CARIBBEAN CURIOSITIES

Monster from the Shallows

They may not look scary, but tilapia have a host of characteristics that make them fearsome invaders on an island like St. Martin.

Tilapia are a group of fish from the warm parts of Africa and the Middle East. They are diverse, with about 100 species, and most live in fresh water. Some species are popular as food. They are caught wild in the lakes and rivers of Africa and farmed around the world to the tune of over a million tons per year.

The things that made them successful in their native range and popular with fish farmers also make them a very dangerous invasive species. In recent years, they have been introduced around the world where they wreak havoc on freshwater ecosystems, eating and competing with native species.

Why are they so dangerous? For starters, they are omnivorous, so they have the potential to disrupt aquatic plants and animals. They even have two sets of jaws. The pharyngeal bones in their throat have teeth and muscles to help tilapia use them as a second set of jaws. With this adaptation, they are able to eat more things and do so more efficiently.

Tilapia grow quickly and reproduce with gusto. They can't handle cold temperatures or very salty water—something we see in the Great Salt Pond when increased salinity causes large die-offs of tilapia. Otherwise, in tropical areas like St. Martin, they can be all but unstoppable. They are extremely common in the Great Salt Pond and in many waterways and ponds on the island. We don't know for sure how they impact native species of fish, shrimp and aquatic life, but it's probably not good.

To their credit, they do eat mosquito larvae and may eat things that other fish avoid. Perhaps they eat the algae that grows too much when human-introduced nutrients overwhelm ponds. Unfortunately, the cost to the local ecosystem is probably higher than the benefits.

The Tree of Life

It is easy to love the Mango tree for its sweet, juicy fruit or the Flamboyant for its showy crown of flowers. Both come from far away, yet have become a part of Caribbean landscapes and cultures. The true native jewel of the Caribbean is a tree that is unfamiliar to many, but without equal in many ways.

The Gaïac tree is also known as the Lignum Vitae, Guaiacum or Palo Santo. It is native to the Caribbean, it is endangered and it has the hardest wood in the world. It is thought of as a small tree, but that's not really true and it was used as a cure for many diseases, although it probably didn't work. At one time it was one of the most important trees in the world, and it has always been one of the most beautiful.

As a native species, the Gaïac evolved to live in the Caribbean. It grows slowly, but can survive in dry and inhospitable environments. They can live near salty coasts, rooted in limestone with just the slightest hint of soil. Their wood is incredibly hard, making the tree sturdy against storms and high winds.

The hardest wood in the world was also very valuable. Gaïac trees were cut down everywhere they could be found, and fashioned into a great many different objects. Mortars and pestles use to pound arrowroot were made from Gaïac, as were billiard balls, police truncheons and clock gears. It was also favored for variety of ship parts, like deadeyes and shaft bearings.

In time, metals, plastics and other materials replaced Gaïac wood for most uses, but by then much damage had been done to this tree. The thousand-year-old trees reaching nearly 20 meters into the sky are almost entirely gone now. The hundred-year-old trees that have grown up since then lead us to believe that the Gaïac is a small species.

It remains incredibly beautiful, with a thick canopy that changes color with the seasons. Deep green leaves stand out during the dry season when the tree is surrounded by browns and yellows. Blue flowers explode into bloom once or twice a year, creating a flurry of activity by bees and butterflies. Tens of thousands of orange fruit can cover a mature tree, bursting open to reveal the seeds in their bright red coating.

Today the Gaïac is resurgent on St. Martin, planted in yards and along roadsides by those familiar with its charms. In a century or two, perhaps it will reclaim its rightful place on the island and in the imagination of those living here.

Nowhere Else in the World

At last count, there are six different species of gecko on St. Martin. Some of them are tiny, about three centimeters long. The Tropical House Gecko is medium-sized and commonly seen climbing walls and eating insects attracted to porch lights. By comparison, the Spotted Woodslave is a monster—up to 20 centimeters overall—with a stout body and thick tail.

Many people are not familiar with the Spotted Woodslave. It is rarely seen around homes and it spends its days hiding, coming out at night to hunt. Those daytime hiding spots often include the stone slave walls that crisscross the island and crevices in the bark of old tamarind trees.

The Spotted Woodslave is instantly recognizable. It's huge, of course, with the sturdy frame of a retired athlete. It also has a generous speckling of black spots on its tan skin. Its legs are draped in loose skin, like long underwear that is a couple sizes too big. Splits in its toe pads make its feet look cartoonishly oversized. It has enormous eyes that stick out on either side of its head like tiny planets.

It is a beautiful lizard, and one that is only found on St. Martin. St. Martiners have known this lizard since people first came to the island, but it was only described as a new species in 2011. Previously, it was considered just a variant of a sister-species, the Turnip-tailed Gecko, which is found in much of the tropical Americas.

Why does St. Martin have its own species of gecko? It's quite hard to say, because it happened long before anyone was around to watch. Perhaps our Spotted Woodslave lived on more islands at one time, before disappearing everywhere but St. Martin. Perhaps Turnip-tailed Geckos colonized the Caribbean twice: an early group that evolved into our Spotted Woodslave, and then a more recent group that remains the same as the geckos on the mainland.

