

Gerard van Buurt

Field Guide to the Amphibians and Reptiles of Aruba, Curaçao and Bonaire



Edition Chimaira



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Gerard van Buurt

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of Aruba, Curaçao and Bonaire**

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Frankfurt am Main



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Cover photo: *Cnemidophorus arubensis* (G. VAN BUURT)

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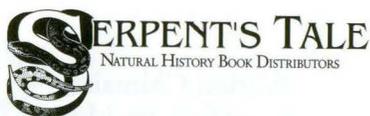
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Curaçao, January 2005

Gerard van Buurt

Preface to the English edition

While translating the Dutch version of “de Amfibieën en Reptielen van Aruba, Curaçao en Bonaire” into English, I was forced to go through the entire text one more time, line by line. Thus it was inevitable that I ended up editing the text somewhat and adding to it as well. Since an English manuscript was now available, several people who had not been consulted previously could now give their comments, which have been incorporated in the English version. Thus the English translation is not a literal transcription of the Dutch version, although the differences between both versions are relatively minor. The islands of Aruba, Curaçao and Bonaire form part of a larger archipelago of islands along the Venezuelan coast. This archipelago includes all the islands from Los Monjes in the West to La Blanquilla in the East. The herpetofauna of the islands of Aruba, Curaçao and Bonaire should be viewed from this somewhat larger perspective. For this reason there are many references to the Venezuelan islands. Faunistic zones often transcend national borders. In this respect I have followed WAGENAAR HUMMELINCK who in 1940 published the first general treatise of the herpetofauna of this archipelago. My field guide is in large part based on this early work of WAGENAAR HUMMELINCK (†).

This field guide is certainly not intended as a taxonomic work. Most guide books use slightly different classifications, sometimes all these differences can be quite exasperating. The latest classification is not necessarily the best, and some of the newer ideas have not gained general acceptance. In this English version the sub-species *Leptodeira annulata bakeri* and *Crotalus durissus unicolor* from the Dutch edition have been upgraded to full species status, in accordance with the prevailing taxonomic trends. I have simply tried to follow what seemed “the roads most traveled” and in many cases have indicated that other classifications also exist. In doing this I have certainly developed my own preferences, often siding with the “lumpers”, sometimes with the “splitters”. I fully realize however that I do not have the expertise to make these kinds of taxonomic judgments, which are better left to others. It is however important to convey to the general public the idea that taxonomy has a subjective element and that taxonomy is not a static structure, but something that can change on

the basis of new evidence or new interpretations. The field guide is also intended as a review summarizing available information on the herpetofauna of these islands. Local information on customs, beliefs and origins of local names has been included. The list of literature, cites many general works but is also intended to serve as a bibliography of the herpetofauna of the islands of Aruba, Curaçao and Bonaire. The sea turtles have not been included. In 1995 I published “De Schildpadden van Curaçao en Bonaire” (The turtles of Curaçao and Bonaire). This book was primarily intended for local use, one of its primary aims was to generate support for sea turtle protection. Since many books on sea turtles in the region already exist, there is no special need to translate this book into English.

I Introduction

Origin of the Neotropical fauna

Pangaea – In the early Triassic there was only one continent, the continent of Pangaea. Somewhere in the Middle Triassic 180–200 million years ago (Ma) this continent split up into two parts; the Northern part of Laurasia and the Southern part of Gondwana. Laurasia basically encompasses the area that is now North America, Greenland, Europe and Asia with the exception of India and Arabia. Laurasia split up in 3 parts West North America, East North America/Europe, and Asia. Later these landmasses got rearranged Europe splitting from North America and ultimately we ended up with the situation we have now: one North American continent and the land-mass of Eurasia. Gondwana split up into South America, Africa, Arabia, Madagascar, India, Antarctica, Australia and New Zealand. About 90 Ma ago South America started to split loose from Africa and started moving West. At about 65 Ma ago the separation of South America from Africa was completed. For millions of years this continent was almost completely isolated, and developed a very typical South American fauna. Characteristic for this fauna, among others were all sorts of marsupials, for example marsupial wolves. There were litopterns, a family of large herbivorous animals with a long neck, some species having a tapir snout. Other characteristic elements were all sorts of rodents and armadillos. Nowadays we tend to associate marsupials with the continent of Australia. At some stage there was contact with Australia via Antarctica. This enabled some marsupials to reach Australia from South America, where the typical Australian marsupial fauna probably developed out of this South American stock.

The Neotropical zone

About 15 Ma years ago South America drifted further toward North America and started to reach this continent. South America was separated from North America by a series of islands. Some fauna could cross over via the islands. With time the series of islands became a full land-bridge which was probably finally established at the end of the Pliocene when Panama was formed (at about 8 Ma). There is some discussion about the date when the last remaining

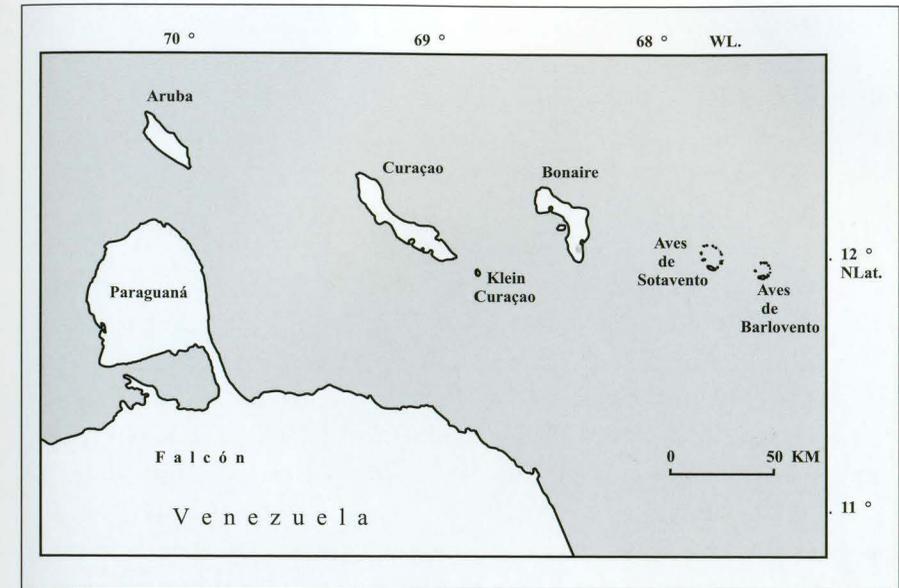


Fig. 1: Aruba, Curaçao and Bonaire and parts of Venezuela.

gap was finally closed. This is usually thought to have taken place 3–5 Ma ago. A persistent gap probably existed in Western Colombia, where we now find the Atrato river valley and the Golfo de Urabá. In the resulting faunal exchange the South American fauna was clearly the loser. Marsupials became nearly extinct, and the litopterns died out completely. Many North American animals such as raccoons, the cat family (FELIDAE), mastodons (a type of elephant) and several families of birds, became firmly established. An example of a North American family of birds that reached South America is the ICTERIDAE (black-birds, orioles and trupials). A few South American animals such as sloths, armadillo's and hummingbirds found their way northward. Due to this faunal exchange a new faunal region was formed, the Neotropical region (the „new“ tropical region or the tropics of the New World). The Neotropical region extends from Southern Mexico down and includes all of South America. The term was coined in 1876 by Alfred Russell WALLACE, a contemporary of Charles DARWIN and an important evolutionary naturalist in his own right.



Photo 1: Sabal palm (cf. *Sabal causeriana*) a West Indian element in the Curaçao flora.

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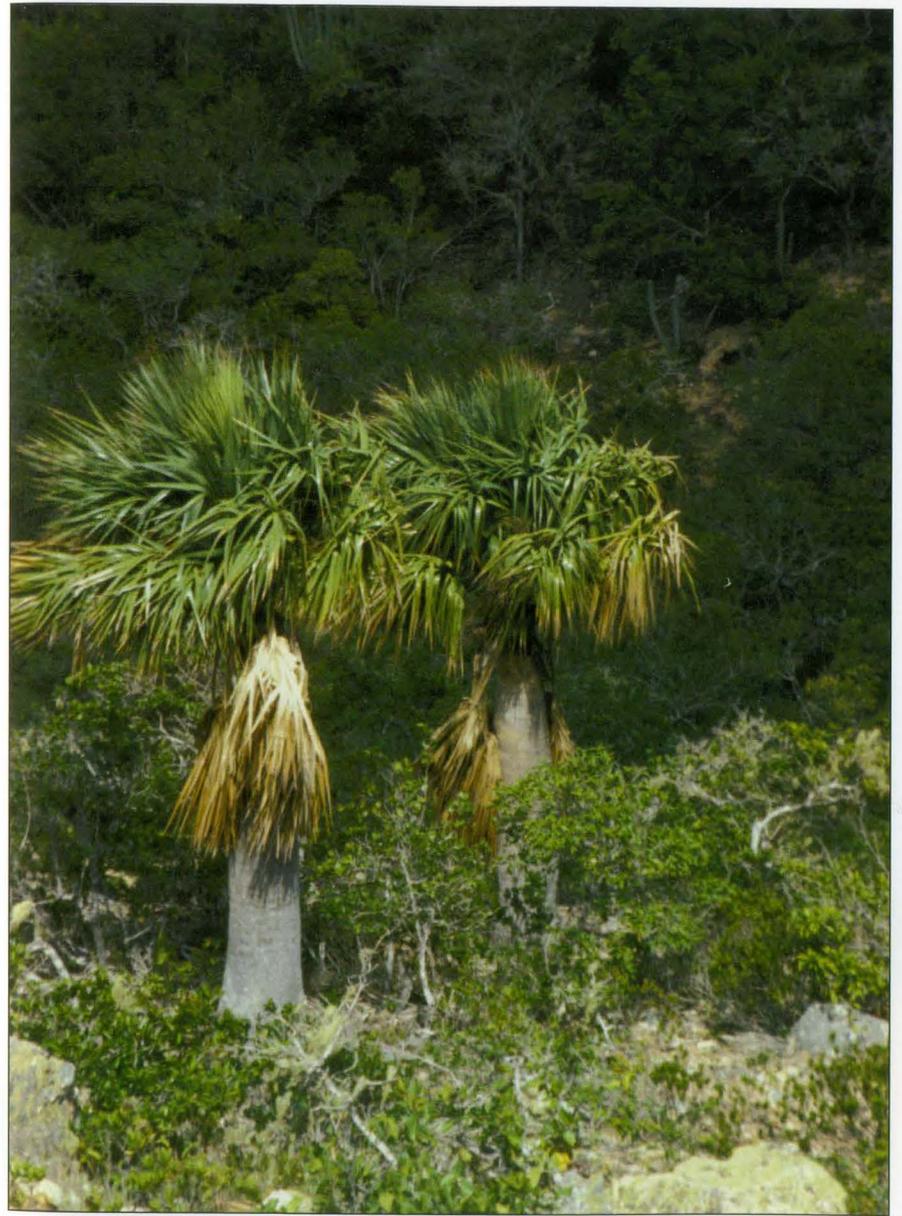


Photo 1b: Sabal palm (cf. *Sabal causeriana*), Seru di Bientu, St. Christoffelpark, Curaçao.

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The term Neotropical also includes regions such as the Andes highlands and the southern parts of South America which are clearly not tropical. This Neotropical region can be subdivided into several distinct faunal zones. In our area there is a distinct West Indian zone encompassing the islands from Cuba to Grenada and also San Andrés and Providencia which have a West Indian fauna. Grenada can be considered an intermediate area with a strong South American faunal influence. The Northern part of South America, to which the islands Aruba, Curaçao and Bonaire belong, forms a different zone (roughly East Colombia, Venezuela, Guyana's).

West Indian elements in the fauna and flora of Aruba, Curaçao and Bonaire

The islands Aruba, Curaçao and Bonaire have been moving slowly from the West to the East on the Caribbean plate. The islands probably emerged above sea level during the Miocene. Long ago they either formed part of or were lying much closer to an early group of West Indian islands. The original West Indian fauna has long since been lost and has been replaced by a South American fauna. Only a few remnants of the old West Indian fauna remain. There are certain fresh and brackish water hadziid amphipods and some species of isopod, which are found in caves, which are also found in the West Indies (STOCK, 1977). Originally these were probably seawater organisms living in the interstitial spaces of sea sand or in caves at the shore on the edges of the Eastern Tethys sea, where the Greater Antilles were also located. Other examples of Old West Indian fauna are the land snails *Cerion uva* (cocolishi di kalakuna) and several species of snails of the genus *Tudora* (cocolishi di kabritu). *Cerion uva* and several species of *Tudora* are endemic to the islands of Aruba, Curaçao and Bonaire. The genus *Cerion* has a West Indian distribution. *Cerion* is found in Florida, Bimini, Bahamas, Cuba, Hispaniola, Cayman islands, Puerto Rico and Anegada. In St. Croix a fossil form is found (DE VRIES, 1974). *Tudora* is related to West Indian genera. Fossil species of *Tudora* are found in Paraguaná. The peninsula of Paraguaná (Venezuela) also harbors other remnants of „old“ West Indian fauna, a fossil species of *Microceramus*, a West Indian snail genus, is found in Paraguaná. The Northern part of Paraguaná and some other parts of the northern Venezuelan coast are terranes, former islands which have accreted to the South American coast. This could



Photo 2: The terrestrial snail *Cerion uva*, is considered to be a relict of the old West Indian fauna in Aruba, Curaçao and Bonaire (actual size).

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explain the occurrence of these West Indian elements. The Sabal palm (*Sabal* sp.) which grows at Seru Gracia and Seru di Bientu in the Christoffelpark in Curaçao and which also occurs in Bonaire, is probably of West Indian origin and an example of a West Indian element in the flora. This Sabal, is clearly indigenous to Curaçao and Bonaire. It occurs in the geological older Western part of Curaçao and has originally been classified as *Sabal palmetto*, which is a species which occurs in the Bahamas, Western-Cuba and the South-Eastern US (HENDERSON, GALEANO & BERNAL, 1995). In the latest revised (3rd) edition of Arnoldo's Zakflora (VAN PROOSDIJ, 2001) this Sabal has now been tentatively classified as *Sabal* cf. *causiarum*. *Sabal causiarum* is another West Indian species that occurs in Hispaniola and Puerto Rico. Most of today's fauna in Aruba, Curaçao and Bonaire is South American with a few „modern“ West Indian immigrants. In the herpetofauna the only West Indian element is *Anolis bonairensis*, which is endemic to the island of Bonaire. The avifauna is also largely of South American origin, even so most West Indian elements can be found in the avifauna, which is not surprising since birds can fly and can cover large distances. Many of these are probably recent or fairly recent arrivals; they constitute a new West Indian fauna. Examples of breeding birds (nonmigrating) of West Indian origin are the Caribbean Elaenia, (*Elaenia martinica*), the Black-whiskered Vireo (*Vireo altiloquus*) and the Scaly-naped pigeon (*Colomba squamosa*). On Bonaire the Pearly-eyed thrasher (*Margarops fuscatus*) is of West Indian origin. A new recent arrival of West Indian origin, which may have reached the islands on its own, via Venezuela, is the Caribbean or Lesser Antillean Grackle (*Quiscalis lugubris*), which is sometimes found on Aruba, Curaçao and Bonaire. Some of the local birds are migrating birds of North American origin.

Herpetofauna

Origin of the herpetofauna families found in Aruba, Curaçao and Bonaire

The LEPTODACTYLIDAE and the IGUANIDAE are of South American origin, with roots that go back to the old Gondwana continent. The BUFONIDAE, which probably also originate in South America, are closely related to the LEPTODACTYLIDAE and probably evolved from members of this family. The BUFONIDAE managed to reach North-America, probably in the early Tertiary and from there they used the Bering land-connection (Beringia) to make their way to Asia, Europe and Africa (BLAIR, 1972). The GEKKONIDAE form a very old family, representatives of this family are found from the Upper-Cretaceous. The origin of the GEKKONIDAE is unclear, but many believe this family originates in Gondwana. The TEIIDAE probably originate in North America. They are present in the North American Cretaceous.

A few members of this family managed to reach South America at a very early stage, before the Panama land bridge was formed. They could have reached South America by „waif dispersal“, may be using intermediate islands as stepping stones and/or they could have been part of the fauna of an island that rafted onto the South American continent and was accreted to it as a terrane. In South America new genera evolved within the TEIIDAE. The LEPTOTYPHLOPIDAE originated in South America. The COLUBRIDAE form a large cosmopolitan family, of great age. Their origins are unclear.

The VIPERIDAE probably originate in Asia, They managed to reach North-America via Beringia and found their way to South America. The rattlesnakes which belong to this family evolved in North-America and reached South America, in the Pliocene after the Panama land bridge was formed (CAMPBELL & LAMAR, 1989).

The origin of the herpetofauna in Aruba, Curaçao and Bonaire

The original herpetofauna on Aruba, Curaçao and Bonaire is almost completely of South American descent. The only West Indian element is *Anolis bonairensis*, which is closely related to the anoles of the *Anolis roquet* group from the Lesser Antilles. The whistling frog *Eleutherodactylus johnstonei*, was



Photo 3: *Anolis bonairensis*.

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introduced from the West Indies, via Venezuela. The Cosmopolitan house gecko *Hemidactylus mabouia* has also been introduced by man and is of African origin. All the other amphibians and reptiles on Aruba, Curaçao and Bonaire are of South American stock. Here we can make a distinction between those species which have reached the islands on their own long ago and more recent arrivals. Those which arrived on their own and have been on the islands for a long period of time, have had time to develop into endemic species or subspecies, such as for example *Crotalus unicolor*, *Phyllodactylus julienni*, *Liophis triscalis*. More recent arrivals have not had sufficient geological time available to develop endemic traits, in many cases they were introduced by man, but in some cases it is difficult to judge whether this is the case and some may have arrived by natural means. *Cnemidophorus lemniscatus lemniscatus* is an example of a species introduced by man. *Ameiva bifrontata* may have been introduced by man. *Pleurodema brachyops* probably arrived in Aruba via an overland route by natural means, but may have been introduced in Aruba by man, it was introduced in Curaçao and Bonaire from Aruba.

Amphibians have a permeable skin; most amphibians cannot survive immersion in salt water. They can cross saltwater barriers only with great difficulty. In some cases tropical storms like hurricanes or typhoons can blow a frog or other small animal like an anole, over a relatively short distance, from one island to another nearby island. Some of these could conceivably have a small chance of surviving such a trip. Often strong hurricanes generate tornados, these can suck up animals, that eventually fall back to the ground. A larger animal cannot survive such an ordeal, but there are documented cases of live fish raining from the sky after a tornado. A frog landing on long wet grass or other soft vegetation or which ended up in a pool of rainwater could conceivably survive such a trip. Oceanic islands usually do not have populations of amphibians. When amphibians are encountered on oceanic islands they have usually been introduced by man. In some cases the island could be a fragment of continent split off by continental drift (cq. Madagascar "the eight continent"), or have been connected to a continent via a land bridge. The fact that *Pleurodema brachyops* occurs in Aruba is an indication that Aruba was at some time connected to the mainland. It is also possible that *Pleurodema brachyops* was imported by the Amerindians. This seems less likely, but the possibility



Photo 4: *Cnemidophorus arubensis*, male (Aruba).

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Photo 5: *Crotalus unicolor*.

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Photo 7: *Cnemidophorus nigricolor*, female, (Islote Palmeras, Aves de Sotavento, Venezuela).

