09, 4.34, 0.27, 22.62, 7.7, 2, 8, 30, 28, 258, 0.65
A. georgeensis, MPM 7502, Belize, (17.316951, -88.047648, NEGATIVE 3 m), J, 33.32, N, N, N, N, N, N, N, N, N, N, N, N, N
A. georgeensis, MPM 7794, Belize, (18.001592, -87.943284, 5 m), A, 70.04, 5.67, 1.4, 3.83, 4.05, 0.26, 22.49, 7.58, 3, 8, 31, 26, 251, 0.76
A. georgeensis, MPM 7995, Belize, (18.001592, -87.943284, 5 m), J, 38.61, N, N, N, N, N, N, N, N, N, N, N, N, N
A. georgeensis, MPM 8047, Belize, (17.761158, -88.027749, 8 m), A, 70.65, 4.76, N, 3.33, 3.64, 0.23, 20.65, 6.89, 3, 8, 30, 26, 251, 0.77
A. georgeensis, MPM 8048, Belize, (17.761158, -88.027749, 8 m), A, 71.08, 6.01, 1.32, 3.7, 3.43, 0.26, 21, 7.09, 3, 8, 29, 28, 249, 0.76
A. georgeensis, MPM 23553, Belize, (17.577877, -87.79582, 4 m), A, 61.15, 5.67, 1.32, 3.84, 4.42, 0.24, 21.21, 7.56, 3, 8, 29, 26, 249, 0.6

A. georgeensis, MPM 23554, Belize, (17.577877, -87.79582, 4 m), A, 64.78, 5.5, 1.2, 3.54, 3.77, 0.25, 20.96, 6.82, 3, 8, 30, 28, 242, 0.6
A. georgeensis, MPM 23555, Belize, (17.577877, -87.79582, 4 m), A, 83.12, 5.92, 1.26, 3.66, 3.62, 0.23, 19.2, 6.62, 3, 9, 30, 28, 243, 0.77
A. georgeensis, MPM 23556, Belize, (17.577877, -87.79582, 4 m), A, 82.55, 6.4, 1.39, 3.88, 3.85, 0.25, 21.27, 6.64, 5, 8, 28, 26, 249, 0.69
A. georgeensis, MPM 23557, Belize, (17.577877, -87.79582, 4 m), A, 99.14, 5.99, 1.37, 3.99, 3.69, 0.22, 22.2, 7.35, 4, 8, 29, 28, 257, 0.71

A. irregularis, FLMNH 41769, Mexico, (20.518921, -86.94375, 8 m), A, 44.82, 6.09, 1.54, 3.86, 4.17, 0.28, 22.49, 7.65, 3, 6, 29, 28, 250, 0.4
A. irregularis, FLMNH 41770, Mexico, (20.518921, -86.94375, 8 m), A, 40.45, 5.27, 1.51, 3.73, 4.3, 0.29, 21.48, 7.22, 4, 6, 29, 28, 240, 0.32
A. irregularis, FLMNH 41771, Mexico, (20.518921, -86.94375, 8 m), J, 16.1, N, N, N, N, N, N, N, N, N, N, N, N, N
A. irregularis, FLMNH 41772, Mexico, (20.506662, -86.932244, 6 m), A, 85.58, 5.84, 1.39, 3.76, 3.42, 0.3, 20.64, 7.6, 3, 7, 30, 28, 252, 0.34
A. irregularis, FLMNH 41773, Mexico, (N), A, 62.48, 4.83, 1.33, 3.01, 4.18, 0.26, 20.73, 5.44, 3, 6, 30, 26, 240, 0.38
A. irregularis, FLMNH 41774, Mexico, (20.404067, -86.857523, 3 m), A, 62.31, 5.3, 1.57, 3.82, 3.72, 0.31, 22.54, 7.33, 3, 8, 30, 26, 245, 0.34
A. irregularis, FLMNH 41775, Mexico, (20.550995, -86.915967, 8 m), A, 49.64, 4.95, 1.39, 3.91, 3.67, 0.31, 20.75, 6.47, 3, 6, 30, 26, 246, 0.35
A. irregularis, FLMNH 41776, Mexico, (20.481537, -86.971669, 7 m), A, 70.78, 5.38, 1.44, 3.69, 3.42, 0.31, 20.66, 7.21, 4, 6, 29, 28, 251, 0.32
A. irregularis, UCM 12439, Mexico, (20.535843, -86.936333, 10 m), A, 48.22, 5.58, 1.45, 4.5, 4.19, 0.26, 22.87, 7.47, 3, 6, 30, 27, 254, 0.3
A. irregularis, UCM 12441, Mexico, (20.535843, -86.936333, 10 m), A, 69.16, 5.34, 1.37, 3.27, 3.99, 0.24, 21.4, 5.19, 2, 8, 31, 28, 258, 0.27
A. irregularis, UCM 12443, Mexico, (20.316666666, -86.93333333, 6 m), A, 83.31, 5.22, 1.36, 3.67, 3.69, 0.26, 21.43, 6.45, 4, 8, 30, 28, 256, 0.33
A. irregularis, UCM 16160, Mexico, (21.25833, -86.74666999, 5 m), A, 88.29, 5.65, 1.6, 3.59, 3.55, 0.26, 21.5, 7.19, 3, 8, 29, 29, 257, 0.44
A. irregularis, UCM 16162, Mexico, (21.25833, -86.74666999, 5 m), A, 55.82, 5.79, 1.45, 3.89, 3.87, 0.24, 20.94, 6.74, 3, 6, 30, 28, 257, 0.37
A. irregularis, UCM 16164, Mexico, (21.25833, -86.74666999, 5 m), A, 64.62, 5.46, 1.62, 3.23, 3.93, 0.31, 20.09, 5.49, 3, 4, 30, 28, 253, 0.41
A. irregularis, UCM 16166, Mexico, (21.25833, -86.74666999, 5 m), A, 58.95, 5.58, 1.48, 3.9, 4.02, 0.24, 21.83, 7.04, 3, 6, 30, 28, 250, 0.31
A. irregularis, UCM 16168, Mexico, (21.25833, -86.74666999, 5 m), A, 94.22, 5.87, 1.59, 4.14, 3.63, 0.29, 22.84, 7.39, 3, 6, 30, 28, 251, 0.71
A. irregularis, UCM 16170, Mexico, (21.25833, -86.74666999, 5 m), A, 72.35, 5.63, 1.38, 2.92, 3.3, 0.3, 20.11, 5.28, 3, 8, 30, 28, 240, 0.36
A. irregularis, UCM 16172, Mexico, (21.25833, -86.74666999, 5 m), A, 66.65, 5.52, 1.37, 3.69, 4.02, 0.29, 22.12, 6.87, 3, 4, 30, 26, 243, 0.38
A. irregularis, UCM 16176, Mexico, (21.25833, -86.74666999, 5 m), A, 68.7, 5.94, 1.64, 3.8, 4.15, 0.26, 21.83, 6.65, 4, 10, 31, 27, 253, 0.32
A. irregularis, UCM 16178, Mexico, (21.25833, -86.74666999, 5 m), A, 87.32, 5.11, 1.31, 3.13, 3.47, 0.3, 20.95, 5.61, 3, 8, 30, 28, 260, 0.44