Whatever its origins, the Spotted Woodslave surely deserves wider recognition as a unique part of St. Martin's nature. It is also part of local culture. With microscopic hooks on its toes like invisible velcro, it can climb walls. This gave rise to the myth that if a woodslave was on your skin it could only be removed by burning it with a hot iron. That myth's not true, of course, but it is rooted in observation of this animal's amazing climbing abilities.

Here Be Monsters

You've marveled at them and perhaps been momentarily intimidated by one. It's the often massive lizard roaming St. Martin: the Green Iguana.

The Green Iguana is named after a color it often outgrows. Freshly-hatched iguanas are a brilliant acid green. As they age, their color fades to darker greens and shades of gray. Male iguanas wear bright orange during the breeding season, most often on their legs and feet. Despite their diverse and splendid range of colors, all the iguanas on St. Martin are the same species.

The iguana is a gentle giant, more or less. They have up to a hundred sharp teeth, but they mostly use them to eat the leaves and fruit that make up their vegetarian diet. They have a row of spines down their back, but just to protect them from predators. They have sharp claws, but they use them to climb the trees where they spend most of their time.

The iguana is most graceful in the water. On land, iguana locomotion ranges from a plodding gait to an awkward, frenetic scramble. If you approach an iguana near a pond, they will usually take a flying leap, legs flailing, into the water. In the instant after splashing down, they are transformed into a sinuous swimming machine, gliding towards the safety of the far bank.

Although they look like primeval caretakers from the island's distant past, the Green Iguana is a surprisingly recent arrival on the island. According to most accounts, a couple crates of iguanas arrived via air freight in the mid-1990s. Originally destined to be pets or perhaps soup, they were never picked up. After a number of days, a sympathetic employee released the forlorn creatures, and for some time they lived primarily in Flamingo Pond.

Flamingo Pond was filled as part of the airport expansion a few years later, and iguanas were brought to other parts of the island. These refugees went on to prosper in their adopted home. Over the next decade, they became increasingly common and they are now found all over St. Martin in large numbers.

What is the impact of the Green Iguana? It's hard to say exactly, but they have the potential to damage or kill trees in spots where there are too many of them. They are also known to eat bird eggs on occasion. Perhaps the biggest danger is the possibility of Green Iguanas from St. Martin making their way to nearby islands with endangered native iguana populations. Competition with Green Iguanas and interbreeding with them are a huge threat to native iguanas in the Caribbean.

Live Fast, Transform Young

The Cuban Tree Frog is the only amphibian on St. Martin that needs to live in fresh water as it develops, and on St. Martin this is a very challenging proposition.

The Cuban Tree Frog is native to Cuba, the Bahamas and the Cayman Islands, but humans have brought it to many other places. It now lives in Florida, Hawaii and many Caribbean islands. Although it needed the help of humans to get to new lands—probably as a stowaway with shipments of plants or other materials—it is very adept at colonizing new places once it arrives.

St. Martin poses a number of challenges for the Cuban Tree Frog. For starters, there simply isn't much fresh water. Most of the ponds on the island are salty or brackish, which is not good if you have permeable skin that can absorb salt. There are no real rivers, and most of the fresh water in guts and roadside ditches is swarming with guppies and other fish that would love to eat young tadpoles.

What's a frog to do then? For starters, they lay a lot of eggs: 100 to 1,000 at a time. Also, they can hop to water that fish can't reach, like livestock ponds, wells and even puddles. Of course, this means they have to grow up fast before their puddle disappears. They start by eating algae, which is the primary food for Cuban Tree Frog tadpoles, but as their home gets smaller, things take a turn towards the sinister.

In the race against time, the tadpoles will often eat their brothers and sisters. This provides the best chance for at least a few to survive and transform into frogs before their water runs out. It may seem unpleasant, but for the survival of the species, it is much better than all of the tadpoles dying when their puddle evaporates.

While their ability to thrive on a relatively dry island is impressive, it isn't necessarily a good thing for native animals. Like all invasive species, the Cuban Tree Frog can upset the delicate balance of life on an island. Animals like our native lizards—including species found only on St. Martin—are potential prey for the Cuban Tree Frog.

Mini Maestro of the Mangroves

Our salt ponds and mangrove wetlands are a complex ecosystem. Many kinds of plants and animals interact in harmony to keep St. Martin's shores from eroding and preserve our clear waters and coral reefs. One tiny animal in particular plays a big role in holding it all together.

Fiddler crabs are small, a couple inches wide at most. On St. Martin, they are most common on the edges of our salt ponds, on sandy flats and beneath mangrove trees. Male fiddler crabs are easy to recognize because they have one enormous claw, sometimes almost as big as the rest of their body.

Why are these little crabs so important? Consider one role of our ponds and mangroves: they trap organic material and soil before it gets swept out to sea. This process counteracts erosion and also keeps the sea clean and clear, something that corals need to survive. Fiddler crabs help, bite by bite. They use their small claw to put sand in their mouth and filter out tiny bits of food from it.