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Photo 6: *Cnemidophorus lemniscatus lemniscatus*, semiadult male.

A. FLÄSCHENDRÄGER

cannot be fully excluded. In Aruba, but also in Curaçao where frogs did not occur, many artifacts of frogs or artifacts with frog motifs have been found. These are locally produced pots with frog motifs and also frog pendants, both imported and locally produced (DE HASETH, 1993). The frog was a symbol of fertility and rain, its call was believed to attract rain (WASSÉN, 1934). This could have been a motive to import such an animal. The Papiamentu name Dori, Dori Maco is of Indian origin and this indicates that this frog already occurred on Aruba before colonial times. Judging from a photograph (Photo 14) Manzanilla PUPPO (pers. comm.) thinks that the color pattern of *Pleurodema brachyops* from Aruba seems somewhat different from those found in Venezuela. This would argue in favor of its having arrived on its own. Comparison of the DNA of Aruba and mainland *P. brachyops* could conceivably shed more light on this matter.

Curaçao and Bonaire were never connected to the mainland. These were islands which amphibians did not reach on their own and which were not easily reached by reptiles. During the ages a few reptile species did manage to reach the islands and as a result of a long period of isolation endemic species and sub-species developed. We find a typical pattern in which there are only a few species present on these islands which are distinct from those of the mainland. The Venezuelan islands Islas Aves, Los Roques, La Tortuga, La Orchila, La Blanquilla and Los Hermanos are also islands which never connected to the mainland; here we find a similar situation. The herpetofauna consists of only a few species c.q. endemic species and/or endemic sub-species, which are different from those on the mainland. *Cnemidophorus nigricolor* and *Phyllodactylus rutteni* are endemic to these islands. Some of the other islands in this region formed part of the continent during the sea-level regressions associated with the last ice-ages.

Isla de Margarita, Coche, Cubagua, Los Frailes, los Testigos, Trinidad & Tobago and Chacachacare all formed part of the mainland. Isla de Margarita which is only slightly larger than Curaçao has a much richer herpetofauna, which consists entirely of species which are also found on the continent. There are no endemic species. In Aruba there is a strong endemic element and the original species (c.q. excluding those introduced by man) are quite few. In this respect the Aruba herpetofauna is more like the herpetofauna of an isolated is-

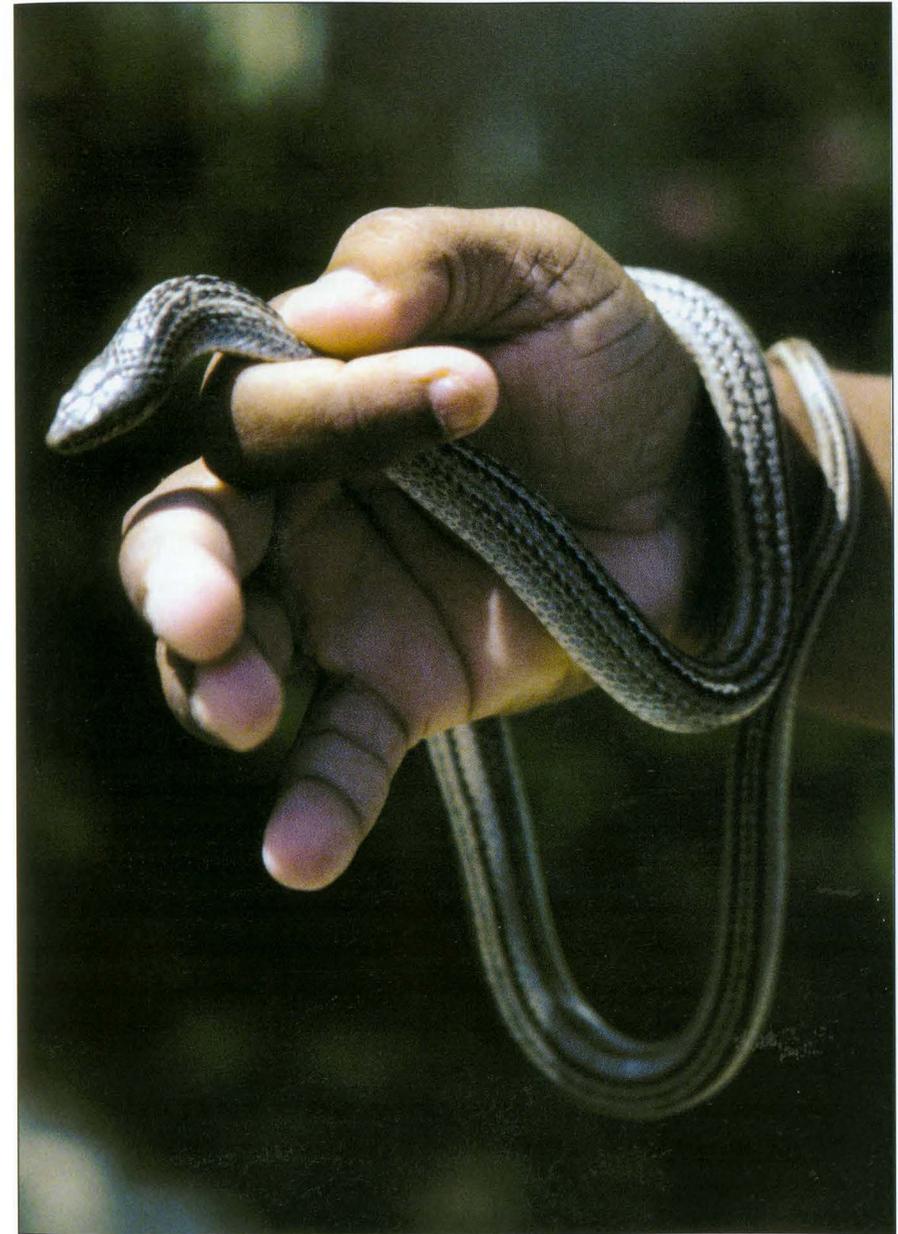


Photo 8: The Curaçao snake, *Liophis triscalis*.

land, it does not have the composition and characteristics of a typical continental island herpetofauna. Examples of endemic species or sub-species in the Aruba herpetofauna are the Aruba rattlesnake (*Crotalus unicolor*), the Aruba whiptail lizard (*Cnemidophorus arubensis*) and the gecko (*Phyllodactylus julienni*). If Aruba ever connected with the mainland (as seems likely), this connection must have existed quite long ago and probably was of short duration.

During the end of the Cretaceous a deep oceanic basin existed north east of South America, the so-called Aruba basin. This basin was gradually filled-in by sedimentation during Late-Eocene and Oligocene times. There was also some folding, parts of the basin were uplifted, others subsided. Aruba probably emerged above the sea during the Late-Miocene. Aruba used to be an oceanic island, like Curaçao and Bonaire nowadays. During the Pliocene (10–12 Ma), the Aruba basin was filled in almost completely. Sediments from this period are neritic; the sea was quite shallow (Curet). Nowadays Aruba forms part of the continental plateau. Between Aruba and the peninsula of Paraguaná in Venezuela the water reaches a maximum depth of about 180–190 m. The bottom gradually slopes down from the Paraguaná side toward Aruba. The maximum depth is reached near Aruba.

During the Late-Pliocene and also during the Pleistocene sea levels receded many times. During the last 2.5 million years, there have been more than 20 glaciations (the precise number is somewhat subjective, depending on which temperature fluctuations one considers to be fully separate “glaciations”). Usually the cold periods would last much longer than the interstadials. During the last 40,000 years, in the Late-Pleistocene, there were at least four major sea level regressions. During these ice ages sea levels were lowered by about 100–140 m below their present level. The last Late-Pleistocene glaciation took place about 18,000–20,000 years ago, and this glaciation caused sea levels to recede by approximately 140 meters. Earlier, about 135,000 years ago, during a previous ice-age, sea levels were lowered by approximately 130 meters. Longer ago, during the Late-Pliocene and the early Pleistocene, there were many early ice ages and their associated periods with lowered sea levels, about which much less is known; there were very cold periods at about 2.5 Ma, 1.7 Ma and 800,000–900,000 years ago.

When we draw the 140 m depth contour on a modern map, only a quite



Photo 9: *Cnemidophorus murinus ruthveni*, eating cactus fruits and flowers.

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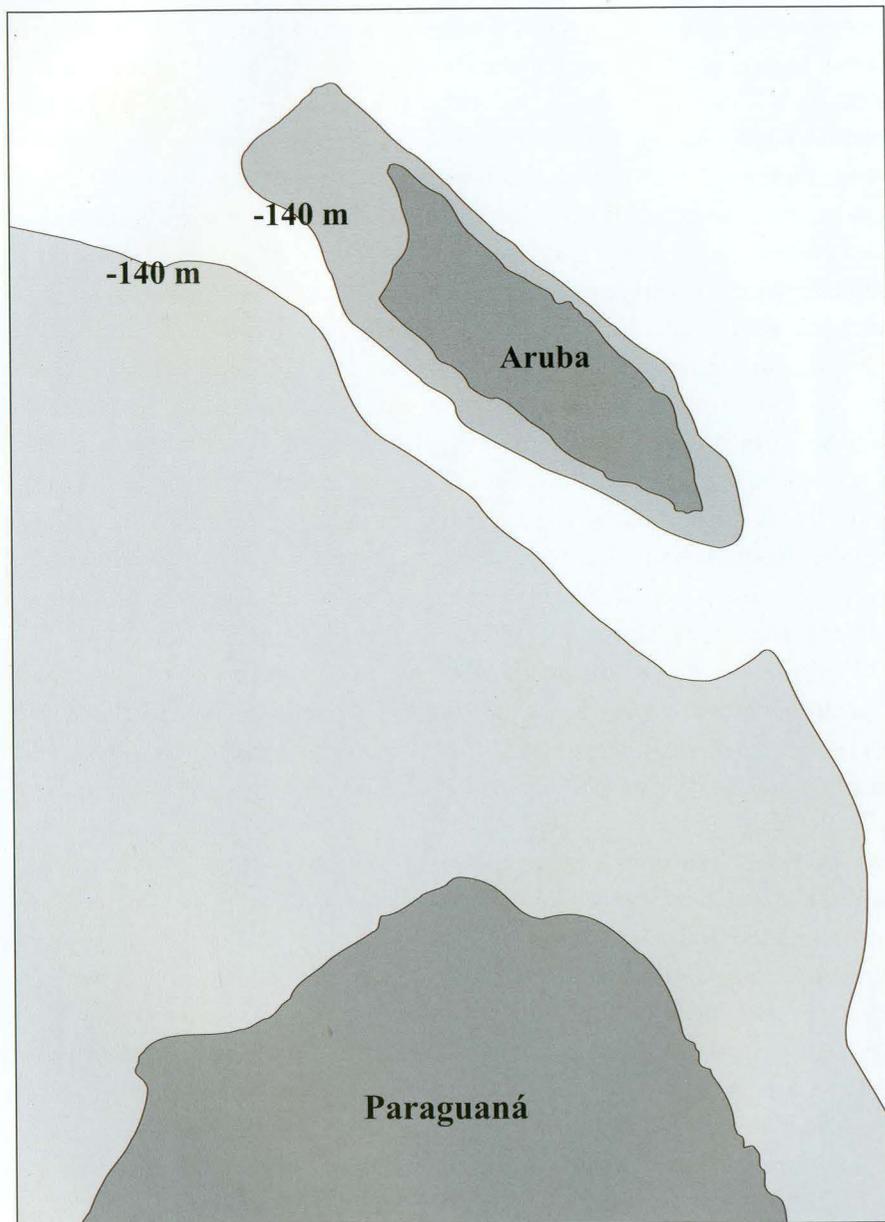


Fig. 2: Aruba and the South American mainland during the ice ages, at the times when lowest seawater level was reached, based on the present 140 m depth contour.

narrow sea-strait remains between Aruba and the continent. This sea strait has a maximum depth of about 50 m (see Fig. 2). During a large part of the Pleistocene ice ages Aruba probably was an island, that was separated from the mainland by a narrow sea way. This however does not mean that the island never connected with the mainland. The sea-strait has strong erosional features and its outlines are bounded by faults. The strait thus forms a mini-graben, a small fault block that has been subsiding along the fault lines. It is thus very probable that Aruba was connected to the mainland, during some early ice-age when this sea-strait had not yet been formed. When sea levels rose during the following interglacial period, an erosional channel was formed along the fault lines, and in subsequent ice ages the connection with the mainland could not be reestablished.

The Aruba herpetofauna has several endemic elements. The fauna differs from the mainland fauna and has a strongly insular character. This indicates that the island has been separated from the mainland for a long period of time and that a connection with the mainland, if it ever existed (as is probable), probably did not last long and must have existed quite long ago.

Pleurodema brachyops, the froth-nest frog (Papiamentu: Dori, Dori maco) must have reached Aruba overland, during the early ice ages in the Late-Pliocene or Early-Pleistocene (this animal could also have been imported by the Amerindians; this however seems less likely, but the possibility cannot be fully excluded). *Crotalus durissus* probably also reached Aruba quite early, possibly overland, during a period of sea-level regression in the Late-Pliocene or Early-Pleistocene, or by crossing the narrow sea-strait. In the avifauna of Aruba we also find another example of an endemic sub-species, that must have reached Aruba in a similar way, that is either overland or by crossing a narrow sea-strait. The Choco or burrowing owl can only cover short distances by flying. On Aruba an endemic subspecies is found (*Athene cunicularia arubensis* syn. *Speotyto cunucularia arubensis*).]

II Species list of the Amphibians and Reptiles of Aruba, Curaçao and Bonaire

Amphibians

FROGS AND TOADS

South-American frogs (Fam: LEPTODACTYLIDAE)

Pleurodema brachyops COPE, 1869

Eleutherodactylus johnstonei BARBOUR, 1914

True toads (Fam: BUFONIDAE)

Bufo marinus LINNAEUS, 1758

Reptiles

LIZARDS

Geckos (Fam: GEKKONIDAE)

Gonatodes antillensis VAN LIDTH DE JEUDE, 1887

Gonatodes albogularis albogularis DUMÉRIEL & BIBRON, 1836

Gonatodes vittatus vittatus WIEGMANN, 1856

Phyllodactylus martini VAN LIDTH DE JEUDE, 1887

Phyllodactylus julienni COPE, 1885

Hemidactylus mabouia MOREAU DE JONNÈS, 1818

Thecadactylus rapicauda HOUTTUYN, 1782

Iguanas, Anolis and related species (Fam: IGUANIDAE)

Iguana iguana LINNAEUS, 1758

Anolis lineatus DAUDIN, 1802

Anolis bonairensis RUTHVEN, 1923

Whiptail lizards, jungle runners and related species (Fam: TEIIDAE)

Ameiva bifrontata COPE, 1862

Cnemidophorus arubensis (VAN LIDTH DE JEUDE, 1887)



Photo 10: *Anolis lineatus* (Curaçao).

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Cnemidophorus lemniscatus lemniscatus LINNAEUS, 1758

Cnemidophorus murinus murinus LAURENTI, 1768

Cnemidophorus murinus ruthveni BURT, 1935

Spectacled tegus and related species (Fam: GYMNOPHTHALMIDAE)

Gymnophthalmus lineatus LINNAEUS, 1758

Gymnophthalmus speciosus HALLOWELL, 1861

Tretioscincus bifasciatus DUMÉRIL, 1851

SNAKES

American blind snakes (Fam: ANOMALEPIDAE)

Liotyphlops albirostris PETERS, 1857

Slender blindsnakes (Fam: LEPTOTHYPHLOPIDAE)

Leptotyphlops albifrons WAGLER, 1824

Colubrid snakes (Fam: COLUBRIDAE)

Leptodeira bakeri RUTHVEN, 1936

Liophis triscalis (LINNAEUS, 1758)

Vipers and pitvipers (Fam: VIPERIDAE)

Crotalus unicolor KLAUBER, 1936



Photo 11: Iguana on a candelabra cactus (Bonaire).

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III Frogs and Toads

South American Frogs (Fam: LEPTODACTYLIDAE)

The LEPTODACTYLIDAE form a large family of frogs which are mainly tropical. Common English names for this family of frogs are Tropical frogs or South American frogs. Neither of these names is very satisfactory. LEPTODACTYLIDAE are also found in areas which are not tropical such as the Andes and the South of Chile. Many other families of frogs exist which are fully tropical or at least as tropical as the "tropical frogs". The name South American frogs is not fully satisfactory either since LEPTODACTYLIDAE also occur in Middle America and the West Indies and they are also found in Mexico, with some species occurring in North-America. In Southern Africa, Australia and New Guinea several closely related genera occur. These are nowadays usually classified in the families HELEOPHRYNIDAE (The Southern African species) and the MYOBATRACHIDAE (the Australian and New Guinea "Leptodactylidae"). Some authors (COGGER, TYLER) feel that this division should be made at the sub-family level. They prefer to maintain the LEPTODACTYLIDAE as one large family including the Southern African and Australian/ New Guinea genera. This large family is usually called "Southern frogs" which refers to their origins, which go back to the times of the great southern Gondwana continent.

In Aruba, Curaçao and Bonaire we find the genera *Pleurodema* (Four-eyed frogs) and *Eleutherodactylus* (Robber frogs, Dwarf barking frogs). *Pleurodema* is a genus of South American origin, that occurs in South and Middle America. It does not occur in the West Indies. The genus *Eleutherodactylus* is a very large genus with more than 500 species, which often resemble each other closely. *Eleutherodactylus* species are found in Middle America and South America, from Mexico to Northern Argentina and also in the West Indies. Many species lay their eggs in humid soil, some attach their eggs to plants. In this way some species can be transported to other countries together with live plants. *Eleutherodactylus johnstonei* has been introduced in Aruba, Curaçao and Bonaire.



Photo 12: *Bufo marinus* (Aruba).

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Photo 13: *Eleutherodactylus johnstonei*.

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Pleurodema brachyops

Names and classification: A synonym is; *Pleuroderma brachyops*. English: Colombian four-eyed frog, Froth-nest frog, Spanish (Venezuela): Sapito lipón [Lipón is a Venezuelan expression for barrigudo, barrigón. Sapito lipón means “fat little toad”], Spanish (Isla de Margarita, Venezuela): Warikki, Papiamentu: Dori, Dori Maco [The name Dori, Dori Maco is of Amerindian origin, it probably is a Caquetío word. Dori maco probably means frog (maco) which has the call “dori”, dori being an onomatopoeia. In the related Taíno language of the larger Antilles (both Caquetío and Taíno belong to the Arawak group of languages) the name Maco was also used. In the Dominican Republic nowadays two types of frogs are named “Maco”], Sapu (the name Sapu is used in the Papiamentu of Curaçao and Bonaire only, in Aruba the name Sapo is used for *Bufo marinus*), Dutch: Arubaanse kikker, Roodbilkikker, Vieroogpad.

Distribution: Panama, Northern Colombia and also in the Colombian llanos, Venezuela, Guyana, Isla de Margarita, Aruba, Curaçao, Bonaire and Klein-Bonaire. In northern South America this frog is found in the savannas, but not in forested areas. The Dori Maco has been introduced in Curaçao and Bonaire from Aruba, in Curaçao around 1910 and on Bonaire in 1928 (WAGENAAR HUMMELINCK). It came to Curaçao with sand which was dug up from bottom of the tanki's (water reservoirs) in Aruba. In the past this hard sand made up of diorite was imported as grit to sandblast and clean steamboilers. The often humid sand was shipped in schooners. During the trip the sand would shift and many frogs would be jumping in the hold of the ship (this story was told to me as a child by a friend of my parents, Mr. Carlos DEBROT †, whose father had been captain of a schooner importing the sand). An uncle, Luis H. Lopez RAMIREZ †, who was from Bonaire, told me long ago how they were introduced in Bonaire. A boy spending his vacation with his aunt in Bonaire brought some larvae (pollywogs) from Curaçao and released them in a dam which was holding water at the time, since it had been raining both in Curaçao and Bonaire.

