= Virgin Islands dwarf sphaero =

The Virgin Islands dwarf sphaero or Virgin Islands dwarf gecko (Sphaerodactylus parthenopion) is a species of gecko and also one of the smallest terrestrial vertebrates . It has only been found on three of the British Virgin Islands : Virgin Gorda , Tortola , and Moskito Island (also spelled " Mosquito Island ") . It was discovered in 1964 and is suspected to be a close relative of Sphaerodactylus nicholsi , a dwarf sphaero from the nearby island of Puerto Rico . It shares its range with the big @-@ scaled least gecko (S. macrolepis) , which is found in leaf litter . Unlike this larger gecko , the Virgin Islands dwarf sphaero lives on drier hillsides , yet prefers moist microhabitats found under rocks because it lacks the adaptations necessary for preventing water loss , which is a significant problem due to its small body size .

The Virgin Islands dwarf sphaero has a deep brown colour on its upper side , often with a speckling of darker scales . On average , it measures 18 mm (0 @.@ 71 in) from its snout to its vent , and is nearly as small as a U.S. dime . At most , it weighs 0 @.@ 15 g (0 @.@ 0053 oz) . There are several stripes or bars of lighter colouration behind the eyes and at the top of the neck that help distinguish it . There are no differences in colouration between males and females , although females are slightly larger in size . Its tail will regenerate when broken off . Little is known about its population size or its biology .

= = Taxonomy = =

The Virgin Islands dwarf sphaero , also referred to as the Virgin Islands dwarf gecko , was discovered in the summer of 1964 by biologist Richard Thomas during a collecting trip along the dry , wooded slopes of Virgin Gorda in the British Virgin Islands . The holotype for Sphaerodactylus parthenopion , MCZ 77211 , was an adult female collected on 12 August 1964 on a hillside above Pond Bay . A total of eight paratypes were collected on Virgin Gorda and used to describe the new species .

Classified as a species of dwarf sphaero or dwarf gecko (genus Sphaerodactylus) , it is characterised not only by its small body size , but also by a distinctive scale colouration pattern on its head , scales that are small but keeled (having a central ridge) and imbricate on its upper (dorsal) side ; a generally uniform dark colouration of the dorsal side , a lack of granular scales on the mid @-@ dorsal area , and a lack of colouration patterns around the shoulders (scapular region) and the pelvis (sacral region) .

Despite striking differences in appearance , S. parthenopion may be most closely related to S. nicholsi . Like the diminutive S. parthenopion in the Virgin Islands , S. nicholsi , the smallest endemic sphaerodactylid in Puerto Rico , is very small . The geographic range of another species , S. townsendi , divides these two closely related populations , suggesting that S. townsendi evolved after S. parthenopion and S. nicholsi diverged .

= = Description = =

The Virgin Islands dwarf sphaero is one of the smallest known amniotes (which includes 23 @,@ 000 species of reptiles , birds , and mammals) , with an average body size (measured as the snout ? vent length or SVL) of 18 mm (0 @.@ 71 in) and a maximum body mass of 0 @.@ 15 g (0 @.@ 0053 oz) , but ranging as low as 0 @.@ 043 g (0 @.@ 0015 oz) and averaging 0 @.@ 117 g (0 @.@ 0041 oz) . The only known amniote that is smaller is the closely related S. ariasae , which measures 16 mm (0 @.@ 63 in) and weighs a maximum of 0 @.@ 14 g (0 @.@ 0049 oz) .

Typically , the species has a deep brown colouration on the dorsal side and legs , often with a scattering or a fine pattern of interconnected darker scales . The species has a preocular transverse bar (a line of coloured scales in front of the eyes at the base of the snout) , although this can be hard to see in some individuals . Along each side and directly behind the eyes , a narrow , dark @-@ edged , yellow @-@ brown postocular stripe crosses the temple and fades out near the base

of the head . In the occipital region , on top of the head behind the eyes , an almost oval @-@ shaped , dark @-@ edged , yellow @-@ brown bar stretches from one side of the head to the other and sometimes connects with the postocular stripes . The dark brown scales on the dorsal side cross over to the ventral side (underside) and fade out , although many scales retain dark edges . The ventral side is light grey or cream . The tail is mostly yellowish @-@ brown with occasional clusters or short lines of darker scales . The gular (throat) pattern has faint to bold lines of light scales running laterally .

There is no sexual dichromatism in this species (the genders do not differ in colour) , although females may be larger than males , with the SVL of females averaging 18 mm (0 @.@ 71 in) , but only 16 mm (0 @.@ 63 in) in males . The snout is moderate in length and blunt . The tail regenerates if broken off .

The dorsal scales are generally small , acute , keeled , imbricate , and flattened , while the throat and pectoral (chest) scales are keeled . Granular (bumpy) scales are found on the top of the head and the anterior neck , while the scales on the middle of the neck are keeled , acute , flattened , and imbricate . In the middle of the back , there is some crowding and size reduction in the scales , and none of these scales are granular . On the dorsal side of the tail , the scales are acute , keeled , imbricate , and flattened . On the underside of the tail , the scales are smooth , rounded , and enlarged towards the centre of the tail (mid @-@ ventrally) . The ventral scales are rounded , smooth , cycloid (have a smooth outer edge) , and imbricate . The scales on the ventral caudal (head) scales are smooth , cycloid , and enlarged mid @-@ ventrally .

The count of dorsal scales , from axilla (armpit) to groin , averages 32 with a range of 30 to 35 . The ventral count from axilla to groin along the midventral line averages 28 scales and ranges from 26 to 29 . The scales around the midbody average approximately 52 and range from 50 to 55 . There are two postnasals and one to three (usually two) internasal scales . There are two to three (usually three) scales from the upper lip to the eye (upper labials) . On the fourth toe of the right foot , there are eight or nine (usually eight) lamellae , or plate @-@ like scales that provide traction for geckos . The escutcheons (scales around the genital region) are relatively small and only slightly extend onto the thighs , varying from three to five scales in length and 11 to 13 scales in width .