A. irregularis, UCM 16180, Mexico, (20.48861, -86.91777999, 11 m), A, 73.75, 5.4, 1.46, 3.63, 3.85, 0.26, 22.17, 7.34, 3, 8, 30, 27, 257, 0.35
A. irregularis, UCM 16183, Mexico, (20.48861, -86.91777999, 11 m), J, 37.12, 5.25, 1.37, 3.56, 3.91, 0.23, 20.39, 6.17, 3, 8, 31, 28, 255, 0.33
A. irregularis, UCM 16185, Mexico, (20.48861, -86.91777999, 11 m), A, 75.34, 5.31, 1.42, 3.8, 3.46, 0.25, 21.38, 7.25, 3, 8, 30, 28, 253, 0.32

A. nelsoni, KU 47169, Swan Island, (17.408199310303, -83.930099487305, 14 m), A, 82.55, 5.43, 1.25, 3.36, 3.5, 0.27, 22.08, 6.63, 3, 6, 32, 23, 216, N
A. nelsoni, KU 223819, Swan Island, (17.40218925, -83.94405365, 0 m), A, 45.03, 5.26, 1.22, 3.55, 3.78, 0.32, 19.52, 5.53, 3, 6, 32, 24, 218, 0.64
A. nelsoni, KU 223820, Swan Island, (17.4050293, -83.94245148, 11 m), A, 61.5, 5.32, 1.24, 3.4, 3.53, 0.29, 20.24, 5.84, 3, 8, 32, 24, 217, N
A. nelsoni, KU 223821, Swan Island, (17.4050293, -83.94245148, 11 m), J, 39.87, N, N, N, N, N, N, N, N, N, N, N, N, N
A. nelsoni, KU 223822, Swan Island, (17.41507912, -83.92913055, 4 m), A, 59.44, 5.52, 1.18, 3.33, 3.57, 0.31, 20.9, 6.22, 3, 6, 30, 26, 217, 0.70
A. nelsoni, KU 223823, Swan Island, (17.41179, -83.93214, 4 m), A, 51.08, 5.58, 1.25, 3.43, 3.78, 0.3, 19.22, 5.54, 3, 8, 32, 26, 223, 0.76
A. nelsoni, KU 223824, Swan Island, (17.40115, -83.94292, 1 m), A, 56.08, 5.26, 1.27, 2.67, 3.78, 0.3, 20.99, 5.22, 3, 6, 30, 26, 217, 0.68
A. nelsoni, KU 223825, Swan Island, (17.40115, -83.94292, 1 m), J, 34.55, N, N, N, N, N, N, N, N, N, N, N, N, N
A. nelsoni, KU 223826, Swan Island, (17.40746, -83.92109, 7 m), A, 50.24, 5.31, 1.29, 3.36, 3.72, 0.31, 19.8, 5.85, 2, 6, 31, 22, 212, 0.6
A. nelsoni, KU 223827, Swan Island, (17.40503, -83.94245, 11 m), A, 67.41, 5.24, 1.17, 3.37, 3.5, 0.31, 20.89, 5.9, 2, 8, 30, 24, 205, N
A. nelsoni, KU 223828, Swan Island, (17.40503, -83.94245, 11 m), A, 61.59, 5.2, 1.32, 3.04, 3.85, 0.3, 20.43, 5.91, 2, 6, 32, 23, 207, 0.54
A. nelsoni, KU 223829, Swan Island, (17.408199310303, -83.930099487305, 14 m), A, 79.3, 4.93, 1.16, 3.3, 3.37, 0.31, 20.71, 6.42, 2, 6, 30, 25, 213, 0.78
A. nelsoni, KU 223830, Swan Island, (17.408199310303, -83.930099487305, 14 m), A, 74.32, 5.52, 1.28, 3.39, 3.39, 0.31, 20.32, 6.69, 2, 6, 30, 24, 217, N
A. nelsoni, KU 223831, Swan Island, (17.408199310303, -83.930099487305, 14 m), A, 58.92, 5.28, 1.21, 3.22, 3.65, 0.28, 20.47, 5.75, 3, 6, 31, 24, 214, 0.51
A. nelsoni, KU 223832, Swan Island, (17.408199310303, -83.930099487305, 14 m), A, 59.28, 5.48, 1.2, 3.17, 3.76, 0.31, 21.05, 6.02, 3, 6, 30, 24, 215, 0.68
A. nelsoni, KU 223833, Swan Island, (17.408199310303, -83.930099487305, 14 m), A, 53.9, 5.06, 1.15, 2.84, 3.8, 0.29, 20.61, 5.97, 2, 4, 29, 25, 203, 0.61
A. nelsoni, KU 223834, Swan Island, (17.408199310303, -83.930099487305, 14 m), A, 51.23, 5.41, 1.11, 3.34, 3.57, 0.3, 20.09, 5.8, 2, 8, 30, 24, 219, N
A. nelsoni, KU 223835, Swan Island, (17.408199310303, -83.930099487305, 14 m), A, 63.41, 5.43, 1.23, 3.33, 3.31, 0.29, 19.81, 5.55, 2, 6, 30, 22, 210, 0.78
A. nelsoni, KU 223836, Swan Island, (17.41026, -83.93986, 3 m), J, 37.92, N, N, N, N, N, N, N, N, N, N, N, N, N
A. nelsoni, KU 223837, Swan Island, (17.41026, -83.93986, 3 m), J, 35.71, N, N, N, N, N, N, N, N, N, N, N, N, N
A. nelsoni, KU 223838, Swan Island, (17.41026, -83.93986, 3 m), J, 42.56, N, N, N, N, N, N, N, N, N, N, N, N, N

A. nelsoni, KU 223839, Swan Island, (17.41026, -83.93986, 3 m), A, 50.12, 5.27, 1.26, 3.19, 3.69, 0.3, 20.21, 5.39, 3, 8, 30, 22, 221, 0.77

A. nelsoni, KU 223840, Swan Island, (17.4121, -83.92467, 13 m), A, 56.45, 5.12, 1.15, 3.31, 3.67, 0.24, 19.47, 5.3, 3, 8, 30, 22, 208, 0.66