Identification: *Pleurodema brachyops* is a small light-brown frog, which resembles a toad [The difference between “frogs” and “toads” (Dutch: “kikker”

and “pad”, Spanish: “rana” and “sapo”) is not absolute. Frogs are species that belong to the family of the RANIDAE (true frogs), while toads are those that belong to the BUFONIDAE (true toads). These families are found in Europe, where the terms frog and toad originated. Usually frog-like species belonging to other families, both in Europe and in other parts of the world, are all called frogs, while the name toad is usually reserved only for those species that belong to the BUFONIDAE. However, sometimes species that look like toads are called “toad” and those that look like frogs “frog”. Thus *Pleurodema brachyops* which belongs to the LEPTODACTYLIDAE, has been described as a small, light-brown ground-frog that resembles a toad. In Dutch this species is named either “Roodbilkikker” or “Vieroogpad” (Lit: Redbum frog or four-eye toad).]. On the lower back ocelli are found. These ocelli are blue black and red giving the frog its name “Four-eyed frog”. In juveniles there is only a black blotch.

Natural history: It is a nocturnal animal. In Curaçao and Bonaire many water storage basins exist, behind earthen dams. On Aruba large depressions have been dug as water reservoirs, the so-called “tanki's”. During the rainy season, after heavy rainfall, these fill-up with water. In some areas much smaller natural depressions also fill up and form fairly shallow temporary ponds. If there is sufficient water available to fully penetrate and saturate the soil to some extent, then adult frogs will burrow out of the mud. If the rainfall has been insufficient, the frogs will not come out. In the dry season they remain buried in the bottom of these reservoirs, and other moist places nearby, where they aestivate in a state of reduced metabolism (similar to hibernation, but at high temperatures). If such an animal is found when one is digging it looks as if it is dead and partly mummified. When it is immersed in water, it will gradually swell and then start to hop away. The very first night when the reservoir is full, copulation starts immediately and during the whole night a chorus of croaks can be heard. The next day foam nests can be seen floating on top of the water, usually they are blown to the edge of the water by the wind. Sometimes they are anchored in some grass or other vegetation. These foam nests are characteristic for frogs of the genus *Pleurodema*. They are quite different from the gelatinous egg masses, which are commonly produced by most species of frogs. The name “froth-nest

frogs” refers to these foam nests (Photo 15). Within a few days croaking subsides completely and no new nests appear. Like most species of *Pleurodema*, the Dori has ocelli on the lumbar region. These ocelli may resemble the eyes of a much larger animal, thus intimidating and giving some protection against predators. Glands which are situated near these ocelli produce toxins, which taken together with the “warning sign” of the ocelli also give the frogs some protection against predators. Although this toxin is not very toxic to humans, it is best to wash hands after handling these frogs and to see to it that children take similar care, not putting frogs in their mouths etc. etc.



Photo 14: *Pleurodema brachyops* (Curaçao).

J. BEAUJON JR.



Photo 15: Frothnest of *Pleurodema brachyops* (Curaçao).

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Eleutherodactylus johnstonei

Names: English: Johnstone's frog, Whistling frog (Jamaica), Spanish (Venezuela): Ranita, Ranita japonesa, Coquí, Spanish: Coquí. Papiamentu: Coquí [In Puerto Rico one species of whistling frog is called Coquí (*Eleutherodactylus coqui*). This name is now used in Papiamentu for the imported whistling frog *E. johnstonei*. In Venezuela *E. johnstonei* is also being called Coquí. In Venezuela the name "Ranita japonesa" is also being used. The origin of this name is unclear.], Dutch: fluitkikker, boomkikker [The Dutch name boomkikker (treefrog), is not particularly suited for this species, which is only found in the lower branches of trees and shrubs, usually at less than 3 meters height.].

Distribution: This whistling frog originates in the Lesser Antilles and is found on most of the islands in this group. Islands where this species occurs are Saint Croix, Anguilla, Saint Martin, Saint Barth's, Saba and Saint Eustatius, Saint Kitts, Nevis, Montserrat, Barbuda, Antigua, Guadeloupe, Martinique, Saint Lucia, Saint Vincent, Grenada and Barbados (SCHWARTZ & HENDERSON, 1991). The whistling frog has been introduced in Jamaica, Bermuda, Guyana, Trinidad (MURPHY, 1997) and into the coastal regions of Venezuela. In Venezuela this frog is found in urbanized areas in the coastal regions such as Cumaná and Caracas. Nowadays this frog has also managed to establish itself far inland, and is found in and around cities like Barquisimeto, Mérida en Trujillo (MANZANILLA PUPPO *et al*, 1995). In Colombia this frog is nowadays found in and around Baranquilla (RENJIFO, 1997). This frog has also been introduced in Aruba, Curaçao and Bonaire, they probably came in from Venezuela with plants which were imported for landscaping. In Curaçao they are present since the late 1970's or early 80's, and have spread out over large areas and can be found in many gardens. In Aruba this frog was introduced in the early 1990's. It can be found in the gardens of some of the hotels such as, La Cabaña. In Bonaire the whistling frog probably came in around 1996, they are now established on the island, many can be found in gardens in the Belnem area. In this area a plant nursery that imports ornamental plants from Venezuela is found.

Identification: *E. johnstonei* is a small frog. Males reach a length of 24 mm (SVL), the females are somewhat larger and can reach a length of 31 mm (SVL). A dark band runs over the snout, the eyes and tympanum. On the back there are some chevron-patterns. Special characteristics which can be used to distinguish this frog from many other *Eleutherodactylus* species are the belly which is beige with a granular texture and the 4 or 5 tuberculi that are present on the upper eyelids.

Natural history: This frog is found on the ground or in low bushes. While it occurs in forests in its original area of natural occurrence in the Lesser Antilles, in many of the areas where it has been imported it is found mostly in urbanized areas. It seems likely that many predators, which cannot enter urbanized areas, prevent its occurrence outside of these areas. On Aruba, Curaçao and Bonaire it is found only in gardens and cannot survive in the bush, which is too arid. At night the males emit a high "bwií-bwií" whistle, which carries a long distance. It is amazing that such a small frog can emit such a strong sound. Unfortunately many people cannot appreciate these tones, the more so since they can penetrate into an air-conditioned room. Pest control companies are nowadays getting clients asking to eradicate these animals, which many consider to be a garden pest. They can be flushed out of their hiding places using ammonia. Animals that are moved from near the house to the back of the garden, can usually find their way back over distances of more than 50 meters.

Photo 16: *Eleutherodactylus johnstonei* (Curaçao).

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Photo 17: Eggs of *Eleutherodactylus johnstonei*, attached to plants.

A. FLÄSCHENDRÄGER

Photo 18: *Bufo marinus*. Playa Grande near San Juan Dom. Rep.

A. FLÄSCHENDRÄGER

Photo 19: *Bufo marinus*. Playa Grande near San Juan Dom. Rep.

A. FLÄSCHENDRÄGER

True toads (Fam: BUFONIDAE)

The BUFONIDAE are usually called "true toads". It is a cosmopolitan family, which is found on all continents, and most continental islands, with the exception of Antarctica, Greenland and Madagascar.

Bufo marinus

Names: Papiamentu Aruba: Sapo, English: Giant Toad, Cane Toad, Marine toad, English (Trinidad & Tobago): Crapaud, Dutch: Reuzenpad, Aga, Aga-pad, Spanish: Sapo común (Venezuela, Colombia), Sapo lechero (Mexico and Middle America), French (Martinique and Guadeloupe): Crapaud buffle, Ladre.

Distribution: *Bufo marinus* originates in the South American tropics and is also found in Mexico and Middle America and in the South of Texas. This toad was introduced in many tropical areas in order to control insect pests in sugarcane fields. This toad was introduced in Martinique from French Guyana before 1844. Later on it was introduced on many other West Indian islands with sugarcane fields, in South Florida and also in the Pacific area; in Hawaii, the Philippines and in Australia and New Guinea (TYLER, 1994). It has also been introduced in Aruba. Originally it was thought that these animals were introduced with the importation of river sand from Surinam in the early 1970's, when the Hyatt hotel was built in Aruba. However letters in the archives of the Veterinary Service in Aruba indicate that these animals are present in Aruba since the early 1960's. They were introduced by an Arubean who went on vacation to Colombia and brought some with him, which were subsequently released in a tanki (water reservoir). [See the Newspaper supplement Ñapa, Amigoe, March 4, 2000.]

Identification: A large toad. The males can reach a length of about 12,5 cm. The females are much larger and can reach a length of 24 cm and a weight of 1,3 kg. The back has a dark and light brown mottled pattern. It has a warty skin. Behind the ears, on the head, there are big glands, the so-called

parotid glands, which produce a milky slime which contains venomous alkaloid (bufotoxin).

Natural history: In many areas where *Bufo marinus* has been imported it is nowadays considered a pest. Many predators that try to grab this animal get poisoned by the venom of the parotid glands. In many areas this has a detrimental effect on the occurrence of natural predators. In Aruba many dogs die after grabbing this toad [The dog's mouth has to be rinsed with lots of water, preferably with a garden hose, as soon as possible. A veterinarian should inject a muscle relaxant and treat against high fever (Amigoe, August 13, 1997).]. A cruel but effective way of killing these animals is now commonly used in Aruba. The toads are killed by pouring household cleaning detergent, such as Pine-Sol over them. *Bufo marinus* eats many insects, rainworms, lizards, small snakes etc. It will also eat carrion, mice and small rats and leftover dog or catfood. This animal will even eat bees and wasps. It can be a problem for beekeepers. In Aruba it is known to eat a lot of cockroaches and at least in this respect it is considered beneficial. Nowadays we tend to see *Bufo marinus* as a pest only. However it has to be remembered, that in the past, before the advent of modern insecticides, it was the only available effective means to combat insect pests in sugarcane fields. It is quite amazing, that this animal has managed to establish itself on an arid island like Aruba. One factor of importance is undoubtedly the fact that although Aruba has a drier climate than Curaçao or Bonaire, the soils are less permeable. The water in the tanki's (water reservoirs) will hold much longer than in Curaçao or Bonaire. While the water in the basins behind the dams of Curaçao or Bonaire will hold for a few months at most, the Aruban tanki will dry up only after a very long and severe dry season; this happens only seldomly. The Sapo also finds refuge in gardens where it seeks out moist spots. Often it burrows beneath the drippers of drip-irrigation systems or beneath the condensed water outlet of air-conditioning systems. The very fact that the Sapo has managed to establish itself in Aruba indicates that if it were introduced, it is possible that it could survive and establish itself in Curaçao or Bonaire as well. The females lay long strings of small black eggs in the tankis. Larval development is extremely rapid and metamorphosis takes place at a small size. Since the introduction of the

Sapo, the Dori has become very rare in Aruba. It is likely that the Sapo competes with the Dori, especially when in the larval stage. The Dori is probably also suitable prey for the Sapo. *Bufo marinus* is known to eat frogs, it can also eat snakes. The Sapo has been observed to eat the Santanero (*Leptodeira bakeri*). On the other hand snakes of the genus *Leptodeira* are known to be immune to the venom of *Bufo marinus* and other *Bufo* species. They constitute one of the few predators of this toad. The Santanero in Aruba eats small *Bufo marinus*, as can be seen in photos 66 and 67. These pictures were taken in a garden, the toad was not fed to the snake, it was a naturally occurring event. Eat and be eaten.



Photo 20: The larvae of *Bufo marinus* develop very rapidly, in this picture metamorphosis has almost been completed. The Netherlands Antilles cent has a diameter of 14 mm.

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IV Lizards

Geckos (Fam: GEKKONIDAE)

Geckos form a large group with a wide distribution. They are found in all tropical and subtropical areas. Even on tropical oceanic islands geckos are usually found. Most species of geckos lay round eggs with a relatively thick calcareous scale. These eggs can withstand dessication and many can also withstand immersion in seawater. Often these eggs are laid in holes in tree trunks or logs, or in partially decayed wood. Such eggs can be transported to islands in floating logs. In several species of geckos different females lay their eggs in the same place. Places they consider safe, and where eggs have previously hatched successfully are chosen. If several eggs of different genetic make-up are transported to an island this will greatly increase the chances of a viable population establishing itself. Sometimes adult animals can also manage to reach islands while hidden in floating tree trunks or logs. After the violent eruption of the Krakatau volcano in 1883, in the Sunda straits between Java and Sumatra, Krakatau island became devoid of all life. It was rapidly recolonised by living organisms and geckos were among the early arrivals (THORNTON, 1996). Distribution by humans is probably also an important factor. Since early times geckos were probably already unintentionally being transported by human beings as stowaways in household belongings. A few species are commonly encountered in and around human habitations, such species are generally referred to as "House Geckos". Nowadays transportation of household goods is usually done by containers. These are shipped in ships which reach their destination much faster than ships in the past. Thus geckos have a much higher chance of surviving such a journey. Usually the containers are not unloaded at the harbor but are rapidly moved onward. This way geckos can turn up at locations which lie far inland. Species like *Hemidactylus mabouia* ("Tropical House gecko", "Cosmopolitan House gecko" or "Wood slave"), *Hemidactylus frenatus* ("Pacific House gecko"), *Hemidactylus turcicus* ("Mediterranean House gecko"), *Hemidactylus garnottii* ("Indo-Pacific gecko"), *Cosymbotus platyurus* ("Flattened House gecko") and *Ptyodactylus hasselquisti* ("Fan-footed rock gecko") have all reached

Florid (BARTLETT, 1994). *Gekko gekko* ("Tokay gecko") is also found in Florida, this population probably did not originate from unintentional, accidental transportation, but from escaped or released pets. Another species which has reached many parts of the world and which nowadays is found in Middle and South America is the Indo-Pacific "mourning gecko" *Lepidodactylus lugubris*. In many parts in the tropics and subtropics some of the species mentioned above are nowadays encountered. *Hemidactylus turcicus* is already found in the New World in Louisiana, Texas, Florida, Cuba, the Mexican Gulf coast and in Chile. *Hemidactylus frenatus* occurs in Texas, Florida, Mexico, Guatemala, El Salvador, Nicaragua, Costa Rica and Panama. The populations of *Hemidactylus turcicus* ("Mediterranean House Gecko"), *Hemidactylus frenatus* ("Pacific House Gecko") and *Hemidactylus garnottii* ("Indo-Pacific gecko") which are found in parts of the New World, do not differ from those in their areas of origin. Their distribution patterns clearly indicate that they were introduced by man and in many cases their introduction has been documented. In Aruba, Curaçao and Bonaire the "Tropical House gecko" or "Cosmopolitan House gecko" *Hemidactylus mabouia* has been introduced. It would surely not be surprising if in the future other species, such as one or some of those mentioned above reach the islands as well.

In Aruba, Curaçao and Bonaire we find four different genera of geckos, these genera can be distinguished from one another fairly easily:

Gonatodes: these are small geckos, (8–13 cm). The toes end in a rather long sharp nail, there are no adhesive pads. They are called "Padless" geckos or American geckos. These geckos do not climb as well as the others and are often found near the ground.

Phyllodactylus: these geckos are somewhat larger (10–15 cm). The toes end in a fan-shaped or V shaped adhesive pad with a small nail. Common names are Leaf-toed geckos or Leaf-fingered geckos.

Hemidactylus: fairly large geckos (about 15 cm). The adhesive pad runs along the full length of the toe and at the end of each toe the nail is clearly visible. They are called Leaf-toed geckos. This can cause confusion since this name is often also used for *Phyllodactylus* species.

Thecadactylus: this is a monotypic genus; there is only one species *Thecadactylus*

rapicauda. This is a large gecko (about 18 cm). The toes are connected by a membrane.

Most geckos are nocturnal. In Madagascar and on the Seychelles and Comores day geckos are found (*Phelsuma* spp). The nocturnal geckos overheat very rapidly when exposed to sunlight. Smaller species such as *Gonatodes*, will be killed within a few minutes. Geckos can live quite long. Small species like *Gonatodes* are known to be able to reach seven years of age, many larger species are much longer lived. *Phyllodactylus europaeus* is known to have reached 22 years of age. Geckos can let loose of their tail (autotomy), when this tail is grabbed by a predator. The part which is broken off keeps twitching and this can deflect the attention of the predator, thus giving the gecko a chance to escape. However with its tail the gecko also loses some of its fat and energy reserves. The tail will regenerate, but usually the new tail does not become as thick as the original tail. In the case of the Turniptail gecko (*Thecadactylus rapicauda*) however, the new tail becomes much thicker than the original tail. The regenerated tail cannot break-off again, the remaining part of the original tail can however break-off at one of the remaining breaking points. Most species of gecko lay two eggs at a time. Smaller species of gecko such as *Gonatodes* spp. usually lay only one egg at a time, but can produce 8 or 9 eggs during a year's time. Most *Phyllodactylus* species and *Thecadactylus rapicauda* also lay one egg at a time. The sex is dependant on the incubation temperature of the eggs. This is called TSD (Temperature Dependant Sex Determination) [It is not clear how this TSD mechanism functions. Steroid hormones, different enzymes and a H-Y antigen are involved. Several genes play a role in determining the sex.]. TSD is found in most species of turtles and tortoises, including all sea turtles, in crocodiles and in some lizards such as geckos. It does not occur in snakes. There are several different TSD patterns. In geckos, at incubation at high temperatures males are born, at low temperatures females.

In Aruba, Curaçao and Bonaire there is, or may be we should say, there used to be, a superstitious belief that a gecko can cling on to a person with such strength that it can only be removed with a hot iron, a burning cigarette or hot water. Many older people used to be afraid of geckos for this reason. Nowadays very few people still believe this, but up to the early 1960's this curious supersti-

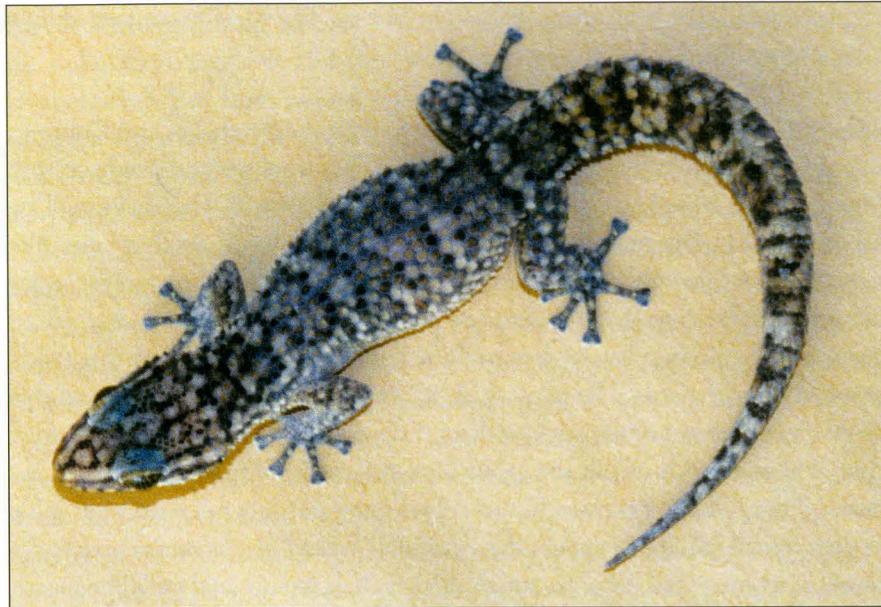


Photo 21: *Phyllodactylus martini* (female). Take note of the form of the toes. The animal has partly shed its skin.
G. VAN BUURT

tion was still quite strong and widespread. In Trinidad & Tobago a similar belief exists (MURPHY, 1997), larger geckos such as *Hemidactylus mabouia* and *Thecadactylus rapicauda* are called "Twenty-four hours". It is believed that they will cling on to their victim, who will die within twenty-four hours.