= = = Comparisons with related species = = =

S. nicholsi from Puerto Rico is both bulkier and larger than the Virgin Islands dwarf sphaero , measuring 20 to 22 mm (0 @.@ 8 to 0 @.@ 9 in) from snout to vent . It also differs in the size of its dorsal scales , which is reflected in scale count comparisons . S. nicholsi has 19 to 24 dorsal scales from axilla to groin , whereas S. parthenopion has 30 to 35 . Also , S. nicholsi has only 34 to 42 scales around the midbody compared to 50 to 55 in S. parthenopion , and its ventral scales from axilla to groin range from 21 to 26 , which is still less than 26 to 29 in S. parthenopion . S. nicholsi typically has one internasal scale versus the two more commonly seen in S. parthenopion . The escutcheons are also larger in male S. nicholsi , on average . In terms of colouration , both species are very similar , but S. nicholsi usually has a crescent @-@ shaped pattern on its head that touches the postocular stripes , instead of an oval @-@ shaped pattern that may or may not reach the stripes . Also , its postocular stripes run the length of its body and tail instead of ending on the neck . The dorsolateral stripes of S. nicholsi converge to make a dark @-@ edged U- or Y @-@ shaped pattern in the sacral (pelvic) region . The majority of S. nicholsi have a pattern on the scapular (shoulder) region consisting of two small pale dots encompassed by small regions of black .

The big @-@ scaled least gecko is significantly larger than the Virgin Islands dwarf sphaero , measuring 25 to 30 mm (0 @.@ 98 to 1 @.@ 18 in) from snout to vent . It also has larger , courser scales . According to Thomas , " S. macrolepis has a pattern of dark lateral stripes and dorsal spotting on a tan or light brown ground color with a boldly black @-@ edged pair of scapular spots (females) or a nearly uniform yellow @-@ brown body color , weak or absent scapular pattern , and contrasting head pattern of black vermiculations [irregular wavy lines] on a grey ground color or

unicolor yellow or orange heads (male) . "

= = Distribution and habitat = =

Originally found only on the island of Virgin Gorda , it has since been reported on Tortola and Moskito Island . Its range is sometimes estimated to encompass the entire British Virgin Islands , although the original expedition by Thomas did not find any specimens on Tortola , Anegada , or other smaller islands , nor in the United States Virgin Islands of Saint Croix , Saint Thomas , and Saint John . Its distribution is considered unusual because despite being separated from its closest relative , S. nicholsi in Puerto Rico , another species , the Puerto Rican Crested Toad (Bufo lemur) , has a geographic range that includes both islands , yet it has not diverged .

The Virgin Islands dwarf sphaero appears to favour dry (xeric) scrub forests ? often mixed with cacti and thorny scrub ? on rocky hillsides . It has been found at sea level , although not on the beach among the seaweed litter or in piles of rotting palm debris in the littoral zone , like the more abundant and larger big @-@ scaled least gecko (S. macrolepis) with which it shares its range . Also unlike the big @-@ scaled least gecko , they do not " swarm " in the leaf litter , but are only uncommonly found hiding under rocks , which are considered moist or mesic microhabitats within their dry ecological niche .

= = Ecology and behaviour = =

As with other dwarf sphaeros , little is known about the ecology and behaviour of the Virgin Islands dwarf sphaero . Because of its high surface @-@ area @-@ to @-@ volume ratio that results from its diminutive size , the species was thought to be susceptible to water loss , so it has been studied to understand how it survives in its semi @-@ arid habitat . Unlike desert @-@ dwelling lizards , the Virgin Islands dwarf sphaero lacks special adaptations to prevent desiccation and loses water at a rate similar to that of lizards from mesic habitats . From size differences alone , it loses water 70 % faster than the larger and sympatric big @-@ scaled least gecko . It survives instead by inhabiting humid microhabitats in its dry environment , by adjusting its reproductive cycle so that hatchlings emerge during the time of year with the highest precipitation , and by reducing activity during the driest parts of the day .

= = Conservation = =

Too little data has been gathered to assess the population size and trend of the Virgin Islands dwarf sphaero . It has been reported as " moderately common " , although difficult to find because of its size and ability to blend into its surroundings . Its distribution across the British Virgin Islands seems to be limited , and development may affect it further .

In early 2011 , the Virgin Islands dwarf sphaero gained international attention when Sir Richard Branson announced plans to introduce lemurs ? endangered primates from Madagascar ? to Moskito Island as part of a captive breeding project for conservation purposes . Biologists , conservationists , and the general public quickly voiced concerns over the impact that would have on the native species of the island . In particular , people feared that the lemurs would wipe out the local population of Virgin Islands dwarf sphaeros , which was referred to as " one of the world 's rarest lizards " , because of the lemurs ' " aggressive , omnivorous " behaviour . Other researchers instead focused on concerns about the lemurs ' ability to thrive or the pathogens they might introduce . The leader of Branson 's environmental impact assessment agreed that caution was needed with the introduction , even before the plans to introduce the lemurs were announced . Regarding the Virgin Islands dwarf sphaero , Branson stated that the concerns were misplaced because lemurs mostly eat plant material and would rarely eat geckos if at all . However , Branson ultimately backed down , stating , " I will keep the lemurs enclosed whilst we get experts to conduct further surveys on geckos and particularly the dwarf geckos . If these studies indicate any real risk to these geckos , we will keep the lemurs enclosed . "