A. nelsoni, USNM 494647, Great Swan Island, (17.40827, -83.94381, 7 m), A, 56.39, 5.39, 1.28, 2.98, 3.67, 0.29, 19.37, 5.48, 3, 6, 28, 22, 205, N

A. nelsoni, USNM 494648, Great Swan Island, (17.40503, -83.94245, 11 m), A, 73.22, 5.05, 1.22, 2.85, 3.39, 0.29, 19.95, 5.34, 2, 6, 30, 24, 215, N

A. nelsoni, USNM 494649, Great Swan Island, (17.40503, -83.94245, 11 m), J, 24.38, N, N, N, N, N, N, N, N, N, N, N, N, N

A. nelsoni, USNM 494650, Great Swan Island, (17.41508, -83.92913, 4 m), A, 77.14, 5.28, 1.18, 3.29, 3.28, 0.3, 19.68, 5.41, 3, 8, 32, 24, 218, 0.53

A. nelsoni, USNM 494651, Great Swan Island, (17.41508, -83.92913, 4 m), A, 59.28, 5.33, 1.3, 2.67, 3.54, 0.32, 19.65, 5.48, 2, 6, 31, 22, 200, 0.79

A. nelsoni, USNM 494652, Great Swan Island, (17.41508, -83.92913, 4 m), A, 44.36, 5.05, 1.24, 3.07, 3.88, 0.3, 20.49, 5.39, 2, 8, 30, 22, 213, 0.58

A. nelsoni, USNM 494653, Great Swan Island, (17.41508, -83.92913, 4 m), J, 29.25, N, N, N, N, N, N, N, N, N, N, N, N, N

A. nelsoni, USNM 494654, Great Swan Island, (17.40129, -83.94315, 1 m), J, 35.24, N, N, N, N, N, N, N, N, N, N, N, N, N

A. nelsoni, USNM 494655, Great Swan Island, (17.40746, -83.92109, 7 m), J, 36.46, N, N, N, N, N, N, N, N, N, N, N, N, N

A. nelsoni, USNM 494656, Great Swan Island, (17.40746, -83.92109, 7 m), J, 36.87, N, N, N, N, N, N, N, N, N, N, N, N, N

A. nelsoni, USNM 494657, Great Swan Island, (17.40908, -83.91559, 12 m), A, 50.88, 5.29, 1.16, 2.69, 3.52, 0.26, 19.71, 5.23, 2, 6, 30, 26, 219, 0.65

A. nelsoni, USNM 494658, Great Swan Island, (17.4039, -83.94348, 6 m), A, 60.22, 5.06, 1.23, 3.11, 3.57, 0.28, 19.18, 5.68, 3, 9, 30, 24, 223, 0.64

A. nelsoni, USNM 494659, Great Swan Island, (17.4039, -83.94348, 6 m), A, 86.11, 5.46, 1.08, 2.97, 3.22, 0.3, 20.83, 5.41, 3, 8, 27, 24, 202, N

A. nelsoni, USNM 494660, Great Swan Island, (17.4039, -83.94348, 6 m), A, 59.54, 5.07, 1.14, 2.94, 3.38, 0.29, 19.85, 5.69, 2, 8, 28, 25, 217, 0.69

A. nelsoni, USNM 494661, Great Swan Island, (17.4039, -83.94348, 6 m), A, 79.74, 5.28, 1.29, 2.97, 3.47, 0.29, 21.86, 5.68, 3, 8, 30, 24, 214, N

A. nelsoni, USNM 494662, Great Swan Island, (17.4039, -83.94348, 6 m), A, 59.41, 5.29, 1.21, 2.91, 3.91, 0.25, 21.7, 5.91, 3, 6, 32, 22, 217, 0.75

A. nelsoni, USNM 494663, Great Swan Island, (17.4039, -83.94348, 6 m), A, 70.11, 5.09, 1.18, 3.29, 3.32, 0.28, 19.4, 5.36, 2, 8, 27, 23, 205, 0.76

A. nelsoni, USNM 494664, Great Swan Island, (17.4039, -83.94348, 6 m), A, 77.41, 5.26, 1.27, 3.23, 3.28, 0.29, 20.27, 5.68, 2, 8, 28, 24, 209, 0.59

A. nelsoni, USNM 494665, Great Swan Island, (17.4039, -83.94348, 6 m), A, 54.77, 5.06, 1.04, 2.92, 3.45, 0.3, 19.83, 5.2, 2, 8, 30, 23, 211, 0.58

A. nelsoni, USNM 494666, Great Swan Island, (17.40219, -83.94405, 0 m), A, 53.51, 5.48, 1.23, 3.03, 3.74, 0.27, 20.87, 5.49, 2, 8, 29, 21, 202, N

A. nelsoni, USNM 494667, Great Swan Island, (17.40219, -83.94405, 0 m), A, 49.44, 5.48, 1.25, 3.4, 3.6, 0.26, 19.44, 6.19, 3, 8, 31, 24, 213, 0.54

A. nelsoni, USNM 494668, Great Swan Island, (17.40219, -83.94405, 0 m), A, 49.67, 5.52, 1.19, 2.92, 3.81, 0.29, 19.85, 5.54, 2, 6, 30, 20, 208, 0.64

A. nelsoni, USNM 494669, Great Swan Island, (17.40219, -83.94405, 0 m), A, 46.25, 5.45, 1.25, 3.37, 3.87, 0.32, 20.97, 5.34, 2, 8, 30, 22, 207, N

A. nelsoni, USNM 494670, Great Swan Island, (17.40976, -83.91789, 14 m), A, 54.65, 5.11, 1.3, 3.39, 3.77, 0.31, 20, 5.36, 3, 6, 31, 24, 217, N

A. nelsoni, USNM 494671, Great Swan Island, (17.40557, -83.93454, 9 m), A, 71.47, 5.02, 1.09, 3.05, 3.64, 0.31, 20.25, 6.09, 3, 6, 30, 22, 212, 0.78

A. praesignis, ANSP 7443, Jamaica, (N), A, 64.6, 5.19, 1.22, 3.03, 3.45, 0.21, 18.93, 4.58, 4, 8, 26, 23, 203, N

A. praesignis, ANSP 7444, Jamaica, (N), A, 60.47, 4.83, 1.19, 3.18, 3.26, 0.21, 17.98, 3.37, 5, 8, 26, 22, 203, N

A. praesignis, FLMNH 126387, Jamaica, (18.392258, -77.859569, 460 m), A, 74.07, 5.49, 1.3, 3.87, 3.35, 0.25, 20.41, 7.06, 4, 8, 30, 20, 183, 0.73