Photo 22: *Gonatodes antillensis*, male from Curaçao.

G. VAN BUURT



Photo 23: *Gonatodes antillensis*, female (Bonaire).

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Gonatodes antillensis

Names and classification: syn. *Gymnodactylus antillensis*. Papiamentu: Pegapega, Totèki pegapega (this is an older name, not much used anymore), English: Antilles gecko, Dutch: Zwavelkopje, Spanish (Venezuela, similar species): Mea-mea.

Distribution: Curaçao, Klein-Curaçao, Bonaire, Klein-Bonaire, Las Aves, La Orchila. This gecko is also found in Aruba, it has probably been introduced from Curaçao.

Identification: *Gonatodes antillensis*. This gecko has a partly translucent body, when found in houses. The bodies of those living in gardens are darker, the color is variable from light brown to greyish brown. Males have a yellow or orange-yellow head. The pupil is vertical, but can become rounded, depending on the amount of light available.

Natural history: It is a nocturnal animal. It is found in and around houses; in gardens under potted plants. In the mondi (bush) it is found beneath stones which lie on loose soil under trees, where insects are found. It does not climb as well as other geckos and is usually found near the ground.

Gonatodes albogularis albogularis

Names: Papiamentu: Pegapega, English: Yellow-headed gecko, Dutch: Geelkopgekko, Gekko, Spanish (Venezuela): Mea-mea, Machurito, in La Guajira: Curumachár, Culumasár.

Distribution: A few different sub-species exist. The sub-species *Gonatodes albogularis albogularis* is found in Northern Colombia and West Venezuela and on Aruba and Curaçao. This sub-species has been introduced in Florida and Cuba. It has probably been introduced from the mainland to Aruba and Curaçao (WAGENAAR HUMMELINCK, 1940). In Curaçao this species has been reported from certain areas such as for example near Daniël and Siberië in Curaçao. This is a clear indication that it probably is an introduced species.

Identification: *Gonatodes albogularis albogularis* is a small gecko which can reach a maximum size of 10 cm. The males have a yellow head, there is a small blue spot near the ear. In *G. antillensis* this blue spot is not present. The body is darker than the body of *G. antillensis*. Females lay one egg at a time only. The pupil is round.

Natural history: similar to other *Gonatodes*.



Photo 24: *Gonatodes albogularis albogularis*, male, Tucupita, NE Venezuela D. HEGNER



Photo 25: *Gonatodes albogularis albogularis*, female, la Horquetta, NE Venezuela D. HEGNER



Photo 26: *Gonatodes vittatus vittatus*, male (Aruba).
R. A. ODUM



Photo 26A: *Gonatodes vittatus vittatus*,
male W. SCHMIDT



Photo 27: *Gonatodes vittatus vittatus*, female (Aruba).

S. KOSTERMAN

Gonatodes vittatus vittatus

Names: Papiamentu: Pegapega, English: Wiegmann's striped gecko, White-banded Gecko, Streak lizard, Dutch: Gekko, Spanish (Venezuela): Meamea, Lagartija. In Aruba the male *Gonatodes vittatus* are sometimes called "Lagadishi di mispel". The stripe on the back and the orange tip of the tail give it a superficial resemblance to *Gymnophthalmus speciosus*, which in Aruba is called "Lagadishi di mispel" and with which it is often confused.

Distribution: Trinidad & Tobago, Colombia, Venezuela, Aruba, Isla de Margarita, Coche, Cubagua, Los Frailes, Los Testigos. In Aruba this species has probably been introduced. In Los Roques there is an endemic sub-species, *Gonatodes vittatus roquensis*.

Identification: *Gonatodes vittatus vittatus* is a small gecko which can reach a maximum size of 8,5 cm. The male has a white longitudinal dorsal band, which is flanked by two dark stripes. There is yellow on the head. In the females there are series of dots, instead of stripes. The pupil is round.

Natural history: similar to other *Gonatodes*.

Phyllodactylus martini

Names: Papiamentu: Pegapega, English: Dutch leaf-toed gecko, Leaf-fingered gecko, Dutch: Gekko, Spanish (Venezuela, similar species): Tuteque, Tuqueque (all *Phyllodactylus* spp.), Salamanqueja.

Distribution: Curaçao, Bonaire, Klein-Bonaire. This species is endemic for Curaçao and Bonaire.

Identification: *P. martini* is a gecko of about 10–12 cm. The toes are characteristic, ending in a fan-like adhesive pad. The color is variable, it can be light brown, orange-brown or orange-yellow brown. There are yellow or orange-yellow bands on the tail ending in a yellow/orange tail tip. The skin is rough with many tubercles. Individuals that live outside (Photo 21 and 28) are of a darker color and are less transparent than those which are found living in houses. Juveniles are dark brown with yellow dots on the head and bands of yellow dots across the body. The tip of the tail is orange (Photo 29). There is a band on each side of the head. From a distance it can be difficult to distinguish this gecko from *H. mabouia*. Usually it is somewhat more orange, with a rougher skin. If one gets near enough to see the toes, then identification is easy; the toes are very different from those of *H. mabouia*.

Natural history: In the "mondi" (bush) *P. martini* can often be found in the hollow branches of dead candelabra cacti.



Photo 28: *Phyllodactylus martini* (Curaçao). Individuals that live outside are of a darker color and are less transparent than those which are found living in houses. P. Ch. HOETJES

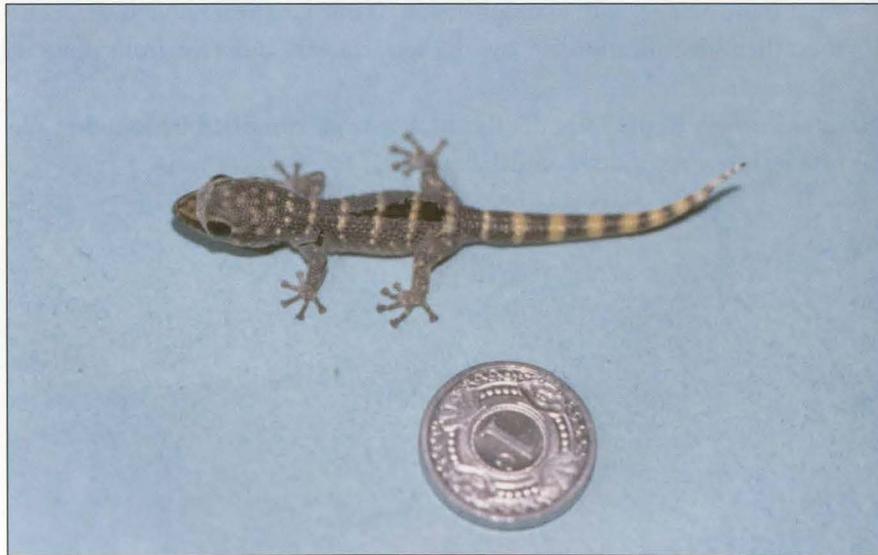


Photo 29: *Phyllodactylus martini* juvenile, which has just emerged from its egg. G. VAN BUURT



Photo 30: *Phyllodactylus julienni* (Aruba). The color of different individuals can vary considerably. R. A. ODUM



Photo 31: *Phyllodactylus julienni* (Aruba). The color of different individuals can vary considerably. G. VAN BUURT

Phyllodactylus julieni

Names: Papiamentu: Pegapega, English: Aruba leaf-toed gecko, Leaf-fingered gecko, Dutch: Gekko, Spanish (Venezuela, similar species): Tuteque, Tuqueque (alle *Phyllodactylus* spp.), Salamanqueja.

Distribution: Aruba.

Identification: This species is very similar to *P. martini*. The adult animals have a pattern of transverse stripes which is very similar to that found in *P. martini* juveniles, but which is absent in adult *P. martini*.

Natural history: similar to *P. martini*.

Hemidactylus mabouia

Names: Papiamentu: Pegapega, English: Cosmopolitan house gecko, Tropical house gecko, Wood slave gecko, African wood slave, Dutch: Gekko, Spanish: Salamanquesa, Spanish (Venezuela, similar species): Tuteque, Tuqueque, Salamanqueja.

Distribution: Africa South of the Sahara desert, Madagascar, Seychelles and Mauritius. In the New World: Lesser Antilles, Puerto Rico (common on Mona, Vieques and Culebra), Guantánamo in Cuba, the East coast of South America from Uruguay to Trinidad & Tobago, Central America and Florida. In Brazil it is found inland along the Amazon river and some of its tributaries, in Minas Gerais and in Fernando de Noronha. In Aruba, Curaçao and Bonaire this species has been introduced. It is said that *Hemidactylus mabouia* has been introduced in the New World from Africa and that it came in with slave ships. For this reason, in the West Indies, this gecko is sometimes called "Wood slave" or "African wood slave"; the slave that came from Africa with wood. VANZOLINI (1968), thinks that this is indeed very likely. In Brazil it has been said, since the early 18th century, that this gecko was introduced along with the slave trade. No specific references can be found to such an introduction, but the early scribes of the 16th and early 17th centuries do not mention a small lizard living in houses, even though their descriptions are otherwise very detailed. This gecko is always associated with human habitation, it does not seem to have a natural habitat in the New World.

KLUGE (1969) however thinks that the distribution of this species and of the closely related *Hemidactylus brookii*, are not indicative of transportation by humans. In his opinion both *H. mabouia* and *H. brookii* must have reached the New World by natural means, by "waif dispersal" with floating logs or vegetation. The New World species are said to differ somewhat from their African counterparts. This would indicate that they have been present in the New World for some time, and thus that they did not arrive with human transportation. Although difference of opinion regarding this matter still exists, it is clear that the distribution range of *H. mabouia* in the New World has been and still is being extended by human transportation. In



Photo 32: *Hemidactylus mabouia* (Curaçao). This animal can vary in color from quite dark to almost white and transparent, as in this picture. The chevron pattern on the back and tail is not always visible. G. VAN BUURT

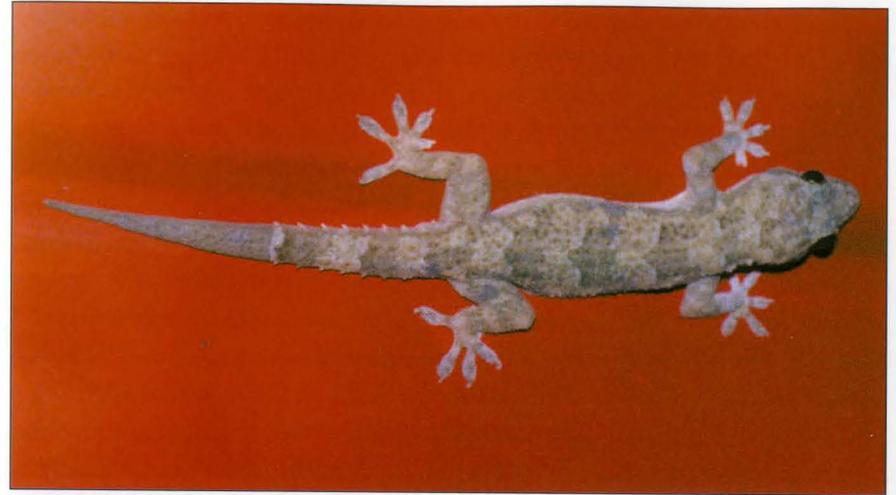


Photo 33 *Hemidactylus mabouia* (Curaçao). The gecko has been photographed on a red car, the chevron pattern is clearly visible. G. VAN BUURT



Photo 33, 34: *Hemidactylus mabouia* (Curaçao). The toes and nails can be seen, the toe pad runs along the whole length of the toe, compare with *Phyllodactylus* (photos 28 to 31). In these pictures the transition break between the old tail and the newly regenerated part can be clearly seen. In the regenerated part of the tail spines are lacking. G. VAN BUURT

Central America, Puerto Rico and Florida *H. mabouia* has been introduced by man and in Curaçao and Bonaire it also is an introduced species. In 1936 and 1937 WAGENAAR HUMMELINCK did not find this gecko on Aruba, Curaçao and Bonaire. It probably became established in Curaçao at the end of the 1980's. In Bonaire this gecko has been introduced more recently and at the time of writing (2001) is not yet found in all houses. In March 1999, I found *H. mabouia* in houses at Sabadeco and at Sta. Barbara heights. During a visit to Aruba in June 1999, I did not find it. However in January 2002 it was also found on Aruba at the Camacuri hotel between Oranjestad and the airport by Mr. Mikael LUNDBERG (pers. comm).

Identification: A medium sized gecko, which can reach a length of 14 cm. The color is very variable. It can vary from dark brown/grey (when found in the garden during daytime) to a pale light brown, almost white and transparent (at night near lamps in the house). There is a characteristic dark-brown chevron pattern on the back. The chevron pattern changes into a striped pattern on the tail. In juveniles the chevron pattern and bands on the tail are unmistakable, but in adults they are not always clearly visible. They fade away when the animals become white and transparent. Regenerated tails do not have these stripes, nor do they possess the lateral rows of small spines of the original tails. The adhesive pads extend all along the toes (Photo 34).

Natural history: In most houses in Curaçao this is now by far the most common gecko, it has practically replaced *Phyllodactylus martini*. It is also present in the gardens around houses, where it has replaced *Gonatodes antillensis* to a large extent. In the so-called "mondi" (bush) however, *P. martini* has not been displaced and *H. mabouia* is not found. Two eggs are laid which are usually fused together.

Thecadactylus rapicauda

Names: *Thecadactylus rapicaudus* is a synonym, Papiamentu: Pegapega, Kèkè, English: Turniptail gecko, Smooth gecko, Dutch: Knolstaartgekko, Spanish (Venezuela): Tuteque, Tuqueque, Salamanqueja.

Distribution: Tropical South America, Middle America and the West Indies. It is found on Aruba, Curaçao, Bonaire, Los Testigos, Trinidad, Tobago. This is probably a species which has a distribution range that has been partly extended by man.

Identification: A large gecko which can reach a length of about 18 cm. The tongue is blue. The toes are connected with a membrane. In a tail that has been regenerated, the new tail looks like a turnip. The pupil is vertical and has four small apertures.

Natural history: This gecko is rather shy. In houses it prefers to stay in the shadows and will dart towards the lights to catch insects now and then. The animal emits clearly audible sounds. It lays a single large egg.



Photo 35: *Thecadactylus rapicauda*. This gecko can be very variable in color. R. A. ODUM



Photo 35a: *Thecadactylus rapicauda*, Mabura Hill Forst Reserve, Guyana. R. ERNST



Photo 36: *Anolis lineatus*, male (Curaçao). *Anolis lineatus* can vary in color from a very bleak light brown to dark brown, in this respect there is no difference between the specimens from Curaçao and those from Aruba. However in those from Aruba the striped pattern tends to be delineated more sharply. This animal has its crest raised. The photographer is getting too near, in the photograph the animal started to get excited and would shortly sprint away. G. VAN BUURT

Iguanas and related species (Fam: IGUANIDAE)

The IGUANIDAE is a large family consisting of several groups of lizards and many genera, which are found in North, Middle and South America, on some Pacific islands (Fiji, Tonga) and on Madagascar.

The anoles used to be classified in the family IGUANIDAE. In some newer classifications the "old" IGUANIDAE family has been split up in seven different families. In these classification the anoles and the bush anoles (*Polychrus* spp) form the family: POLYCHROTIDAE.

Within the "old" IGUANIDAE family the "real" iguanas are found (c.q. the "new" IGUANIDAE family), there are 8 genera with 30 species.

Marine iguanas (*Amblyrhynchus*) – Galápagos islands

Banded iguanas (*Brachylopus*) – Fiji and Tonga islands

Galapagos land iguanas (*Conolophus*) – Galápagos islands

Spiny-tailed iguanas (*Ctenosaura*) – Mexico to Panama, San Andrés and Providencia

Ground or Rock iguanas (*Cyclura*) – Bahamas, Cuba, Jamaica, Hispaniola, Cayman islands, Mona island, Anegada

Desert iguana (*Dipsosaurus*) – Southwestern US, Northern Mexico

Green iguanas (*Iguana*) – Mexico to South Brazil and Paraguay

Chuckwallas (*Sauromalus*) – Southwestern US, Northern Mexico

There are many species of anoles, most of these are tree lizards. They can be found in the Southern US, Mexico, the West Indies, Middle America and the tropical and sub-tropical parts of South America. Nowadays in some classifications the original genus *Anolis* has been split into five different genera. These are a genus *Anolis* in which the "real" *Anolis* have been retained and the genera *Ctenonotus*, *Dactyloa*, *Norops* and *Semiurus* (SAVAGE and GUYER, 1989). CANATELLA and DE QUEIROZ (1989) and also WILLIAMS (1989) have criticized this new classification.

In Aruba, Curaçao and Bonaire only the green iguana (*Iguana iguana*) occurs. On many West Indian islands rock iguanas are found (*Cyclura* spp.). These are large brown, red-brown, brown grey or greyish lizards, most of

which are nowadays quite rare and which are extinct on some islands. Several species exist. They are found on Cuba, Jamaica, Hispaniola, Bahamas, Turks and Caicos, Cayman Islands, Isla Mona and Anegada and formerly also on Puerto Rico and Saint Thomas. The green iguana did not occur on these islands, in some of these islands it has been introduced. The green iguana is probably native to some of the Lesser Antilles, but on other islands it has been introduced.

In the Virgin Islands it has probably been introduced. From Anguilla to Martinique another species of iguana, the Lesser Antilles iguana or West Indian iguana (*Iguana delicatissima*) is found on several islands. Within the Netherlands Antilles it occurs on St. Maarten (Saint Martin) and St. Eustatius (Statia). On Saba, *Iguana iguana* is found, *Iguana delicatissima* does not occur.

Most species of iguanas are herbivorous. The Spinytail-iguanas (Spanish: Algarobos), the Rock iguanas and the Banded iguanas are predominantly herbivorous, but can sometimes eat other food as well. When they are small they eat a lot of insects. The adult green iguana is fully herbivorous. In different regions there can be differences in the color of green iguanas. Those from Parque Nacional Manuel Antonio in Costa Rica have reddish heads. The green iguanas on Saba are quite dark with blue on the head. On several small islands, dark melanistic iguanas are found. On Los Frailes the adult "green" iguanas are brown-grey and on Los Hermanos black with the bands visible only on the tail (WAGENAAR HUMMELINCK, 1940). On La Blanquilla they are grey or black (Photo 38).