A. praesignis, KU 92679, Grand Cayman Island, (19.276609, -81.340444, 8 m), A, 54.5, 4.7, 1.27, 2.9, 3.25, 0.27, 18.95, 5.67, N, 6, 28, 22, 215, N

A. praesignis, KU 229009, Grand Cayman Island, (19.286749, -81.371894, 6 m), A, 69.59, 5.09, 1.18, 3.61, 3.38, 0.25, 20.64, 6.18, 3, 6, 28, 26, 224, 0.73

A. praesignis, KU 229010, Grand Cayman Island, (19.286749, -81.371894, 6 m), A, 66.74, 5.05, 1.29, 3.37, 3.42, 0.28, 19.51, 6.73, 4, 6, 28, 26, 223, 0.71

A. praesignis, KU 229011, Grand Cayman Island, (19.286749, -81.371894, 6 m), A, 65.6, 5.67, 1.05, 3.35, 3.31, 0.22, 21.89, 6.78, 4, 9, 28, 25, 217, 0.63

A. praesignis, KU 229012, Grand Cayman Island, (19.286749, -81.371894, 6 m), A, 54.54, 5.1, 1.17, 3.56, 3.78, 0.25, 20.13, 7.1, 3, 7, 26, 24, 216, 0.54

A. praesignis, KU 229013, Grand Cayman Island, (19.286749, -81.371894, 6 m), A, 59.58, 5.24, 1.16, 3.44, 3.32, 0.25, 19.81, 6.33, 4, 8, 26, 24, 221, 0.65

A. praesignis, KU 229014, Grand Cayman Island, (19.286749, -81.371894, 6 m), J, 35.65, N, N, N, N, N, N, N, N, N, N, N, N, N

A. praesignis, KU 229015, Grand Cayman Island, (19.286749, -81.371894, 6 m), A, 89.45, 5.08, 1.26, 3.44, 3.21, 0.26, 22.76, 6.56, 2, 8, 26, 26, 221, N

A. praesignis, KU 229016, Grand Cayman Island, (19.276609, -81.340444, 8 m), A, 64.53, 4.65, 1.15, 3.21, 3.63, 0.28, 19.87, 6.2, 3, 6, 26, 26, 232, 0.65

A. praesignis, KU 229017, Grand Cayman Island, (19.276609, -81.340444, 8 m), A, 63.55, 5.32, 1.05, 3.08, 3.62, 0.26, 20.31, 6.44, 4, 6, 28, 24, 219, 0.69

A. praesignis, KU 229018, Grand Cayman Island, (19.35349, -81.124405, 11 m), J, 39.49, N, N, N, N, N, N, N, N, N, N, N, N, N

A. praesignis, KU 229022, Jamaica, (17.865127, -77.384501, 49 m), A, 44.82, 5.49, 1.23, 3.46, 3.64, 0.25, 21.64, 7.36, 3, 8, 26, 22, 205, 0.61

A. praesignis, KU 229023, Jamaica, (17.865127, -77.384501, 49 m), J, 34.74, N, N, N, N, N, N, N, N, N, N, N, N, N

A. praesignis, KU 229024, Jamaica, (17.731104, -77.183091, 140 m), A, 54.65, 5.76, 1.12, 3.59, 3.77, 0.24, 20.37, 6.46, 3, 10, 29, 27, 191, 0.56

A. praesignis, KU 229025, Jamaica, (17.731104, -77.183091, 140 m), A, 68.09, 5.35, 1.31, 3.48, 3.42, 0.25, 21.9, 7.18, 2, 8, 27, 26, 219, N

A. praesignis, KU 229026, Jamaica, (17.969926, -77.371101, 46 m), A, 64.63, 5.85, 1.3, 3.61, 3.67, 0.26, 21.2, 7.32, 3, 8, 26, 24, 222, N

A. praesignis, KU 229027, Jamaica, (17.833923, -77.173987, 6 m), A, 46.13, 5.55, 1.19, 3.3, 4.1, 0.24, 21.18, 5.7, 3, 8, 27, 22, 209, 0.54

A. praesignis, KU 229028, Jamaica, (17.75117, -77.149504, 10 m), A, 57.64, 5.01, 1.09, 2.95, 3.89, 0.25, 20.4, 6.63, 3, 8, 29, 23, 187, 0.54

A. praesignis, KU 229029, Jamaica, (18.448319, -78.218042, 22 m), A, 83.66, 5.9, 1.18, 3.77, 3.24, 0.27, 20.79, 7.49, 3, 6, 29, 25, 217, 0.94

A. praesignis, KU 229030, Jamaica, (18.448319, -78.218042, 22 m), A, 80.2, 5.54, 1.18, 3.94, 3.18, 0.28, 20.85, 7.36, 3, 6, 30, 25, 217, 0.99

A. praesignis, KU 229031, Jamaica, (18.448319, -78.218042, 22 m), A, 63.07, 5.01, 1.27, 3.36, 3.28, 0.25, 19.01, 6.5, 3, 8, 28, 23, 204, 0.78

A. praesignis, KU 229032, Jamaica, (18.276355, -78.048841, 87 m), A, 73.73, 5.75, 1.3, 3.31, 3.46, 0.25, 20.94, 7.61, 3, 6, 30, 26, 232, 0.95

A. praesignis, KU 229033, Jamaica, (18.276355, -78.048841, 87 m), A, 49.11, 5.91, 1.2, 4.09, 4.13, 0.24, 21.36, 7.9, 2, 9, 30, 23, 208, N

A. praesignis, KU 229034, Jamaica, (18.276355, -78.048841, 87 m), A, 78.66, 5.54, 1.12, 3.75, 3.45, 0.25, 19.35, 7.3, 3, 8, 27, 28, 228, 0.86

A. praesignis, KU 229035, Jamaica, (17.952653, -77.550059, 562 m), A, 53.78, 5.78, 1.26, 3.51, 3.72, 0.27, 21.42, 6.82, 3, 8, 26, 27, 216, 0.61

A. praesignis, KU 229036, Jamaica, (17.869491, -77.561035, 23 m), A, 71.91, 5.59, 1.21, 3.56, 3.48, 0.28, 20.61, 6.93, 3, 6, 30, 26, 203, N

A. praesignis, KU 229037, Jamaica, (17.869491, -77.561035, 23 m), A, 51.61, 5.39, 1.28, 3.51, 4.07, 0.25, 19.43, 5.48, 3, 8, 26, 20, 193, 0.85

A. praesignis, KU 229038, Jamaica, (17.843412, -77.509235, 23 m), A, 67.86, 5.69, 1.26731506041851, 3.31564986737401, 3.30091364574123, 0.258928571428571, 20.5717653993516, 7.75125257883879, 3, 8, 30, 21, 197, 0.9

A. praesignis, KU 229039, Jamaica, (17.843412, -77.509235, 23 m), A, 56.99, 5.74, 1.12, 3.42, 3.77, 0.25, 20.86, 7.18, 3, 8, 30, 21, 183, 0.87

A. praesignis, KU 229040, Jamaica, (17.853714, -77.534133, 8 m), J, 26.32, N, N, N, N, N, N, N, N, N, N, N, N, N

A. praesignis, KU 229041, Jamaica, (17.864965, -77.358495, 12 m), J, 30.23, N, N, N, N, N, N, N, N, N, N, N, N, N

A. praesignis, KU 229042, Jamaica, (17.866567, -77.393652, 9 m), A, 56.09, 5.4, 1.12, 3.41, 3.65, 0.31, 19.95, 5.85, 3, 5, 28, 22, 202, 0.61

A. praesignis, KU 229043, Jamaica, (17.866567, -77.393652, 9 m), A, 54.76, 5.7, 1.28, 3.31, 3.87, 0.2, 19.65, 6.17, 4, 8, 30, 25, 210, N

A. praesignis, KU 229044, Jamaica, (17.866567, -77.393652, 9 m), J, 28.28, N, N, N, N, N, N, N, N, N, N, N, N, N

A. praesignis, KU 229045, Jamaica, (17.866567, -77.393652, 9 m), A, 71.7, 5.33, 1.21, 3.56, 3.79, 0.28, 21.32, 6.47, 4, 8, 30, 26, 216, N

A. praesignis, KU 229060, Jamaica, (18.129922, -77.165151, 423 m), A, 72.76, 4.67, 1.17, 3.16, 3.42, 0.2, 19.56, 7.02, 3, 8, 30, 24, 215, 0.85

A. praesignis, KU 229061, Jamaica, (18.222651, -77.803838, 466 m), J, 32.32, N, N, N, N, N, N, N, N, N, N, N, N, N

A. praesignis, KU 229062, Jamaica, (18.056511, -77.950795, 13 m), A, 54.44, 6.3, 1.07, 4.06, 4.1, 0.22, 22.45, 7.15, 3, 6, 29, 24, 212, 0.83

A. praesignis, KU 229063, Jamaica, (18.056511, -77.950795, 13 m), A, 55.8, 5.68, 1.13, 3.53, 3.98, 0.26, 20.29, 6.85, 3, 6, 27, 22, 194, 0.57

A. praesignis, KU 229117, Jamaica, (18.088035, -77.964481, 15 m), A, 43.18, 5.88, 1.25, 3.84, 4.21, 0.23, 22.88, 6.53, 3, 8, 30, 25, 222, 0.59

A. praesignis, KU 229118, Jamaica, (18.088035, -77.964481, 15 m), A, 57.17, 5.37, 1.15, 3.6, 3.9, 0.26, 19.99, 7, 3, 8, 28, 24, 228, 0.62

A. praesignis, KU 229119, Jamaica, (18.134874, -77.993515, 55 m), A, 60.14, 5.62, 1.11, 3.13, 3.69, 0.21, 21.7, 6.52, 2, 6, 26, 26, 226, 0.75

A. praesignis, KU 229120, Jamaica, (18.170881, -78.028042, 16 m), A, 63.68, 4.92, 1.07, 2.98, 3.52, 0.23, 21.04, 6.97, 2, 8, 26, 22, 199, 0.87

A. praesignis, KU 229121, Jamaica, (18.239561, -78.323336, 54 m), A, 75.57, 5.7, 1.18, 3.64, 3.41, 0.24, 19.98, 6.72, 3, 8, 26, 24, 225, 0.52

A. praesignis, KU 229122, Jamaica, (18.239561, -78.323336, 54 m), A, 67.29, 5.54, 1.31, 3.6, 3.61, 0.26, 19.47, 6.79, 4, 6, 29, 24, 227, N

A. praesignis, KU 229123, Jamaica, (18.239561, -78.323336, 54 m), A, 56.2, 5.12, 1.05, 3.11, 3.56, 0.3, 20.55, 7.03, 3, 5, 27, 20, 213, 0.65

A. praesignis, KU 229124, Jamaica, (18.239561, -78.323336, 54 m), A, 53.22, 5.98, 1.28, 3.66, 3.96, 0.22, 23.04, 6.6, 3, 8, 29, 22, 217, 0.76

A. praesignis, KU 229125, Jamaica, (18.239561, -78.323336, 54 m), A, 59.57, 5.2, 1.16, 3.26, 3.74, 0.27, 18.13, 6.4, 3, 6, 26, 22, 219, 0.65

A. praesignis, KU 229126, Jamaica, (18.239561, -78.323336, 54 m), A, 51, 5.43, 1.27, 3.1, 4.27, 0.25, 20.8, 6.43, 4, 6, 26, 24, 216, 0.5

A. praesignis, KU 229127, Jamaica, (18.239561, -78.323336, 54 m), J, 34.38, N, N, N, N, N, N, N, N, N, N, N, N, N

A. praesignis, KU 229128, Jamaica, (18.239561, -78.323336, 54 m), J, 30.31, N, N, N, N, N, N, N, N, N, N, N, N, N

A. praesignis, LACM 61451, Grand Cayman Island, (19.276609, -81.340444, 8 m), A, 65.27, 4.55, 1.27, 2.88, 3.29, 0.27, 19.24, 5.82, 2, 8, 27, 24, 218, 0.76

A. praesignis, LACM 109077, Jamaica, (18.450488, -77.970115, 17 m), A, 58.63, 5.39, 1.14, 3.43, 3.29, 0.27, 19.41, 5.68, 3, 6, 26, 20, 200, 0.77

A. praesignis, SBH 267908, Jamaica, (18.24788, -78.360247, 9 m), A, 53.66, 5.74, 1.23, 3.62, 3.99, 0.26, 21.26, 6.69, 4, 7, 27, 24, 214, 0.87

A. praesignis, SBH 267909, Jamaica, (N), J, 28.39, N, N, N, N, N, N, N, N, N, N, N, N, N

A. praesignis, SBH 267910, Jamaica, (18.24788, -78.360247, 9 m), A, 72.13, 5.61, 1.25, 3.36, 3.45, 0.28, 21.49, 7.32, 2, 6, 30, 26, 221, 0.83

A. praesignis, SBH 267913, Jamaica, (17.97367, -77.802823, 26 m), A, 55.95, 5.93, 1.25, 3.95, 3.57, 0.26, 22.36, 7.74, 3, 8, 26, 24, 218, 0.68