In Papiamentu the original Caquetío name Yuana for the iguana has been preserved and is still in use. Caquetío is an Amerindian language that was spoken on Aruba, Curaçao and Bonaire and in parts of Northeastern Venezuela. Caquetío belongs to the Arawak group of languages, other related Amerindian languages in this group are Lokono (Arawak), Taíno and Guajiro. The name Yuana was also used in Taíno. The Spanish scribe Gonzalo Fernández DE OVIEDO, who lived in the New World from 1514 to 1533, has recorded how the Taínos called the iguana:

"...Llámase yuana, i escríbese con estas cinco letras, i pronúnciae y, con poquísimo intervalo u, e después las tres letras postreras ana, juntas o dichas presto; assí que en el nombre todo se hagan dos pausas de la forma que es dicho..." ("They call

them yuana, this is written with five letters, and pronounced “y”, then directly followed by “u” and then the last three letters “ana”, spoken together in sequence; thus in the full name [of the iguana] there are two pauses, as indicated”).

The Taïno name Yuana applied to the rock-iguana (*Cyclura* spp), the green iguana did not occur on the larger Antilles. The English name iguana has been taken from Spanish. The Spanish name iguana is derived from the Carib languages, where the forms Ihuana, Iuana and Iwana are found. The Taïno used the name Siguana for Ameivas. In Papiamentu anoles are called Kaku or Totèki (Curaçao and Bonaire) or Waltaka (Aruba), on Bonaire the name Lagadishi di palu (lit. transl: tree lizard) is also used. The name Totèki is derived from the Amerindian Caquetío language. In Venezuela the names Tuqueque and Tuteque are used for geckos of the genus *Phyllodactylus*. In the past in the Papiamentu of Curaçao these geckos were called Totèki, Turtiki, Totèki pegapega or Turtèki pega pega. Nowadays for these species only the name Pega pega is used, some older people still refer to *Gonatodes* spp. as Totèki pegapega. For some reason the name Totèki which in Papiamentu used to refer to geckos is nowadays used for *Anolis lineatus*. The name *Anolis* is derived from the Taïno: anaóli.

Most anoles are tree lizards. Some live near the ground and are called grass anoles. The males differ from the females (sexual dimorphy). Males are usually larger and have a larger dewlap. In Papiamentu this dewlap is called “sambèchi” (Lit transl: folding pocket knife). In the males the root of the tail is usually higher than in the females. There are no femoral pores. The anoles are diurnal, they mostly eat insects and other arthropods. There are adhesive pads on the toes, like the geckos. Females usually lay one, sometimes two eggs. Anoles are not particularly long-lived. Most smaller species do not live more than 3 or 4 years in captivity. Larger species can sometimes reach an age of 14 years (pers. comm. L. WIJFFELS). In the wild anoles probably have life spans which are considerably shorter.



Photo 37: *Iguana iguana* – Bonaire

G. VAN BUURT



Photo 38: Greyish/ black, melanistic *Iguana iguana* (El Yaque, La Blanquilla, Venezuela).

L. WIJFFELS

Iguana iguana

Names: Papiamentu: Yuana, English: Green Iguana, Common Green Iguana, South American Green Iguana, Dutch: Groene Leguaan, Zuid en Midden-Amerikaanse groene leguaan, Spanish: Iguana verde, Carib: Ihuana, Iuana, Iwana, Taïno: Yuana, Higuana, Lokono: iuwana, Guajiro: Yuana.

Distribution: Mexico to South Brazil and Paraguay; Aruba, Curaçao, Bonaire and Klein-Bonaire. It does not occur on Klein-Curaçao. It is probably native to some of the Lesser Antilles, but has been introduced on many other West Indian islands. The "Curaçao" white-tailed deer (*Odocoileus gymnotis currasavicus*) and the so called "Curaçao" rabbit (the cotton-tail rabbit, *Sylvilagus floridanus nigronuchalis*) were almost certainly introduced on the island by the Amerindians. It has often been assumed that this would also be the case for the green iguana. Remains of Amerindian people that have been dated back to 2500 BC have been found in Curaçao. Nowadays we call these Indians Paleo-Indians. In Aruba remains of Paleo-Indians dating back to 2000 BC have been found. The iguanas living on these islands differ from those on the mainland; they are already adapted to life on semi-arid islands. These adaptations concern differences in behavior, size, size of the eggs and clutch size. The timing of the reproductive cycle is geared to the normal pattern of rainfall on these islands (see below). It seems unlikely that such adaptations could have developed in a time span of only 4,000 to 5,000 years or less. It is thus more likely that the green iguana has been present on these islands for quite a long time and that it reached these islands on its own. This does not exclude the possibility that it may have been introduced on for example an island like Klein Bonaire.

Identification: A large lizard that, on these islands, reaches a maximum size of about 1 meter. This lizard is green with dark bands. It is variable in color. Those living in green trees can be light green, while those that live on the xeric calcareous plateaus are green with grey. Juveniles can change color more rapidly than older ones, going from quite yellow-green in dry leaves to either light or dark green, depending on the vegetation in which they are found. The large males have some blue on the head. In Aruba there are many individuals in which the stripes are much better developed and more

sharply delineated than in the Curaçao and Bonaire iguanas. In the Bonaire iguanas often there are no black stripes on the body at all or only very vague greyish markings; the black stripe pattern is found on the tail only. While it can probably not be said that every island has its own "island variety", there is nevertheless some genetic differentiation; such differences also indicate that iguanas have been present on the islands for quite some time and are unlikely to have been introduced by man. Male iguanas normally reach a larger size than females (in the Curaçao green iguana however, no significant difference in maximum size between the sexes was observed, see BAKHUIS 1982. It is not known whether this is also the case in the Aruba and Bonaire iguanas). Males have heads and dewlaps which are relatively larger than those of females of similar size. The comb of spines on the back is higher than in females. In older animals these spines can be quite worn, in such cases it is not always immediately obvious that the animal is male, although a more careful look will usually still tell the difference. The lower body is fuller in the females, especially when they are carrying eggs. Both sexes have femoral pores. In the males these are much larger (Photo 40).

Natural history: The green iguana is a tree lizard. Normally it is very arboreal, it does not venture on the ground very often. The green iguanas on Aruba, Curaçao, Bonaire are much less arboreal in their behavior than the mainland iguanas; to a large extent they have developed the habits of a ground lizard. ROZE, (1956) reports similar behavior for the green iguanas on Los Roques. Another major difference is the maximum size which they attain. The mainland iguana can be 70% longer and can attain three times the weight of the largest Curaçao iguana (van Marken LICHTENBELT and ALBERS, 1993). Another adaptation to the dry climate is the fact that the females lay fewer eggs, which are however larger than those of mainland iguanas (van Marken LICHTENBELT and ALBERS, 1993). The Green iguana is a herbivore. In the colon cellulose is fermented by bacteria. The green iguana can eat the poisonous fruit of the manchineel tree (*Hippomane mancinella*). In Papiamentu this tree is called Mansaliña. When iguana soup is made the strip of skin with the femoral pores, the so-called "cuenta" (string of beads), is cut away and is not used in the soup. It is said that if the femoral pores are left in the soup, this may cause skin rash and itch in



Photo 39a: Young iguana (*Iguana iguana*) on Curaçao G. VAN BUURT

some people who are allergic to it. The female iguana digs a rather deep hole or tunnel to lay her eggs. This hole can reach a depth of 50–70 cm. Loose soil such as diabase soil is preferred, after the eggs have been laid the hole is filled. When they have finished digging the hole and laying their eggs, the females are usually completely exhausted and can easily be grabbed by hand. The eggs are white and somewhat kidney shaped. They have a gummy-like appearance. Eggs hatch after a period of about three months. The whole reproductive cycle is geared to the pattern of normal rainfall (VAN MARKEN LICHTENBELT, 1991). Courtship and copulation usually take place in March/April, the eggs are laid in April/May and hatch June/July. Usually eggs hatch after the first heavy rains. Usually the first rains after the dry season fall in July/August. When the eggs hatch there will be some food available, there will be some sprouts of grass and new leaves. The rainy season from the end of September to December which will bring more food, will still lie before them. In very dry years this cycle is somewhat delayed. It is my impression that in gardens where food is available all year round, there can be significant deviations from this cycle. In my garden I have had iguanas laying eggs at the end of September. Iguanas can swim very well. Along the coast they often jump into the sea to escape predators. An easy way of



Photo 39b: Young iguana in Aruba (*Iguana iguana*), this iguana is only slightly larger than the Curaçao iguana. The stripes on the body are clearly delineated. G. VAN BUURT

catching them is to chase them into the sea and have a small boat stand by with a diver to catch them in the water. At night iguanas often sleep clinging to candelabra cacti or in holes between rocks. During the early morning they take the sun while still clinging to these cacti (Photo 11). In former times iguanas were often caught when asleep, by plucking them from the candelabra cacti with a noose attached to a long pole. Another plant in which iguanas feel safe and in which they like to sleep, is *Euphorbia lactea*. This is a densely branched tree Euphorbia with many small spines. In Papiamentu this plant is called “kaktus Sürnam” which means Surinam cactus. It is not a cactus but an Euphorbia and it does not originate in Surinam but in the Old World, from which it was introduced. In inhabited areas iguanas often sleep in the spaces between roofs and ceilings. In Aruba iguanas are legally protected. In Curaçao and Bonaire this is not the case. Even so, at the present time such protection is not really needed, the iguana is not endangered on these islands. It is much more common than it used to be 30 or 40 years ago. It is not really needed as a food item

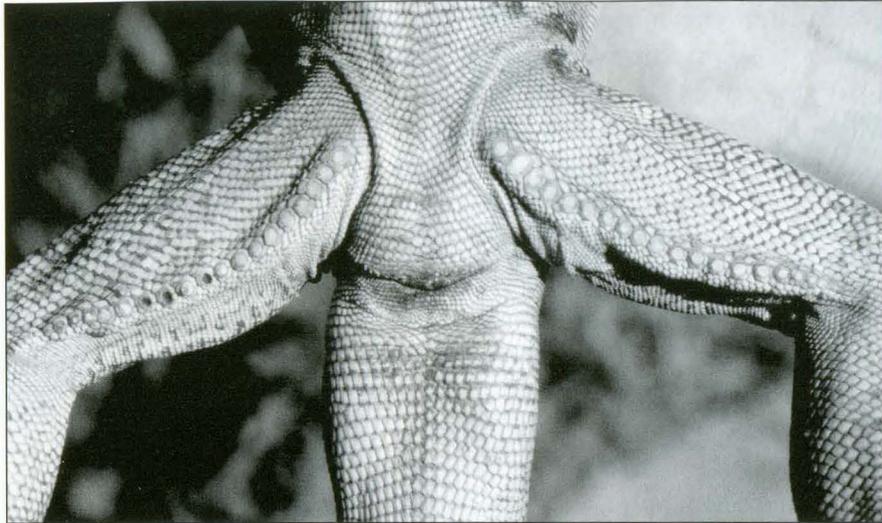


Photo 40: Femoral pores in male iguana (*Iguana iguana*).

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anymore, which was the case in the past, when a large part of the population of the islands was still very poor. A new generation has been raised on a diet of TV and Nintendo, these people do not possess the hunting skills their parents had, nor do they hold much interest in hunting iguanas. People nowadays hunting iguanas are usually older people. The slingshots (catapults) that were formerly used are now prohibited and the elastic rubber of car tire inner tubes that was used to make them is not available anymore. Today's inner tubes are made of a non-elastic type of rubber, which is not suitable for slingshots. Firearms are tightly regulated and airguns may only be used on private property. Thus hunting pressure is much less than it used to be in the past. Another important factor is that most gardens nowadays are more lush than in the past; there are grass lawns and many flowering plants, which are irrigated with drip-irrigation systems. Some plants which were introduced not too long ago are now important new sources of food (such as for instance the seeds of *Washingtonia* palms). There is more food available and much of this food is also available in the dry season.

Anolis lineatus

Names and classification, related species: Papiamentu: Kaku, Totèki, Waltaka (Aruba), English: Striped anole, Dutch: Anolis, Spanish: Lagartijo. *Norops lineatus* is a synonym. *Anolis lineatus* is of South American origin. It is closely related to, and belongs to the so-called *Anolis nitens* (syn. *Anolis chrysolepis*) group. *Anolis nitens* is found in Venezuela and the Guyana's, there are several sub-species.

Distribution: Aruba, Curaçao.

Identification: A medium sized tree anole. Males can reach a SV length (snout-vent) of 70–75 mm, the females reach a maximum SV length of about 60 mm. The color of the body can change markedly, it can vary from light greyish brown to dark-brown. When startled or excited the color can turn very dark rapidly. There are two bands on each side, which are formed by a series of dark-brown stripes with yellow brown edges. The belly is light grey. In the Aruban *Anolis lineatus* there is a somewhat sharper delineation of the stripes. Males have a larger dewlap than females. The dewlap is orange with a thin yellow line at the outer edge and a black band near the throat.

Natural history: These lizards eat insects and small arthropods found on trees. The animals have their own territory, often they are found on trees with a medium size stem. They will sit with their heads downward to defend "their" tree against intruders, which they threaten with their dewlaps.

Photo 41: *Anolis lineatus* (Curaçao).

P. MUDDE

Photo 42: *Anolis lineatus* – juvenile (Curaçao).

G. VAN BUURT

Photo 43: *Anolis bonairensis*.

G. VAN BUURT

Photo 44: *Anolis bonairensis*.

G. VAN BUURT

Anolis bonairensis

Names and classification, related species: Papiamentu: Totèki, Kaku, Lagadishi di Palu, English: Ruthven's Anole, Dutch: Anolis, Spanish: Lagartijo. A synonym for *Anolis bonairensis* is *Dactyloa bonairensis*. *Anolis bonairensis* is of West Indian origin. It belongs to the *Anolis roquet* group. *Anolis roquet* is an anole from Martinique. The roquet group of anoles consists of the anoles of Martinique, Barbados, Saint Lucia, St Vincent, Grenada and the Grenadines, La Blanquilla and Bonaire. Based on the results of DNA analyses *Anolis bonairensis* has been found to be most closely related to the anoles of La Blanquilla (*Anolis blanquillanus*) and Saint Lucia (*Anolis luciae*).

[Up to now a generally accepted theory of the geological history of the Caribbean tectonic plate and the Caribbean islands has not yet emerged. Several competing theories exist, which although similar in their general outlines, still conflict with each other in many respects. One theory proposes that the northern and southern part of the Caribbean have a different geological origin. In this view the area from Martinique to Bonaire forms a different geological subregion, with clear breaks between Dominica and Martinique and between Curaçao and Bonaire. This part of the Caribbean plate would have contained an island arc consisting, amongst others, of the islands of Bonaire, La Blanquilla and Saint Lucia. The leading edge of this island arc overtook the Eastern Caribbean island arc, thus positioning Saint Lucia between Martinique and Saint Vincent. The other islands from Bonaire to La Blanquilla moved toward Venezuela. According to Roughgarden, the close relationship (as determined from DNA tests) between *Anolis bonairensis*, *Anolis blanquillanus* and *Anolis luciae* indicates that faunistic dividing lines exist which are consistent with this theory. Another similar example in the fauna is the endemic *Cnemidophorus vanzoi*, which occurs on the Maria islands. The Maria islands are two small islets (Maria major and Maria minor), which lie along the South-East coast of St. Lucia. *Cnemidophorus vanzoi* is related to *C. murinus ruthveni* on Bonaire and to *C. nigricolor*, which occurs on the islands from Las Aves to La Blanquilla and Los Hermanos. The genus *Cnemidophorus* does not occur on any of the oth-

er Lesser Antilles. Blair HEDGES (1966 and 1999) states that such distribution patterns can best be explained in terms of "waif dispersal" and that there is no need to invoke vicariance. *Anolis* could have reached La Blanquilla and Bonaire from Saint Lucia, with the prevailing currents. During the ice ages sea levels were much lower. The islands of La Blanquilla, La Orchila, Los Roques and Las Aves were much larger and could have formed "stepping stones" on the way to Bonaire. During some of the interglacial periods sea levels were higher than the present sea level and the islands La Orchila, Los Roques and Las Aves were partly or completely flooded. Populations of *Anolis* which may have existed on these islands could thus have been eliminated. During the ice ages the south eastern part of the Caribbean was more enclosed and it is very likely that the sea in this area was much calmer than nowadays. It can be argued that waif dispersal is much more likely to occur as a result of "extreme events", bad weather conditions such as hurricanes and their often associated rough seas and/or heavy rainfall. Such weather conditions can wash vegetation or logs into the sea. While this is undoubtedly true, the chances of survival at sea would certainly increase with calmer seas. One scenario however does not necessarily exclude the other. Fast transit times are not necessarily dependant on strong winds and bad weather. An *Anolis*, clinging to a branch, swept into the seas, by heavy rainfall on one island, could subsequently merrily drift along to another island in fairly calm seas, being carried by the currents and a light wind. Although this is not always the case, often seas can be very calm after a hurricane has passed. Neither is the speed of drifting and the strength of the currents, necessarily directly dependent on strong winds. While working with FAD's (Fish Aggregating Devices) along the South coast of Curaçao in open waters 1–2 nm offshore, it was discovered that some periods with very strong currents occur a few times every year. Usually this happens during October, November and early December and sometimes also in February. During these periods sea conditions are usually fairly calm; these currents are not primarily wind driven. The current which normally has a speed of 0,5–1,5 knot, may exceed 2 knots for a period of about a week and can even reach 2,5 knots or more over a shorter period of time. In the past small fishing vessels from Saint Lucia, St. Vincent (Bequia), Grenada and Barbados, that cut

loose from their moorings or experienced engine failure have ended up on the east coast of Bonaire. Once a small boat from St. Lucia ended up on the east coast of Bonaire, where normally it would have been smashed to pieces on the rocky coast, but this little boat drifted into the entrance of the Lac lagoon and came to rest on a sandy beach totally undamaged. In December 2004 a fisherman from Bequia (St. Vincent) reached Bonaire after drifting at sea for 23 days, when reaching the coast his vessel sank on the rocks, luckily he managed to reach the shore safely. A fishing vessel will have a larger wind catching surface than most natural drifting objects, it will tend to drift somewhat faster. (With the SarPc computerprogramme which is used to calculate drift for Search and Rescue operations, using the so called Mariano oceanographic database, it has been calculated that a drifting object which is not influenced by the wind could reach Bonaire from St. Lucia in about 12 days, St. Lucia to Blanquilla in about 6 1/2 days and Blanquilla to Bonaire in 6 days (Pers Comm: Commander R. J. JURRIANSEN (KLTZ) Neth Antilles & Aruba Coastguard). Even though the distance from St. Lucia or La Blanquilla to Bonaire is rather large "waif dispersal" could certainly have taken place.]. *Anolis blanquillanus* is found in La Blanquilla and los Hermanos. Formerly this species was considered to be a sub-species of *Anolis bonairensis* and was named *Anolis bonairensis blanquillanus*, nowadays it is considered to be a separate species.

Distribution: Bonaire, Klein-Bonaire.

Identification: The Bonaire anole has a dark brown pattern on a light yellow-brown background. On the back and sides of the body there are diagonal bands, which are vertical on the tail. The underside of the animal has a light color. The dewlap has a pale lemon color. The pineal eye on the head between the eyes is clearly visible. *Anolis bonairensis* is somewhat smaller than *Anolis lineatus*.

Natural history: These lizards eat insects and small arthropods found on trees. They are very common on dyewood trees which are also called "brasiletto" (*Heamatoxylon brasiletto*), but are also found on other trees such as the Kwihí or Indjú (*Prosopis juliflora*) and the Wayaká (*Guaiacum officinale*). In Papiamentu the brasiletto is called Palu (di) Brasil. During the night and most of the day *A. bonairensis* stays hidden in the deep grooves of the trunk

of the brasiletto tree. It comes out of hiding between 7-10 in the morning and 4-6 in the afternoon to roam around and search for food. *A. bonairensis* is less shy than *A. lineatus*, one can approach it quite closely. However sometimes when they are found on the ground (moving from one tree to another?) they sprint away rapidly, and move much faster than *A. lineatus*.