A. praesignis, SBH 267915, Jamaica, (17.97367, -77.802823, 26 m), A, 64.24, 5.59, 1.14, 3.35, 3.56, 0.27, 20.75, 7.15, 4, 6, 28, 24, 203, 0.85

A. praesignis, SBH 267916, Jamaica, (18.24788, -78.360247, 9 m), A, 58.27, 5.71, 1.29, 3.45, 3.86, 0.26, 22.91, 7.14, 3, 6, 27, 24, 223, 0.72

A. praesignis, SBH 267917, Jamaica, (17.97367, -77.802823, 26 m), A, 59.94, 5.54, 1.27, 3.62, 3.74, 0.22, 21.81, 7.34, 4, 8, 27, 22, 203, 0.81

A. praesignis, SBH 267918, Jamaica, (17.8854, -77.768, 13 m), A, 60.21, 5.28, 1.26, 3.75, 3.47, 0.23, 22.8, 7.61, 2, 8, 28, 22, 200, 0.67

A. praesignis, SBH 267919, Jamaica, (18.24788, -78.360247, 9 m), A, 39.92, 5.54, 1.23, 3.38, 4.06, 0.26, 19.81, 6.39, 2, 8, 26, 24, 221, 0.67

A. praesignis, SBH 267922, Jamaica, (18.24788, -78.360247, 9 m), A, 50.63, 5.53, 1.09, 3.87, 4.05, 0.25, 20.86, 7.37, 3, 6, 26, 24, 214, 0.92

A. praesignis, SBH 267925, Jamaica, (18.27397, -78.353156, 34 m), A, 37.95, 5.64, 1.19, 4.19, 4.19, 0.27, 24.03, 6.88, 3, 6, 26, 23, 215, 0.75

A. praesignis, SBH 267929, Jamaica, (18.24788, -78.360247, 9 m), A, 65.36, 5.26, 1.12, 3.41, 3.47, 0.3, 20.03, 6.95, 3, 6, 27, 22, 211, 0.64

A. praesignis, SBH 267930, Jamaica, (18.24788, -78.360247, 9 m), A, 56.75, 5.71, 1.18, 3.52, 3.56, 0.28, 21.27, 6.26, 3, 7, 26, 22, 203, 0.57

A. praesignis, SBH 267931, Jamaica, (18.24788, -78.360247, 9 m), A, 49.29, 5.25, 1.3, 3.51, 3.88, 0.23, 24.12, 6.92, 3, 8, 27, 24, 216, 0.79

A. praesignis, SBH 267932, Jamaica, (18.24788, -78.360247, 9 m), A, 59.59, 5.55, 1.21, 3.44, 3.39, 0.27, 21.11, 6.85, 4, 7, 26, 24, 226, 0.69

A. praesignis, SBH 267933, Jamaica, (18.24788, -78.360247, 9 m), A, 61.68, 5.64, 1.31, 3.5, 3.53, 0.28, 22.47, 6.71, 4, 6, 28, 22, 202, 0.65

A. praesignis, SBH 267934, Jamaica, (18.24788, -78.360247, 9 m), A, 59.28, 5.63, 1.25, 3.68, 3.69, 0.28, 22.35, 6.55, 2, 6, 26, 22, 205, 0.92

A. praesignis, SBH 267938, Jamaica, (17.97367, -77.802823, 26 m), A, 48.23, 5.7, 1.24, 3.9, 4.06, 0.24, 24.47, 7.86, 3, 8, 26, 24, 219, 0.59

A. praesignis, SBH 267939, Jamaica, (17.97367, -77.802823, 26 m), A, 57.67, 6.28, 1.2, 3.8, 3.94, 0.24, 23.51, 7.53, 3, 8, 30, 24, 226, 0.63

A. praesignis, SBH 267940, Jamaica, (17.97367, -77.802823, 26 m), A, 53.02, 5.96, 1.24, 4.22, 3.94, 0.28, 22.78, 7.6, 4, 7, 26, 24, 227, 0.61

A. praesignis, SBH 267941, Jamaica, (18.268306, -78.347242, 68 m), A, 60.56, 5.45, 1.09, 3.53, 3.52, 0.29, 23.07, 6.51, 3, 6, 26, 24, 206, 0.76

A. praesignis, SBH 267947, Jamaica, (18.033536, -77.856738, 7 m), A, 40.46, 5.61, 1.14, 3.71, 4.5, 0.25, 23.13, 7.61, 3, 8, 26, 24, 216, 0.62

A. praesignis, USNM 32116, Grand Cayman Island, (19.322168, -81.240861, 6 m), A, 105, 5.35, N, 3.81, N, N, 22.08, 7.71, N, N, 26, 29, 238, N

A. praesignis, USNM 32117, Grand Cayman Island, (19.322168, -81.240861, 6 m), A, 100.07, 5.42, N, 3.48, N, N, 20.53, 7.29, N, N, 28, 26, 235, N

A. praesignis, USNM 108245, Jamaica, (17.870707, -77.56568, 9 m), A, 54.42, 4.23, N, 4.15, N, N, 21.43, 7.86, N, N, 26, 22, 210, N

A. praesignis, USNM 108246, Jamaica, (17.870707, -77.56568, 9 m), A, 54.69, 5.61, N, 3.57, N, N, 21.5, 6.82, N, N, 30, 22, 201, N

A. praesignis, USNM 108247, Jamaica, (17.870707, -77.56568, 9 m), A, 40.54, 5.72, N, 3.72, N, N, 21.76, 6.91, N, N, 28, 20, 198, N

A. praesignis, USNM 108293, Jamaica, (17.742255, -77.157486, 157 m), A, 54.41, 5.66, N, 3.79, N, N, 20.24, 5.73, N, N, N, N, 187, N

A. praesignis, USNM 117609, Jamaica, (17.751252, -77.152695, 26 m), A, 64.91, 5.99, N, 3.73, N, N, 22.32, 7.44, N, N, N, N, 208, N

A. praesignis, USNM 117610, Jamaica, (18.310572, -77.827223, 587 m), A, 37.35, 6.16, N, 4.58, N, N, 23.43, 7.74, N, N, 26, 27, 235, N

A. praesignis, USNM 251776, Jamaica, (18.185326, -77.999858, 674 m), A, 48.79, 6.25, N, 4.08, N, N, 20.72, 7.09, N, N, 29, 30, 217, N

A. praesignis, USNM 251783, Jamaica, (18.487963, -77.92447, 65 m), A, 70.32, 5.76, N, 3.57, N, N, 22.11, 7.98, N, N, 28, 24, 218, N