Photo 45: *Anolis bonairensis*.

G. VAN BUURT

Whiptail lizards, jungle runners and related species (Fam: TEIIDAE)

The family of the Teiidae consists of the Whiptail lizards which are also called race runners (*Cnemidophorus* spp.), the tegus (*Tupinambis* spp.), the Ameivas or Jungle runners (*Ameiva* spp.), Cayman lizards (*Dracaena*) and some other groups. In older classifications the Teiidae were divided into two groups: the Macro-teiidae and the Micro-teiidae. The Micro-teiidae are nowadays usually classified in a separate family the: GYMNOPHTHALMIDAE (spectacled tegus and related species).

Ameivas are found in Middle and South America and on the West Indian islands. The Ameivas are very similar to whiptails, the differences between these two groups are very minor. Some DNA analyses even suggest that some Ameivas may be more closely related to some *Cnemidophorus* than to other *Ameiva*. There are differences between the number of rows of the scales on the belly and differences in the structure of the tongue bones. On Aruba we find

Ameiva bifrontata.

Whiptails or race runners are lizards which look very similar to the Old World genera *Lacerta* and *Podarcis*. They are found in the US, Mexico and Middle and South America. In the West Indies there are only two species. *Cnemidophorus vanzoi* is found on the Maria islands (Maria major and Maria minor) at St. Lucia and *C. lemniscatus* is found on the Colombian islands of San Andrés, Isla de la Providencia and Sta. Catalina, which lie east of Nicaragua. These can be considered to be South American elements in the West Indian fauna. Most whiptails eat mainly insects and other arthropods.

The South American species are all closely related to *C. lemniscatus* and belong to the so-called lemniscatus-group. *Cnemidophorus lemniscatus*, The "Rainbow racerunner" or "Dotted racerunner" (Photo 47 to 50) occurs in Middle America and the northern part of South America, including a large part of Brazil. On the South American islands this lizard is found on those islands that were connected to the mainland during the last ice ages; Trinidad & Tobago, Isla de Margarita, Cubagua, Coche, Los Testigos and Los Frailes. In Aruba it

was introduced by man. The Whiptails of Aruba, Curaçao and Bonaire all belong to the lemniscatus group. Another closely related species is *C. nigricolor*. This species is found on Las Aves, Los Roques, La Orchila, Los Hermanos, La Blanquilla and La Tortuga (Photo 7). Whiptail lizards stop now and then and wave a front limb in the air. This behavior takes place when they are confronted with a possible adversary such as a human being. This behavior is probably comparable to head-bobbing in iguanid lizards such as iguanas and anoles. It may signify something like "don't waste your time trying to catch me, I have already spotted you". If one is too near the head-bobbing will not occur, in order not to draw undue attention. If one is quite far there is no need for a warning, since there is no threat. The signaling behavior has other roles as well, such as in sexual behavior, when confronting opponents etc.

Whiptails sometimes lift their feet in order not to burn them on hot ground. Sometimes they lift all feet, resting on their belly and raising up the tail. The whiptails on these islands are most active during the day, when the sun is very hot. They come out around 9 o' clock in the morning and stay most active till around 14.30 in the afternoon. Afterward their activity is reduced. Larger lizards sometimes come out earlier and can be found till sun-down. This pattern of activity is quite different from that of *Anolis bonairensis* which is active in the early morning and late afternoon and hides during the day.

On Aruba, Curaçao and Bonaire whiptails are very common. They can be found nearly everywhere. Around houses, chicken farms and other premises where extra food can be found they can be found in even greater numbers. The sight of so many lizards is quite unusual. One of the main reasons for these high population densities is the fact that these island whiptails are predominantly herbivorous, unlike most other whiptail species (like for example *C. lemniscatus*) which eat mainly insects and other arthropods (SCHALL, 1973). In a natural environment there are usually not enough insects and other arthropods present to maintain populations of such rather large lizards in such high densities. These island whiptails also eat insects and other arthropods and will eat carrion; they gorge on practically all other food which they can find around houses. They can also be cannibalistic. In Curaçao this was observed during the dry season. A large *C. murinus murinus* male ate a juvenile. However it is not clear whether the fact that it was a very dry season and food

was scarce had in fact anything to do with it, although one would suspect this to be the case. All of this creates the general impression that these whiptails are totally omnivorous. In their natural bush habitat (the so-called "mondi") however, most of their food consists of plant materials such as flowers, nectar, leaves and fruits. The colon is larger than in other species of whiptails and is clearly adapted to a herbivorous diet (DEARING, 1993). About 80% of the stomach contents in a natural, undisturbed habitat consists of plant materials, 15% consists of insects and other arthropods and about 5% of materials such as feces, little stones and twigs (DEARING & SCHALL, 1992). The Curaçao whiptail has always had the reputation of being difficult to maintain in captivity (the same probably holds true for the Aruba and the Bonaire whiptail as well). One of the main reasons for these difficulties is without doubt the fact that it is not generally realized that these whiptails are to a large extent herbivorous. Usually they are given a diet of crickets, mealworms, small mice etc. which would be perfectly suited to most other species of whiptails. At first they thrive and then later on they develop intestinal problems and die. Very few lizard species are herbivorous (see SZARSKI, 1962 and OSTROM, 1963). Usually herbivorous lizards are large. Most iguana species, especially the larger ones are herbivorous. In Africa and parts of Asia large herbivorous agamas are found (*Uromastyx* spp.). In the Solomon Islands there is a large herbivorous skink (*Corucia zebrata*). Smaller herbivorous lizards are very unusual and are usually found on islands. The situation on Aruba, Curaçao and Bonaire where we find large populations of medium-size herbivorous lizards is thus quite unusual.

All whiptails have femoral pores. In the females the pores are not as large as in the males. Males also have pre-anal pores. During the mating season the colors of the dominant males become more pronounced. This is especially true in the Aruba whiptail lizard (*C. arubensis*).



Photo 46: *Ameiva bifrontata* (Aruba).

G. VAN BUURT

Ameiva bifrontata

Names: Papiamentu: Koffie ku lechi, the name Vloem or Floem is less commonly used. English: Cope's Ameiva, Jungle runner, Dutch: Ameiva, Spanish (Venezuela): Lagartija, Mato, Bizurre, Lobo. In Spanish used in Cuba, the Dominican Republic and Puerto Rico other species of *Ameiva* are called Siguana, from the Tāino: Siguana.

Distribution: Aruba, Northern Venezuela, Colombia, Northern-Peru, Isla de Margarita, Cubagua, Los Testigos, Los Frailes. In the 1930's WAGENAAR HUMMELINCK found this lizard only around Oranjestad, where it was not common. The similarity with the mainland species and the fact that it had such a restricted distribution, led WAGENAAR HUMMELINCK to conclude that *A. bifrontata* in Aruba had probably been recently introduced by man. However according to RUTHVEN (1924) *A. bifrontata* had already been collected in Aruba by COPE in 1885 and also by Dr. H. Burrington BAKER in 1922. In the early 1970's *A. bifrontata* was found all over Aruba (SCHALL, 1973).

Identification: *A. bifrontata* is a fairly large, light khaki brown lizard, on the head and the front parts there is light green or greyish-green overlaying the khaki color. On the rest of the body this green color is less pronounced and is superimposed on the light khaki background like a light greenish cast. The Papiamentu name for this lizard, "Koffie ku lechi" (Coffee with milk) gives an apt description of the khaki color. The Aruba *Ameiva bifrontata* is very similar to *Ameiva bifrontata* in Venezuela. According to RUTHVEN (1923) the color of the Aruba *A. bifrontata* is bleaker and more uniform than in specimens from the mainland. In the animals on Aruba the black spots which are found on mainland animals are few or totally absent. WAGENAAR HUMMELINCK also notes these differences, but notes that in Paraguaná similar animals without, or with just a few black spots occur.

Natural history: *A. bifrontata* largely feeds on arthropods but is also known to eat whiptail lizards. It is usually found in areas with some vegetation and is absent from open areas with scarce vegetation. *C. arubensis* is found in both these habitats (SCHALL, 1973).

Cnemidophorus lemniscatus lemniscatus

Names and classification: Papiamentu: Lagadishi bèrdè (males), Lagadishi di maïshi (females and juveniles), the general name Lagadishi is also used for females and juveniles. English: Rainbow whiptail, Rainbow whiptail lizard, Rainbow racerunner, Dotted racerunner, Striped runner, Foot-shaker, Shake-hands. Dutch: Hagedis, Sranang tongo: Waiwaihanu, Spanish: Lagarto, Lagartijo, Spanish (Venezuela): Lagartija verde [In Spanish lizard is: Lagarto. This word derives from vulgar Latin Lacartu, which derives from Latin: Lacerta. The diminutive of lagarto is lagartijo (small lizard). In Venezuela and Colombia the form lagartija is used; even fairly large lizards such as *Ameiva bifrontata* are called lagartija. In many countries the name lagarto is used for the American crocodile (*Crocodylus acutus*). The English name Alligator derives from El Lagarto. In the Dominican Republic, lagarto is a lizard, lagartijo a small lizard and the American crocodile has maintained its original Tāino name Caimán. Lagadishi in Papiamentu is derived from either the Spanish form: lagartija or the Portuguese: lagartixa (which is pronounced as lagartisha).], Lobo, Bizurre, Bisure (Paraguaná), Culu (La Guajira).

In 1997 MARKEZICH, COLE and ARENDS described a new species, *Cnemidophorus arenivagus* from Paraguaná (Venezuela). In their publication they indicate that the *Cnemidophorus lemniscatus lemniscatus* which has been introduced in Aruba is probably also *C. arenivagus*, the underlying assumption being that it was probably imported from Paraguaná. In the Aruba *C. lemniscatus* males however, the khaki color on the flanks found in *Cnemidophorus arenivagus* from Paraguaná is almost totally lacking. The flanks are yellow and light green. This may indicate that these animals did not necessarily originate in Paraguaná, but could have come from another part of Venezuela or from another country where *C. lemniscatus* occurs. For these reasons I have decided to retain the name *Cnemidophorus lemniscatus lemniscatus*.

Distribution: Aruba, Middle America to Northern South America. It occurs on all the continental islands which were connected to the mainland during the ice ages: Trinidad & Tobago, Isla de Margarita, Cubagua, Coche,



Photo 47: *Cnemidophorus lemniscatus lemniscatus*, male (Aruba, Aruba Golf Club, North of San Nicolaas).
G. VAN BUURT



Photo 48: *Cnemidophorus lemniscatus lemniscatus*, male (Aruba, Aruba Golf Club, North of San Nicolaas).
G. VAN BUURT



Photo 49: *Cnemidophorus lemniscatus lemniscatus*, female (Aruba, Aruba Golf Club, North of San Nicolaas).
G. VAN BUURT



Photo 50: *Cnemidophorus lemniscatus lemniscatus*, pair, Los Llanos, Venezuela.

D. HEGNER

Los Testigos, Los Frailes. *Cnemidophorus lemniscatus lemniscatus* has been introduced in Aruba around 1950. The animals were first discovered near the oil jetty's of the refinery in San Nicolaas, this can easily lead one to conclude that they probably came in on an oil tanker, or that they were brought in by a crew member of an oil tanker. Such tankers came from Venezuela, not only from Paraguaná, but also from places like Caripito, Cabimas and Lagunillas. Other tankers transported white products to several ports in South and Middle America where *C. lemniscatus* is known to occur. Also materials for the refinery were often unloaded at San Nicolas, such materials could have come from many different places. This species is not spreading out over the island very rapidly. In 1997 it was still only found around San Nicolaas; at Cura Cabai, Mabon, Brasil, around the location of the former airfield "de Vuist" and on and around the Aruba Golf Club. Within this area it is found only in areas with sandy soils. *C. arubensis* also occurs in this whole area, including the sandy areas where *C. lemniscatus lemniscatus* is found. It seems as if this animal has only established a precarious foothold on the island and that it can only barely withstand competition with *C. arubensis*, having a slight advantage in areas with sandy soils.

Identification: Males are substantially larger than females. Males are strikingly colored, they have a green back with some yellow-brown longitudinal stripes. There is some yellow on the lower flanks. There is blue on the head, the frontlegs are blue. The hind feet and the leading edge of the hindlegs are also blue. In the larger dominant males the blue is more pronounced and colors are more vivid. Females are brown with yellow-brown longitudinal stripes.

Natural history: The food of *C. lemniscatus* consists mainly of insects and other arthropods. Parthenogenetic populations of *C. lemniscatus* exist, these are sometimes considered to be a different species and are accordingly named *C. cryptus*. All individuals are females. The Aruba population is bisexual, it consists of both male and female animals.

Cnemidophorus arubensis

Names and classification: Papiamentu: Cododo, Cododo blau, Blausana, Lagadishi (females and juveniles are also called lagadishi); English: Aruba whiptail, Aruban whiptail lizard, Dutch: Arubaanse renhagedis, Spanish: Lagarto, Lagartijo, Spanish (Venezuela and Colombia): Lagartija. The Aruba whiptail was formerly classified as a sub-species of *Cnemidophorus lemniscatus*. This sub-species was named *Cnemidophorus lemniscatus arubensis*. When *C. lemniscatus lemniscatus* was introduced in Aruba, probably around 1950, it turned out that this species was not hybridizing with the Aruban *Cnemidophorus* species, which was subsequently classified as a species in its own c.q. *Cnemidophorus arubensis* (see SCHALL, 1973).

Distribution: Aruba.

Identification: In all of the *Cnemidophorus* lizards on these islands the colors of the dominant males are somewhat more vivid during the mating season. In *C. arubensis* however this difference is quite spectacular. During the mating season (September–October) males become very blue and the light-blue color extends over most of the body.

Natural history: Most of the natural history has already been described in the earlier general section on Whiptail lizards. Signaling with a front paw occurs frequently in *C. arubensis*. It can also be observed in *C. lemniscatus lemniscatus*. In *C. murinus murinus* and *C. murinus ruthveni* this behavior seems to be somewhat less frequent.



Photo 51: *Cnemidophorus arubensis*, male; the animal is signaling with its right frontleg.
G. VAN BUURT



Photo 52: *Cnemidophorus arubensis*, female (Aruba).
G. VAN BUURT



Photo 53: *Cnemidophorus murinus murinus*, male, (Curaçao).
C. TRAMM



Photo 54: *Cnemidophorus murinus murinus*, female, (Curaçao).
G. VAN BUURT

Cnemidophorus murinus murinus

Names: English: Laurent's whiptail, Curaçao whiptail lizard, Spanish: Lagarto, Lagartijo, Spanish (Venezuela en Colombia): Lagartija. Papiamentu: Lagadishi (general name for a lizard, used for the females and for the brown juveniles), Blausana, Blousana [In the phonological spelling of Papiamentu, which is nowadays the official spelling of Papiamentu in Curaçao and Bonaire, but not in Aruba, the spelling is: Blousana. A phonological spelling is a spelling which largely follows the "logic" of phonetics and which is basically but not strictly phonetical.], Blaublau, Blòblò (the large greyish males with blue tail). Dutch: Blauwe renhagedis.

Distribution: Curaçao, Klein-Curaçao.

Identification: *C. murinus murinus* is a rather large lizard. Juveniles and females (lagadishi) are brown, with four rows of white dots on each side of the body. The belly is greyish-white. The large males (Blausana, Blòblò, Blaublau) are grey with a blue tail, with blue feet and blue on the leading edge of the hind legs. The head is gray with a bluish cast. In both males and females the dots on the head are quite bleak and tend to form a narrow band just below the eye with some bleak spots left on the cheek. This band is not always clearly visible. In 1992 a melanistic *C. murinus murinus* was observed at Klein Kwartier near the office of the Department of Agriculture (Dienst LVV). Such melanistic individuals are extremely rare. *C. murinus murinus* also occurs on Klein Curaçao, a small 1,2 km² coral island South-East of Curaçao. Both males and females of these lizards are smaller than those on the main island of Curaçao (444 km²), there is also a much larger difference in size between males and females. The males tend to be more bluish and grayish than those in Curaçao and the stripes on the head tend to fall apart into a series of dots.

Natural history: Most of the natural history has already been described in the earlier general section on the *Cnemidophorus* lizards of these islands. The female *C. murinus* (both *C. murinus* and *C. murinus ruthveni*) lay only one large egg at a time. This also holds true for *C. arubensis* (see SCHALL, 1983).

Cnemidophorus murinus ruthveni

Names: English: Bonaire Island whiptail lizard, Spanish: Lagarto, Lagartijo, Spanish (Venezuela and Colombia): Lagartija, Papiamentu: Lagadishi, Kododo, Dutch: Bonairiaanse renhagedis.

Distribution: Bonaire, Klein-Bonaire.

Identification: The coloring is very similar to the Curaçao whiptail. In adult males of the Bonaire whiptail the lower back is brownish grey, the body of the adult male Curaçao whiptail is greyish throughout. The dots on the head are clearly visible. In the Curaçao whiptail the spots on the head are much bleaker, they tend to form a narrow band just below the eye with some bleak spots left on the cheek. The females of the Bonaire whiptail have many bleak dots on the lower back and hind legs, forming a somewhat marbled pattern. In size the Bonaire whiptail is somewhat smaller than the Curaçao whiptail.

Natural history: Similar to the Curaçao whiptail





Photo 55: *Cnemidophorus murinus ruthveni*, male (Bonaire). The dots on the head are clearly visible, note the khaki color on the lower body, hind legs and upper tail. G. VAN BUURT



Photo 56: *Cnemidophorus murinus ruthveni*, female (Bonaire). The lower body and hind legs have many bleak dots, which cause a marbled appearance. G. VAN BUURT

Spectacled tegus and related species

(Fam: GYMNOPHTHALMIDAE)

The Family GYMNOPHTHALMIDAE contains a few genera of small lizards, some of which are very similar to skinks. This family originates in South America but some species are also found in Middle America. Most species live in leaf litter and loose soil where they can burrow rapidly. They eat small insects and other arthropods. The limbs are often reduced in size, giving some of these species a snake-like appearance. On Aruba, Curaçao and Bonaire we find two species of spectacled tegus (*Gymnophthalmus* spp.) and one species of *Tretioscincus*. Some species in the genus *Gymnophthalmus* are parthenogenetic.

Gymnophthalmus lineatus

Names: English: Striped spectacled tegu, Spanish (Venezuela): Madre de Culebra, Papiamentu (Curaçao, Bonaire): Colebra di mispel, Dutch: Gestreepte brilteju.

Distribution: NE South America, Brazil, Curaçao, Klein Curaçao, Bonaire.

Identification: the striped spectacled tegu is a small brown-black lizard with two yellowish lateral dorsal lines and an orange tail. The limbs are reduced in size, giving this lizard the appearance of a small snake. The scales are smooth and shiny. Males are smaller than females. The front paws have four fingers.