A. praesignis, USNM 251784, Jamaica, (18.487963, -77.92447, 65 m), A, 50.52, 5.38, N, 3.6, N, N, 19.77, 6.99, N, N, 30, 30, 208, N

A. praesignis, USNM 251786, Jamaica, (18.487963, -77.92447, 65 m), A, 46.3, 5.16, N, 3.5, N, N, 20.89, 7.86, N, N, 30, 24, 208, N

A. praesignis, USNM 251800, Jamaica, (18.001078, -77.785705, 10 m), A, 48.45, 5.74, N, 3.22, N, N, 20.66, 7.74, N, N, 29, 26, 226, N

A. praesignis, USNM 251801, Jamaica, (18.001078, -77.785705, 10 m), A, 53.25, 5.03, N, 3.21, N, N, 20.75, 6.93, N, N, 26, 24, 212, N

A. praesignis, USNM 251802, Jamaica, (17.987064, -77.787289, 10 m), A, 63.34, 4.96, N, 3.14, N, N, 18.47, 6.71, N, N, 26, 22, 199, N

A. praesignis, USNM 251804, Jamaica, (17.987064, -77.787289, 10 m), A, 76.82, 5.73, N, 3.67, N, N, 20.57, 7.52, N, N, 26, 25, 218, N

A. praesignis, USNM 251805, Jamaica, (17.987064, -77.787289, 10 m), A, 42.98, 8.12, N, 4.26, N, N, 19.8, 6.98, N, N, 26, 24, 214, N

A. praesignis, USNM 251806, Jamaica, (17.987064, -77.787289, 10 m), A, 70.12, 5.82, N, 3.61, N, N, 20.35, 7.63, N, N, 30, 29, 220, N

A. praesignis, USNM 251807, Jamaica, (17.987064, -77.787289, 10 m), A, 63.32, 5.34, N, 3.28, N, N, 20.31, 8.01, N, N, 27, 24, 204, N
A. praesignis, USNM 251808, Jamaica, (17.987064, -77.787289, 10 m), A, 61.27, 5.03, N, 3.02, N, N, 18.39, 6.89, N, N, 27, 22, 195, N
A. praesignis, USNM 251809, Jamaica, (18.137006, -77.832685, 25 m), A, 93.9, 5.62, N, 3.9, N, N, 20.63, 8.03, N, N, 31, 28, 225, N
A. praesignis, USNM 251810, Jamaica, (18.427209, -77.881279, 500 m), A, 47.66, 4.99, N, 3.73, N, N, 20.48, 7.05, N, N, 25, 22, 201, N
A. praesignis, USNM 251811, Jamaica, (18.427209, -77.881279, 500 m), A, 44.5, 5.84, N, 3.55, N, N, 20.16, 8.25, N, N, 26, 22, 196, N
A. praesignis, USNM 251812, Jamaica, (18.024667, -77.851238, sea level), A, 81.19, 5.95, N, 3.65, N, N, 21.02, 7.8, N, N, N, N, 223, N
A. praesignis, USNM 251813, Jamaica, (18.024667, -77.851238, sea level), A, 62.75, 5.77, N, 3.94, N, N, 20.48, 8.06, N, N, N, N, 211, N
A. praesignis, USNM 251815, Jamaica, (17.858894, -77.16861, 6 m), A, 69.07, 4.97, N, 3.78, N, N, 19.72, 6.52, N, N, 26, 22, 197, N
A. praesignis, USNM 251816, Jamaica, (17.858894, -77.16861, 6 m), A, 52.49, 4.99, N, 2.97, N, N, 18, 6.92, N, N, 29, 22, 194, N
A. praesignis, USNM 251817, Jamaica, (17.858894, -77.16861, 6 m), A, 41.87, 5.47, N, 3.42, N, N, 19.75, 6.5, N, N, 28, 22, 200, N
A. praesignis, USNM 251818, Jamaica, (17.751699, -77.151148, 7 m), A, 58.42, 5.08, N, 3.66, N, N, 20.44, 6.78, N, N, 27, 29, 218, N
A. praesignis, USNM 251819, Jamaica, (17.751699, -77.151148, 7 m), A, 43.46, 5.66, N, 3.82, N, N, 21.19, 6.67, N, N, 30, 27, 214, N
A. praesignis, USNM 251820, Jamaica, (17.731213, -77.151971, 105 m), A, 46.35, 5.26, N, 3.65, N, N, 19.33, 6.45, N, N, N, N, 189, N
A. praesignis, USNM 251830, Jamaica, (17.973708, -77.067441, 26 m), A, 54.65, 4.3, 1.13, 2.71, 3.71, 0.27, 20.27, 5.84, 4, 8, 26, 22, 202, N
A. praesignis, USNM 292260, Jamaica, (17.897225, -76.894478, 5 m), A, N, N, N, N, N, 0.29, N, N, 3, 6, 26, 21, N, 0.57
A. praesignis, USNM 328199, Jamaica, (17.739372, -77.23318, 0 m), J, 26.71, 6.44, 1.12, 3.89, 4.38, 0.27, 20.67, 5.2, 3, 6, 28, 21, 191, 0.57
A. praesignis, USNM 328200, Jamaica, (17.739372, -77.23318, 0 m), J, 40.13, 4.76, 1.15, 2.99, N, N, 20.61, 5.31, N, N, 26, 20, 202, 0.63
A. praesignis, USNM 328201, Jamaica, (17.739616, -77.230535, 15 m), A, 47.96, 5, 1.21, 2.4, 4.13, 0.26, 20.08, 5.13, 4, 7, 26, 20, 194, N
A. praesignis, USNM 328202, Jamaica, (17.739616, -77.230535, 15 m), A, 49.25, 5.16, 1.32, 2.66, 3.96, 0.26, 20.14, 5.16, 4, 8, 29, 20, 198, 0.73
A. praesignis, USNM 328203, Jamaica, (17.739616, -77.230535, 15 m), A, 66, 5.27, 1.27, 3.26, 3.94, 0.28, 21.45, 5.39, N, 6, 26, 22, 204, 0.81
A. praesignis, USNM 328204, Jamaica, (17.75117, -77.149504, 10 m), A, 62.47, 4.66, 1.23, 3.09, 3.57, 0.26, 20.75, 5.71, 2, 8, 26, 20, 186, 0.91
A. praesignis, USNM 328205, Jamaica, (17.75117, -77.149504, 10 m), A, 51.28, 4.23, 1.19, 2.69, 3.45, 0.24, 19.85, 5.42, 2, 10, 27, 20, 182, 0.62
A. praesignis, USNM 328206, Jamaica, (17.75117, -77.149504, 10 m), A, 58.61, 4.61, 1.18, 3.14, 3.82, 0.25, 20.2, 5.03, 4, 8, 27, 20, 196, 0.78
A. praesignis, USNM 328207, Jamaica, (17.75117, -77.149504, 10 m), A, 53.67, 5.01, 1.29, 3.09, 3.52, 0.28, 18.89, 5.14, 4, 8, 29, 21, 190, 0.75
A. praesignis, USNM 337565, Jamaica, (18.274, -78.3531, 34 m), A, 65.68, 5.12, N, 3.9, N, N, 20.23, 7.35, N, N, N, N, 212, N

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ACADEMIC VITA

AMY R. RUTTER
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EDUCATION

The Pennsylvania State University (University Park, PA) Expected Graduation: May 2015
Schreyer Honors College
Bachelor of Science: Wildlife & Fisheries Science **Option:** Wildlife **Minor:** Biology

RESEARCH EXPERIENCE

Penn State (University Park, PA) January – May 2015
Volunteer undergraduate curator, Department of Ecosystem Science and Management
- Independently identified and catalogued 500+ uncurated, mounted bird specimens

Penn State (University Park, PA) August 2013 – December 2014
Undergraduate Researcher, Hedges Lab
- Studied the morphology of croaking gecko (*Aristelliger spp.*) specimens for taxonomic revision and new species description

Smithsonian National Museum of Natural History (Washington, D.C.) May – August 2013
Natural History Research Experiences Intern, funded by the National Science Foundation
- Conducted independent research on the morphological variability of brocket deer (*Mazama spp.)* using linear morphometric techniques
- Educated museum visitors in the Hall of Mammals through the "Scientist is In" program

Penn State—Berks Campus (Reading, PA) August 2012 – May 2013
Undergraduate Researcher, Arnold Lab
- Assessed several traditional and camera-based methods of detecting provisioning of adult common terns (*Sterna hirundo*) to chicks using voice transcriptions and digital photographs

Berks International Conservation Internship Program (Ontario, Canada) June – July 2012
Undergraduate Intern
- Conducted field research on common terns (*Sterna hirundo*), including data entry, nest observations of feeding and behavior, bird handling, and small watercraft safety practices
- Assisted with elementary school education programs at Presqu'ile Provincial Park

LEADERSHIP EXPERIENCE

Shaver's Creek Environmental Center (Petersburg, PA) May 2015

Outdoor School Counselor

- Led a group of 15 elementary school students during a 4-day immersive environmental education field experience

Conservation Leaders for Tomorrow Professional Development Program September 2014

Max McGraw Wildlife Foundation and the Wildlife Management Institute

- Received scholarship to attend a workshop on hunting awareness and education, including field firearm and hunting skills and safety

Penn State Honors Club—Berks Campus August 2011 – May 2013

Community Service Coordinator (2011–2013) & *Secretary* (2012–2013)

- Coordinated environmental service projects at state parks and environmental centers
- Organized activities and events for 15-60 students and faculty members

Penn State Lion Ambassador—Berks Campus April 2012 – May 2013

Member, selected through a competitive process

- Provided campus tours and assisted at open houses for prospective students

Penn State Peer Mentor—Berks Campus August 2012 – May 2013

Orientation Leader, First-year seminar Peer Mentor, & *Chemistry Mentor*

- Mentored an engineering First-Year Seminar during Orientation week and throughout Fall 2012, including teaching lessons on time management and presentation techniques
- Mentored a Principles of Chemistry I course, including assisting students with practice problems in class and facilitating exam review sessions

PUBLICATIONS & PRESENTATIONS

Gutiérrez, E. E., J. E. Maldonado, A. Radosavljevic, J. Molinari, B. D. Patterson, J. M. Martínez-C., **A. R. Rutter**, M. T. R. Hawkins, F. J. Garcia, and K. M. Helgen. Submitted. The taxonomic status of *Mazama bricenii* and the significance of the Táchira Depression for mammalian endemism in the Cordillera de Mérida, Venezuela. PLoS ONE.

Neotropical deer: Morphometrics and taxonomy of the Mazama americana species complex (Mammalia: Cervidae). 2014. Poster. 94th Annual Meeting, American Society of Mammalogists, Oklahoma City, OK, USA. **Rutter, A. R.**, J. Maldonado, K. M. Helgen, and E. E. Gutiérrez.

Assessing provisioning rates of common terns: Traditional vs. automated methods. 2013. Poster. 37th Annual Meeting, Waterbird Society, Wilhelmshaven, Lower Saxony, Germany. **Rutter, A. R.**, S. A. Oswald, and J. M. Arnold*

The Hunger Games on Wall Street: A look at hegemonic parallels in popular culture and politics. 2012. Oral Presentation. Undergraduate Research and Creative Expression, Higher Education Council of Berks County, Kutztown, PA, USA. **Rutter, A. R.**

HONORS

Student Marshal, *College of Agricultural Sciences*	2015
Dean's List, *Penn State*	All semesters
Evan Pugh Scholar Award, *Penn State*	2014, 2015
"Most Impressive Students at Penn State," *Business Insider*	2014
*Best Student Poster Award, *Waterbird Society*	2013
Outstanding Sophomore Award, *Gamma Sigma Delta Honor Society*	2013
Agricultural Sciences Award, *Penn State Berks*	2013
President Sparks Award, *Penn State*	2013
First-Year Chemistry Award, *Penn State Berks*	2012
President's Freshman Award, *Penn State*	2012

GRANTS & SCHOLARSHIPS

Schreyer Honors College Ambassador Travel Grants (Canada, Germany)	2012, 2013
Penn State Undergraduate Research Grant	2013
Waterbird Society Student Travel Award	2013

Schreyer Honors College Academic Excellence Scholarship	2011 - 2015
Farm and Home Foundation of Lancaster County Scholarship for Agriculture	2011 - 2015
Stephen H. Lesher and Nora Anderson Lesher Scholarship	2011 - 2015
Theola F. Thevaos Honors Scholarship in the College of Agricultural Sciences	2013 - 2015
Ferguson-Cope Forestry Award	2013 - 2015
Galen Dreibelbis Endowment for Excellence in Agriculture	2012 - 2013
Boscov Honors Excellence Scholarship Award	2011 - 2012
Raymond F. Russell Scholarship	2011 - 2012
Conservation Leaders for Tomorrow	2014
Covance, Inc. Dr. James Noel Scholarship Award	2011
Penn State Alumni Association's Lancaster County Chapter Scholarship	2011
Cocalico Education Foundation's Scholarship for Academic Achievement, Community Service, & Continuing Education	2011
Scholarship for Academic Excellence in Anatomy and Physiology	2011
Denver Alumni Association's Ira Martzall Scholarship Award	2011