Natural history: The striped spectacled tegu has a very cryptic lifestyle. It is a small lizard which would be very vulnerable to predation by the many whiptail lizards that roam around, if it did not keep itself concealed. Birds such as the mockingbird or Chuchubi (*Milvus vagus*) would also constitute a mortal danger for a spectacled tegu. Thus these animals are seldom seen. This creates the impression that they must be very rare, which is not the case. They are often found in fruit gardens, the so called "hofjes" where usually a thick carpet of leaf litter is found on the ground. In such a biotope, they can be quite plentiful, but are not easily caught since they burrow very rapidly. The Papiamentu name which is used in Curaçao "Colebra di mispel", means "Snake of the zapote" (*Achras sapote*). This is a reference to the fact that this lizard is often found under the dry leaves found under zapote trees. In Aruba the very similar Golden spectacled tegu (*Gymnophthalmus speciosus*) is more aptly named "Lagadishi di mispel" meaning "Lizard of the zapote". They are also often found beneath the dry leaves of the sea grape (*Coccoloba uvifera*), under the Mesquite tree (*Prosopis juliflora*) which is locally called Kwihi or Indjú, and under some other (but not all) trees that produce a lot of leaf-litter. The Striped spectacled tegu is also found near some beaches, above the highest waterline, it burrows in loose sand and is found in areas where flat stones are found on the sand and where some beach vegetation is present (for example near Pos Spaño and on the small island of Klein Curaçao). In the past, before extensive sand mining took place in this area, they were very common around

Willemstoren in Bonaire. Here they were found in large numbers, in a habitat with sand covered by many larger and smaller loose stones, interspersed with clumps of *Mallotia gnaphalodes* (Tabaku di piskadó). [The local name Tabako di Piskadó originally applies to *Mallotia gnaphalodes* syn. *Tournefortia gnaphloides*, but is nowadays also widely used for *Suriana maritima*. Notwithstanding the fact that this name can be considered incorrect for *Suriana maritima*, this plant is now being called Tabako di Piskadó by many people and this "error" has now become common usage.]. The orange tip of the tail probably mimics the orange hind legs of centipedes (*Scolopendra* spp.) While trying to catch such an animal, I could not help hesitating while digging, upon seeing the moving orange tail, thus giving the spectacled tegu time to escape. It is not only the color of the tip of the tail but also the way in which it is moved which creates the impression of having to do with a centipede. In Australia, a skink is found with a color pattern that is nearly identical to that of the spectacled tegu. The "Fire-tailed skink" (*Morethia taeniopleura*) is a small skink which lives in loose soil and leaf-litter, just like the spectacled tegu.

In the Florida Keys another skink is found, the "Florida key mole skink" (*Eumeces egregius egregius*) with a similar color pattern and similar habits. These are nice examples of parallel evolution, which also indicate that this color pattern is functional for animals with these habits. In Curaçao, in the past, it was said that the presence of a spectacled tegu brings luck to the owner of the house and/or garden, it should not be killed. When one sees such an animal it is a good idea to buy a lottery ticket. Unfortunately this useful superstition, giving the animals some protection is now a thing of the past.

Photo 57: *Gymnophthalmus lineatus* (Curaçao).

G. VAN BUURT

Photo 58: *Gymnophthalmus lineatus* (Bonaire).

L. J. VITT

Gymnophthalmus speciosus

Names: a synonym is: *Gymnophthalmus laevicaudus*, English: Golden Spectacled Tegu, Spanish Venezuela (Las Aves): Madre de Culebra, Spanish (Middle America) Lisa dorada, Papiamentu (Aruba): Lagadishi di mispel, Colebra di mispel, Dutch: Kleine brilteju.

Distribution: From southwestern Mexico and Guatemala to the northern part of South America. In South America it is found in Colombia, Venezuela and Guyana, Aruba, Las Aves. It is also found on the island of Chacachacare (Trinidad).

Identification: The Golden spectacled tegu is greyish to greyish-brown on the back, the sides are black and the tail is long and thin with an orange tip. There is a sharp delineation between the color on the back and the color on the sides, which can be seen as a light line, but there are no lateral dorsal lines as with the Striped spectacled tegu. The scales are smooth, some scales near the end of the tail are keeled. Males have small femoral pores. The front paws have four fingers. The tongue is long and forked.

Natural history: The Golden spectacled tegu has a cryptic lifestyle very similar to the Striped spectacled tegu.

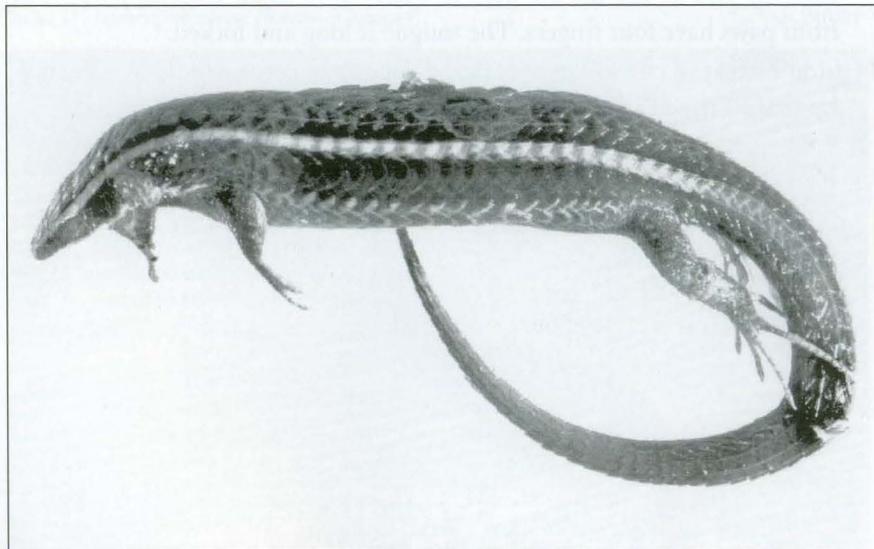
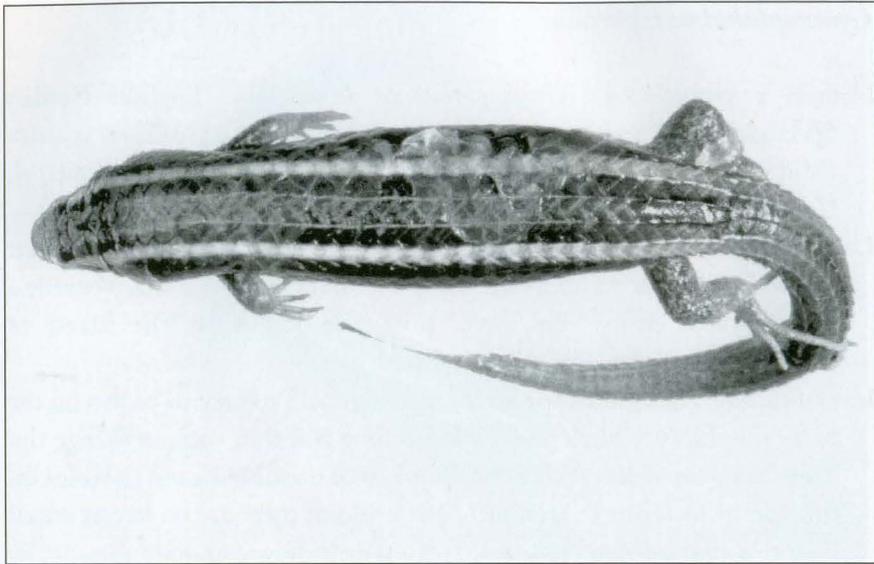


Photo 59, 60: *Tretioscincus bifasciatus*, This specimen is from Isla de Margarita, Toma de Agua, west of La Asunción. RMNH (National History Museum, Leiden) no. 29088, P. WAGENAAR HUMMELINCK, 1936.

RMNH (National History Museum, Leiden)

Tretioscincus bifasciatus

Names: English: Rio Magdalena tegu, Spanish (Venezuela): Lagartijo cola azul, Madre de Culebra., Papiamentu: Lagadishi di scama.

Distribution: North East Colombia, Isla de la Providencia, North-West Venezuela, Aruba, Los Hermanos, Isla de Margarita.

Description and related species: a small lizard with a maximum length of about 15 cm. This animal is about the same length as *Gymnophthalmus speciosus*, but it is much more heavily built. It is greyish-brown with a blue-black sheen and two yellowish-white lateral dorsal stripes. The tip of the tail is blue [Juveniles of numerous skinkid lizard species of the genus *Eumeces* have bright blue or orange tails. Experiments by COOPER and COOPER & VITT (see literature) prove that a lizard can greatly increase its chances of escaping if the predators attention is diverted from the body to the tail. The orange tails of *G. lineatus* and *G. speciosus* can also have this function, in addition to their being used to mimic the hind legs of centipedes. Other examples of mimicry of centipedes by small lizards exist (VITT, 1992).]. This animal has keeled scales. In this respect it differs from *Gymnophthalmus speciosus* which has smooth scales.

Natural history: Its lifestyle is cryptic, it lives mainly on the ground but will also climb on stones, on low walls and on trees. In this respect it differs from the *Gymnophthalmus* species, which do not climb. It is a very shy animal. *Tretioscincus bifasciatus* seems to be quite rare in Aruba. However, due to its cryptic habits and very shy behavior it is seldom seen and although it is certainly not a common animal, it may not necessarily be as rare as is generally assumed.

V Snakes

Several families of blind snakes exist:

Fam: ANOMALEPIDIDAE

(American blind snakes, Dawn blind snakes, Blind snakes),

Fam: LEPTOTYPHLOPIDAE

(Slender blind snakes, Thread snakes),

Fam: TYPHLOPIDAE

(Blind worm snakes, Typical blind snakes).

The genus *Liotyphlops* (Lesser blind snakes) is usually classified as belonging to the Fam: ANOMALEPIDIDAE (Eng: American blind snakes, Dawn blind snakes, Blind snakes). Some taxonomists however do not consider the American blind snakes to be a taxonomical unit, cq. a different family. *Liotyphlops* is thus sometimes classified as belonging to the TYPHLOPIDAE.



Photo 61: *Liotyphlops albirostris*, actual size. The Netherlands Antilles 10 ct piece has a diameter of 18 mm.

G. VAN BUURT



Photo 62: *Liotyphlops albirostris* (Curaçao).

G. VAN BUURT

American blind snakes (Fam: ANOMALEPIDAE)

This family is found in the Southern parts of Middle America and the Northern parts of South America.

Liotyphlops albirostris

Names: English: Whitenose blind snake, Blind worm-snake, Spanish: Cieguita. Papiamentu: Bichi di dos cabes (lit. transl.: two-headed worm), Dutch: Wormslang,

Distribution: Curaçao, from Costa Rica to West Colombia.

Identification: a small wormlike snake, which can reach a length of 15–20 cm and a diameter of about 3 mm. On the snout there is a large scale with a whitish color. The tongue is whitish and is forked. The snake is dark olive brown on top and somewhat lighter on the underside. The eyes are covered by transparent scales and are visible beneath these scales as small dark dots.

Natural history: These snakes live from ants and termites, especially their eggs and pupae. They are often found in gardens in loose humid soil and compost. During the day the animals have to stay hidden, they very quickly overheat when exposed to the sun. During and after heavy rains one can sometimes see these animals move above ground during daytime. During the dry season some were found, early in the morning, in some holes that had been freshly dug, this indicates that they probably roam around at night. Although these snakes have very smooth scales, they can climb surprisingly well, they are able to raise their scales and use the edges to climb.

Slender blindsnakes (Fam: LEPTOTYPHLOPIDAE)

This family of snakes is found both in the Neotropics and in the Old World.

Leptotyphlops albifrons

Names: *Leptotyphlops tenella* is a synonym. English: Wagler's blind snake, White-faced worm snake, Slender blind snake, Spanish (Venezuela): Cieguita, Papiamentu: Colebra di plata, Colebra di suerte, Dutch: IJzerslangetje, Wormslang, Zilverslang.

Distribution: Bonaire, Trinidad, on the South American mainland from Venezuela to Argentina. *Leptotyphlops albifrons* is considered a typical Amazonian species; it seems likely that this species was introduced in Bonaire by man.

Identification: this snake can reach a maximum length of 27,5 cm. The scales are smooth. The eyes are covered by transparent scales and are visible beneath these scales as small dark dots. This snake is very similar to *Liotyphlops albirostris* (which however does not occur on Bonaire). The pattern of scales on the head is different, there are 14 rows of scales around the body. It is a larger animal and it has a much lighter color. The color is a bit

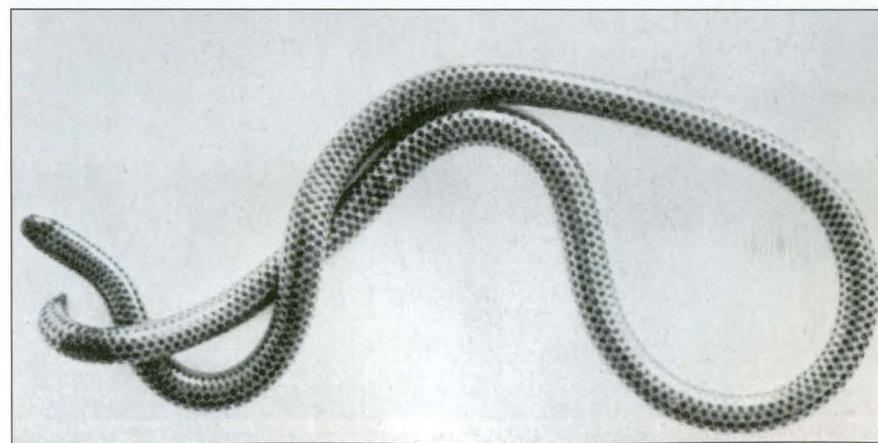


Photo 63: *Leptotyphlops albifrons* (Bonaire).

silvery, which explains the Papiamentu names Colebra di plata (silver snake) and also the name Colebra di suerte (snake that brings luck, the luck being silver cq. money). There is a pattern of lengthwise stripes on the body, which cannot always be distinguished very clearly.

Natural history: Most species of *Leptotyphlops* are predators of termites. Since they live mostly underground and are very cryptic, not much is known about their habits. These snakes produce a pheromone which allows them to enter termite nests. The termites do not recognize the intruder because of the pheromone and do not attack. These snakes can also follow the trails of termites, which leads to their nests. Not much is known about the habits of *Leptotyphlops albifrons* on Bonaire. We may assume that their principal prey are termites, like elsewhere. The termites which are found on Bonaire are a species of *Nasutitermes*. These make large nests which are usually situated somewhat above ground in trees. *L. albifrons* can climb and can also lay eggs behind loose bark of trees. Usually four long thin eggs are laid.



Photo 64: *Leptotyphlops albifrons* (Bonaire).

B. ANTOIN

Colubrid snakes (Fam: COLUBRIDAE)

The Colubridae form the largest family of snakes. This family is present on all continents except Antarctica. In Australia they are poorly represented. Other common names for this family are Advanced snakes, Typical snakes.

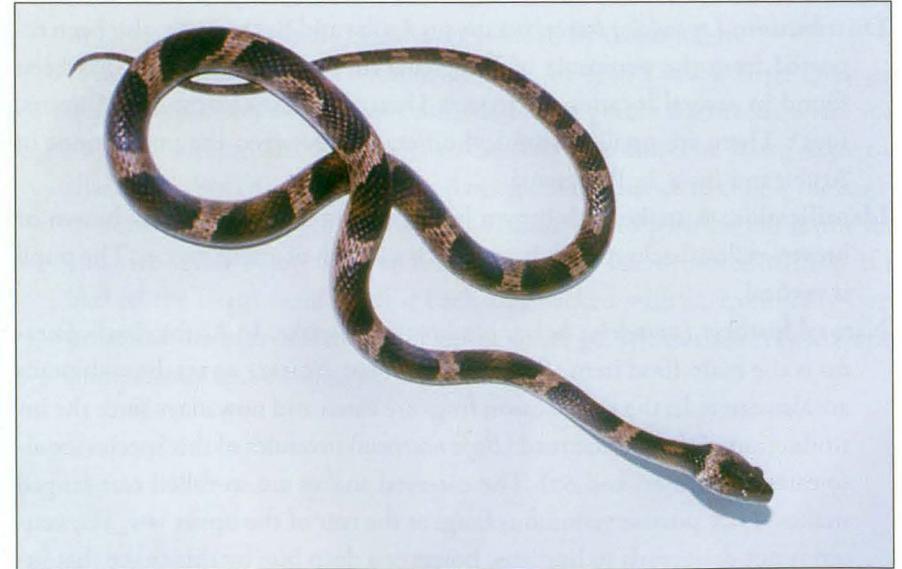


Photo 65: The Santanero, *Leptodeira bakeri* (Aruba).

G. VAN BUURT

Leptodeira bakeri

Names: English: Baker's cat-eyed snake, Aruba cat-eyed snake, Papiamentu: Santanero.

In South America several other species of *Leptodeira* occur. BRONGERSMA (1940) described *Leptodeira bakeri* as a sub-species of *Leptodeira annulata*, and used the name *Leptodeira annulata bakeri*. *Leptodeira annulata* is a common snake with a wide distribution in Middle and South America. Other species and subspecies of *Leptodeira* which occur nearby on the South American mainland, in Venezuela and Colombia are *Leptodeira annulata annulata*, *Leptodeira annulata ashmeadi* and *Leptodeira septentrionalis ornata*. For *Leptodeira annulata* the following names are used: English: Banded cat-eyed snake, Banded night snake, Banana snake, The name Banana snake refers to the fact that this snake is often found in shipments of bananas. English (Trinidad): Mapepire, Surinam Dutch: Katteoogslang, katslang, Sranang tongo (Surinam Creole): Pina Owroekoekoe, Spanish (Venezuela): Sapa, Falsa Mapanare.

Distribution: *Leptodeira bakeri* occurs on Aruba and has recently also been reported from the peninsula of Paraguaná in Venezuela, where it has been found in several locations (MIJARES-URRUTIA, MARKEZICH and ARENDS, 1995). There are small anatomical differences between the populations in Aruba and those in Paraguaná.

Identification: A snake with brown bands or blotches on a yellow-brown or brown-yellow background. It can reach a length of about 70 cm. The pupil is vertical.

Natural history: *Leptodeira bakeri* is a nocturnal snake. In Aruba *Anolis lineatus* is the main food item (BRONGERSMA 1940, SCHALL 1975), but whiptails are also eaten. In the rainy season frogs are eaten and nowadays since the introduction of the marine toad (*Bufo marinus*) juveniles of this species are also eaten (Photo 66 and 67). The cat-eyed snakes are so-called rear-fanged snakes. They possess venomous fangs at the rear of the upper jaw. The venom is not dangerous to humans, however a deep bite by this snake that involves the venom fangs, can be very painful.

Liophis triscalis

Names and classification: syn. *Leimadophis triscalis* and *Coluber triscalis*.

English: Three-scaled ground snake, Spanish (Venezuela, similar species): Reinita. Papiamentu: Colebra, Colebra di Kòrsou, Dutch: Curaçaosche zweepslang.

Distribution: Curaçao; this is an endemic species. In Middle America and South America many different species of *Liophis* occur. In Venezuela five different species of *Liophis* can be found.

Identification: This snake can reach a length of more than a meter. It is grey or brownish-grey, with three light-brown stripes running along the back of the body and two on the tail. Snakes from the western part of Curaçao (Banda Abao) sometimes have stripes which are interrupted and which form a pattern of long blotches. The pupil is round.

Natural history: This is a diurnal snake, it usually hunts in the early morning. It can be found in the vicinity of moist areas or sources of water. The prey consists of whiptail lizards and frogs. Around houses mice and probably small rats are also eaten. Larger prey is killed by constriction.

[The prey is not always without defense. In 1998 I saw a large Blausana (*Cnemidophorus murinus murinus*) which had grabbed a medium size (ca. 70 cm) Curaçao snake (*Liophis triscalis*) by the tail. The lizard kept the snake stretched, moving with it and not giving it chance to coil. If the snake tried to turn its head to the right, the lizard would pull the tail to the left and vice versa. If the snake moved forward the lizard moved with it. If it backed the lizard would pull it back and backed with it. Eventually I approached too near and the lizard let the snake go, which then crawled away immediately and escaped.].



Photo 66, 67: Santanero *Leptodeira bakeri* catching and eating a small Sapo (*Bufo marinus*). The prey is immobilized by poison glyphs in the back of the upper jaw. The Santanero does not constrict its prey (compare with photo 68).
E. KUIN



Photo 68: A Curaçao snake (*Liophis triscalis*), which has caught a Blausana (*Cnemidophorus murinus murinus*). This event was photographed on an early morning along the road to the bay of Jan Thiel.
H. VELVIS



Photo 69: *Liophis triscalis*, juvenile.

G. VAN BUURT

Vipers and Pitvipers (Fam: VIPERIDAE)

The Old World vipers and the Asiatic and New World pitvipers form the family of the VIPERIDAE.

Pitvipers possess heat-sensitive organs which are situated between the eye and the nose on each side of the head (this is reflected in the Spanish name "Cuatronarices", cq. having four noses). These organs are very sensitive and can detect very small differences in temperature. All rattlesnakes, the bush-master, cottonmouth and *Bothrops* species such as the mapanare or fer the lance are examples of New World pitvipers.

Crotalus unicolor

Names: English: Aruba dwarf rattlesnake, Aruba Island rattlesnake, Aruba Cascabel. Papiamentu: Cascabel, Dutch: Arubaanse ratelslang.

On the South American mainland the following names are used for the mainland parent species, *Crotalus durissus*: Spanish Venezuela: Cascabel, Cascabel común, Cascabel enana, English: Neotropical rattlesnake, Tropical rattlesnake, Dutch: Zuid-Amerikaanse ratelslang, Surinam Dutch: Sakka slang, Sranang tongo (Surinam Creole): Sakasneki

Distribution: *Crotalus unicolor*; this snake is endemic to Aruba. On Aruba it is found at Franse pas (French pass), at Ayó and in the areas surrounding Yamanota (Photo 70). The mainland parent species, *Crotalus durissus* has a large distribution. It is found from Mexico to Argentina. Within such a large area of distribution, some genetic variation is expected; 14 sub-species are recognized. *Crotalus durissus* is the only rattlesnake which occurs South of the Isthmus of Tehuantepec, this is reflected in the English name "Neotropical rattlesnake". In Venezuela this snake is also found on the Isla de Margarita and on Los Testigos. The Neotropical rattlesnake lives in dry areas, such as savannas and areas with a xeric vegetation. This snake is not found in tropical rainforests.

Identification: The Aruba rattlesnake is a dwarf species, it is usually less than

1 meter in length and can probably reach a maximum length of about 1 meter. The mainland Neotropical rattlesnake can reach a length of 1,80 meter. On the mainland dwarf varieties of the Neotropical rattlesnake can also be found. Isolated dwarf populations are found in the savannas and dry areas of North East Venezuela (CAMPBELL & LAMAR, 1989). The Neotropical rattlesnakes found on Isla de Margarita and on Los Testigos are also reduced in size. However the Aruba rattlesnake is not just a dwarf race, it also differs in color and behavior. This justifies its classification as a separate species (KLAUBER, 1936), some authors however consider this species to be a subspecies, *Crotalus durissus unicolor* (CAMPBELL & LAMAR, 1989). There is quite some variation in color. Some individuals are light grey, usually with some light khaki brown, others are khaki light-brown or beige-orange-brown. There is a color pattern which is very similar to the pattern of the mainland Neotropical rattlesnake, but the pattern is very subdued and sometimes hardly noticeable. The name *unicolor* refers to this; the snake seems to be of one color. In juveniles the pattern is more clearly visible. In adult khaki light brown snakes it is almost absent.

Natural history: Rattlesnakes usually hunt at night for small mammals, birds, lizards and frogs. The pupil of these snakes is vertical. All rattlesnakes are venomous. The Neotropical rattlesnake is less aggressive than other species of rattlesnake such as the Western diamondback (*Crotalus atrox*) and the Western rattlesnake (*Crotalus viridis*) (HARDY, 1995). The Aruban rattlesnake is even less aggressive than the mainland Neotropical rattlesnake and can be described as being almost docile. This behavior probably developed as a result of a long period of isolation in a safe environment with very few predators, if any. Before the arrival of man, the Aruba rattlesnake was a top-predator in the island ecosystem. This changed with the later introduction of dogs, cats and pigs after 1499 when the Spaniards arrived in Aruba. The Aruba rattlesnake is an endangered species. In 1995 (REINERT, BUSHAR and ODUM, 1995) the size of the population was estimated to be around 225 animals. In recent years it appears that the population has recovered somewhat, probably as a result of the protection afforded by the new "Parke Nacional Arikok", increased public awareness and other conservation measures (pers. comm. Dr. H. REINERT) The increasing human population on



Photo 70: Rattlesnake habitat near Yamanota, Aruba.

G. VAN BUURT



Photo 71: *Crotalus unicolor*. This animal is mostly light grey with some subdued yellowish brown tints. The Aruba rattlesnake can also be yellowish-light brown or beige orange-brown. The diamond-back pattern can still be made out very vaguely.

G. VAN BUURT



Photo 72: Juvenile Aruba rattlesnake *Crotalus unicolor*. In the juvenile Aruba rattlesnakes the diamondback pattern is still visible.

G. VAN BUURT



Photo 73: Aruba rattlesnake – *Crotalus unicolor*.

L.W. PORRAS

Aruba and the increase in economic development are decreasing the habitat available. Snakes which venture near houses are killed and many are killed by cars. Also some are killed by cats and dogs. Another cause of mortality are hooved animals. Some snakes are trampled by goats, sheep and donkeys. The rattlesnake does not run away when threatened, but stays coiled and gives warning with its rattle. Snakes are deaf, they can detect vibrations but cannot hear the sound of the rattle. For this reason it is unlikely that the rattle has a social function. The typical sound of the rattle would have the function of warning and staving off predators. Some vipers shake their tails when threatened, the rattle could have evolved as a result of such behavior. Rattlesnakes evolved in North America. It has been surmised that the rattle would protect snakes in open areas such as the American prairies against being trampled by hooved animals such as bison or deer. There is however insufficient proof for this assumption. In any case the protection afforded by the rattle is not always effective and strange as it may seem, sometimes rattlesnakes do get trampled by hooved animals.

In general rattlesnakes prefer warm blooded prey such as small rodents and small birds. Cold-blooded animals such as lizards are usually not preferred prey items. Like all pitvipers rattlesnakes possess heat-sensitive organs with which they can detect small differences in temperature and which they use to detect warm blooded prey at night. A rattlesnake which is temporarily blinded by molting can still follow a human hand moving in front of the glass of its terrarium quite easily. Based on this preference for warm blooded prey, it can be assumed that in the past, during pre-Columbian times, the Vesper mouse (*Calomys hummelincki* syn. *Baiomys hummelincki*) probably formed an important prey item for the Aruba rattlesnake (REINERT, BUSHAR and ODUM, 1995). [The Vesper mouse belongs to the FAM: CRICETIDAE, a family of mostly New World rats and mice. The Old World world hamsters however, also belong to this family. The Vesper mouse eats grasses and grass seeds. The species *Calomys hummelincki* occurs in Aruba, Curaçao and the Northern part of Venezuela (EISENBERG, 1989). In Curaçao this animal has a Papiamentu name and is called "Djaka di caña". In Curaçao it used to be common in *Sorghum* fields, the very fact that it has a Papiamentu name also indicates that it probably was fairly

common. In Curaçao this animal is very rare nowadays, in Aruba it seems to be somewhat more common (BEKKER, 1996). In Aruba the name "Djaka di caña" is not used. Sorghum (the "caña") was never planted on a large scale in Aruba. It is generally assumed that the Vesper mouse was more common in former times, in Aruba as well as in Curaçao. This assumption however is based on the recollections of older people and not on any written records or population studies. The (probable) decline in numbers of the Vesper mouse could be the result of competition with introduced European rats and mice. Other contributing factors could have been competition for food with imported cattle and the introduction and establishment of Old World grasses. The Vesper mouse (*Calomys hummelincki*) is often mistaken for the European mouse (*Mus musculus*). It is also likely that in the past many more people could distinguish this mouse from the European mouse than nowadays. In Curaçao in the past *Sorghum* was planted on a much larger scale, and the *Sorghum* fields where this mouse was encountered were much more extensive. It is also possible that competition with European rats and/or mice could be stronger in Curaçao than in Aruba. Aruba has a climate which is even more arid than Curaçao. In Aruba the Vesper mouse is found only in very dry areas with some rather sparse grass cover. It seems that it is excluded from other areas by competition with European mice and rats. A study by BEKKER (1996), in Aruba seems to support this hypothesis. In Curaçao areas that seem quite similar to these dry areas in Aruba, could in fact have a slightly different, more diverse vegetation, favoring European mice, or other competitors such as for example certain grass-seed eating birds. In Aruba nowadays the distribution range of the Vesper mouse and the Aruba rattlesnake overlap only partly. The Aruba rattlesnake is found in areas with hills and many rocks and low xeric shrubs, while the Vesper mouse is found almost exclusively in a coastal strip along the North coast, in a dry area with some rather sparse grass cover. In the past the Vesper mouse could have had a much wider range, including the areas where the rattlesnake is found and could indeed have been an important prey item for the Aruba rattlesnake. This interesting idea does not seem an unreasonable assumption, however we have to realize that the evidence to support it is somewhat ambiguous.]



Photo 74: The Neotropical rattlesnake *Crotalus durissus cumanensis* from “Tierra Firme”, (Venezuela). The diamondback pattern is clearly visible, note the two lateral stripes on the head.

R. MONTIEL



Photo 75: This Cuban treefrog (*Osteopilus septentrionalis*), was found in Curaçao in a shipment of Washingtonia palms which were imported from Cuba (2000). The palms were transported in an open top container, which was transshipped via Venezuela and took approximately 5 weeks to arrive.

G. VAN BUURT



Photo 76: Cuban treefrog (*Osteopilus septentrionalis*) in shed (Bonaire).

G. VAN BUURT

In 1995 the "American Zoo and Aquarium Association" held a meeting in Aruba to develop a management plan for the conservation of the Aruba rattlesnake.

VI Exotic herpetofauna

In Curaçao when strange snakes or other animals are encountered the public will generally report this to the Department of Agriculture and Fisheries (DLVV), or bring in the animal for identification. Quite regularly boas (*Boa constrictor*) are brought in. Most of these were probably kept as pets and either escaped or were released. Although these are protected by CITES, some are still smuggled to the islands. In the so called Kabouterbos (wood of the leprechauns), a small wooded area with large Manzanilla trees, which forms part of a water catchment area, a large boa which had eaten two large green iguanas (*Iguana iguana*) was found. On another occasion nine healthy juveniles were found together under leaves in a garden, the mother was never found. Such incidents demonstrate that boas can probably survive on the island for a considerable period of time. Sometimes the animals seem quite tame, probably having been kept as pets for a long time, but on other occasions they are quite aggressive. Recently Corn snakes (*Elaphe guttata*), from North America were found, both in Curaçao (Oct 2001, 2002 and 2003) and on Bonaire (March 2002). In Curaçao these were all found in an area called Kwartje. In this area there is a piece of land where plants which were imported from Florida had been stored. They could have been imported with these plants, but could also have been escaped or released pets since it is known that Corn snakes had been sold by a local pet shop. October 2001 a juvenile was found, early 2002 some adults were brought in, later in the year some juveniles were found. January 2003 a new adult Corn snake was brought in and several sightings were reported from the same area. During February 2004 traps were set out in the area by Mr. Marcus DE MAAIJER who caught 6 adults. At the time of writing (December 2004) no more sightings have been reported. Hopefully this population has been eliminated, but it is probably still too early to tell.

From Venezuela fruits and vegetables are imported with small vessels. Several times species of *Leptodeira* were found in cargoes of bananas. Other snakes that came in with these fruit vessels and were reported are a species of *Imantodes* and once a *Lepthophis*.

Exotic species are often brought in with plants and large trees which are imported for landscaping. Some cargoes of palms that were imported from Florida were found to contain a coral snake (*Micrurus fulvius fulvius*), an Eastern black neck garter snake (*Thamnophis cyrtopsis ocellatus*) and a Southern ringneck snake (*Diadophis punctatus punctatus*). A cargo of *Washingtonia* palms that came in from Cuba (2000) contained a Cuban treefrog (*Osteopilus septentrionalis*) and several anoles, the anoles escaped and were not found again. In Bonaire a Cuban treefrog was found in Kaya Grandi, the main street of Kralendijk (2002). It probably came in with imported plants which are sold in a nearby shop. On the 9th of December of 2004 it was reported from Bonaire (Gijs VAN HOORN) that a fairly large population of Cuban treefrogs is now established in an area around a nursery which imports plants from Florida. In October and November there were heavy rains in Bonaire, this has probably facilitated the establishment of these colonies. A few days later there was a plague of frogs hopping all over Kralendijk. It seems likely that during the the coming dry seasons, it will only be able to survive in gardens and will not be able survive in the "mondi" (bush), which is too arid. This is the case with the whistling frog (*Eleutherocactylus johnstonei*).

In Aruba boas are also regularly found. In 1999, 25 cases were reported to the Parque Nacional Arikok. One boa was found in the cave of Baranca Sunu, in an arid area quite far from the inhabited areas. In 2000 and 2001 more and more boas were found and nowadays sometimes 5 or 6 are reported in a weeks time. Many of these are juveniles. It now seems likely that *Boa constrictor* has established itself on Aruba. Dr. Howard REINERT of the College of New Jersey (USA) and his colleagues are now studying *Boa constrictor* and the ecological effects of its introduction in Aruba, in cooperation with the Parque Nacional Arikok. Another exotic found in Aruba is the red-eared slider freshwater turtle *Trachemys scripta*. Several are found at the freshwater pond at Bubali. This pond is filled with treated sewage waters. It is not known whether they are reproducing in this pond. Some red-eared sliders are also found at Fontijn.

VII Vagrants

In the early 1930's, it probably happened in 1932, a "kaiman" landed on the little island of Klein Curaçao. In those days the Papiamentu language did not distinguish between caimans and crocodiles, both were called "caiman". The animal was fairly large and it was quite aggressive. It seems likely that it must have been an American crocodile (*Crocodylus acutus*). Previously there had been very heavy rains along the Venezuelan coast to the South of Klein Curaçao. It seems likely that this animal was swept to the sea after the rains and that it came from one of the small rivers near Chichiriviche in Venezuela. In those days the American crocodile was quite common along the Venezuelan coast. In the Parque Nacional Cuare near Chichiriviche some can still be found. On the Isla de Margarita the American crocodile occurred in the laguna de La Restinga till the 1940's, where it was exterminated in the 1950's. It has now been reintroduced.

After a few days the occupants of the lighthouse on Klein Curaçao decided to kill the animal, since it became quite a nuisance. My informants Mr. Kichin ZIMMERMAN and Mr. Ciro MADURO (†) told me that they saw this animal when they were (respectively) approximately 12 and 10 years old. Fishermen had brought it in from Klein Curaçao, to the small fishing village of Boca San Michiel in Curaçao. The whole village came out to see the animal, unfortunately the tail had already been chopped into pieces (to be roasted and eaten). Kichin said: "*nos ta bisa caiman, pero e tabata muchu grandi, awendia nos la bisa krokodil*" (we say (said) caiman, but it was too large, nowadays we would say crocodile).

In 1910 a crocodile is known to have landed on the island of Grenada, this was an Orinoco crocodile (*Crocodylus intermedius*).

Species checklist for each island

Aruba

Pleurodema brachyops
Eleutherodactylus johnstonei
Bufo marinus

Gonatodes antillensis
Gonatodes albogularis albogularis
Gonatodes vittatus vittatus
Phyllodactylus julieni
Hemidactylus mabouia
Thecadactylus rapicauda
Iguana iguana
Anolis lineatus
Ameiva bifrontata
Cnemidophorus arubensis
Cnemidophorus lemniscatus lemniscatus
Gymnophthalmus speciosus
Tretioscincus bifasciatus

Boa constrictor
Leptodeira bakeri
Crotalus unicolor

Curaçao

Pleurodema brachyops
Eleutherodactylus johnstonei

Gonatodes antillensis
Gonatodes albogularis albogularis
Phyllodactylus martini
Hemidactylus mabouia
Thecadactylus rapicauda
Iguana iguana
Anolis lineatus
Cnemidophorus murinus murinus
Gymnophthalmus lineatus

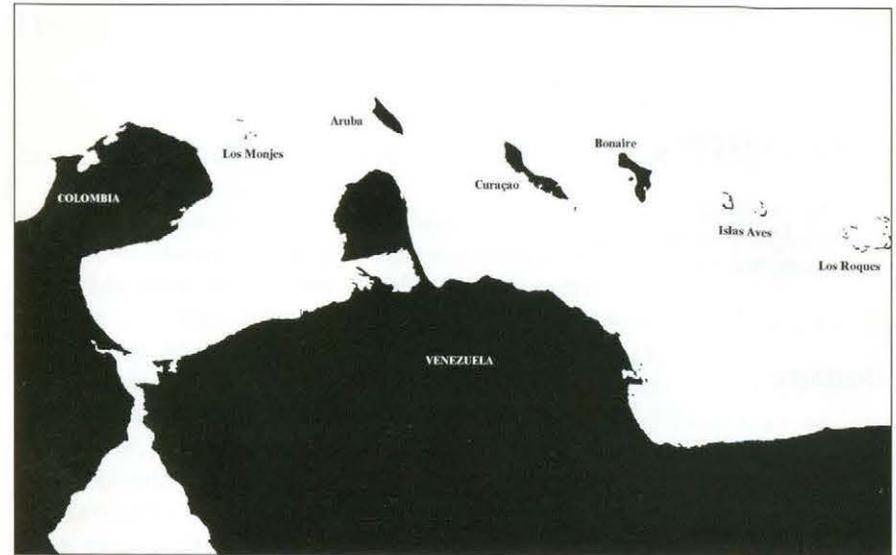


Fig. 3: Western Venezuela.



Fig. 4: Eastern Venezuela.

Liotyphlops albirostris
Liophis triscalis

Klein Curaçao

Gonatodes antillensis
Cnemidophorus murinus murinus
Gymnophthalmus lineatus

Bonaire

Pleurodema brachyops
Eleutherodactylus johnstonei
Osteopilus septentrionalis

Gonatodes antillensis
Phyllodactylus martini
Hemidactylus mabouia
Thecadactylus rapicauda
Iguana iguana
Anolis bonairensis
Cnemidophorus murinus ruthveni
Gymnophthalmus lineatus

Leptotyphlops albifrons

Klein Bonaire

Pleurodema brachyops

Gonatodes antillensis
Phyllodactylus martini
Iguana iguana
Anolis bonairensis
Cnemidophorus murinus ruthveni
Gymnophthalmus lineatus?

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The author with an iguana rescued from a swimming pool. Photo: M.M. DE HASETH-DEBROT

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