Fiddler crabs also help maintain healthy mangroves by digging tunnels in the sand. The crabs dig the holes so they have a place to hide from hungry birds, but the holes also loosen and aerate the sandy ground where they live, which is good for the mangroves. The crabs also bring buried organic matter to the surface when tunneling, so it can be eaten. In some cases, other animals use the tunnels as hiding places, too.

Fiddler crabs are also an important source of food for many wetland animals, particularly wading birds and herons. These crabs sustain our year-round resident birds as well as migratory species that travel thousands of miles to winter here. The energy the crabs unlock from filtering wet sand is provided to these birds in bite-sized packages.

It is hard to imagine what our island would be like without the fiddler crab. Our wetlands would be quite different. Familiar birds would probably be less common or gone altogether. The island could be smaller, our shorelines eroded with less protection from mangroves. Our coral reefs could be overwhelmed by algae. Rotting material trapped in the sand could even make the island smell worse. Thank goodness for our fiddler friends!

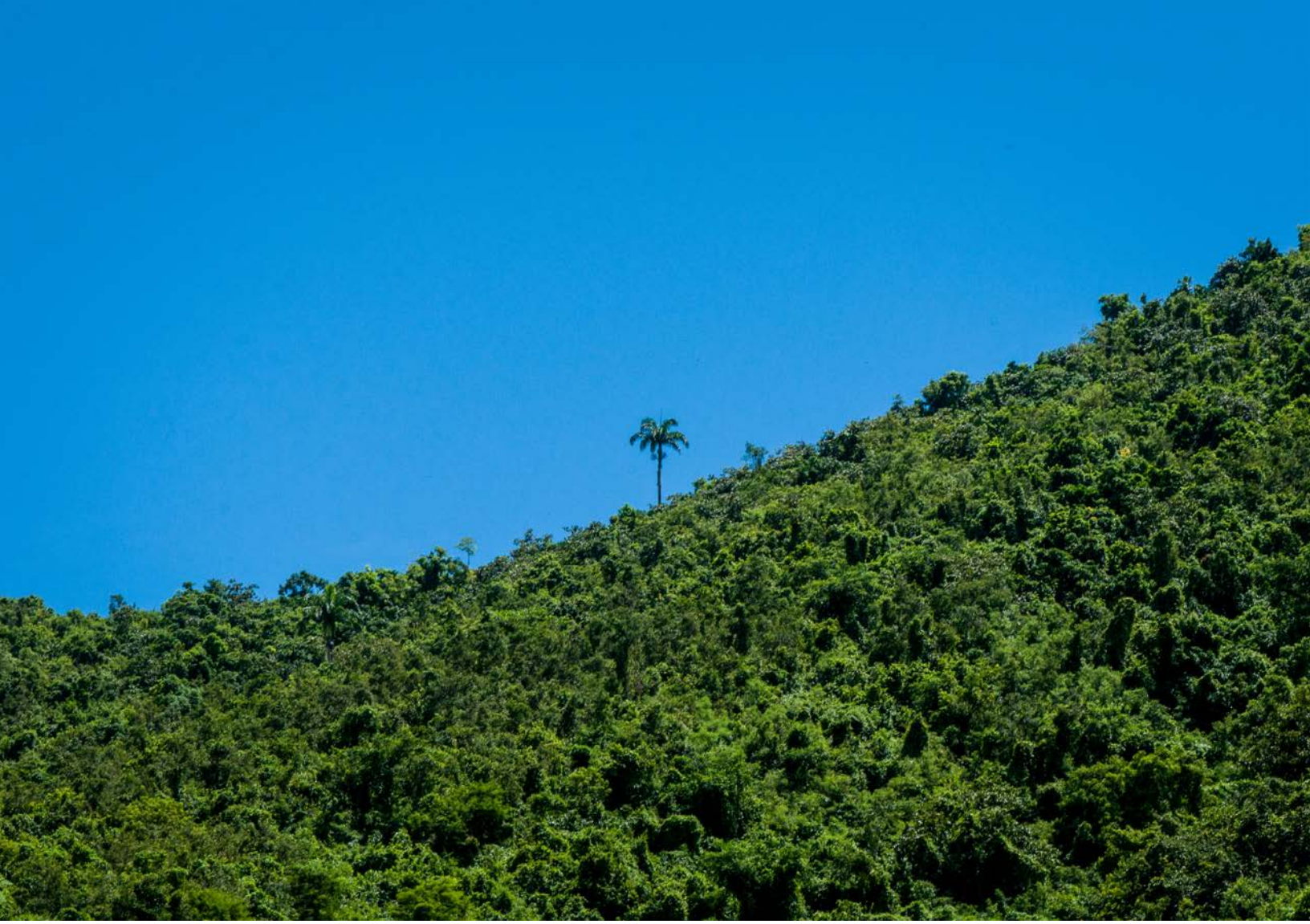
CARIBBEAN CURIOSITIES

PART TWO: ISLAND OF CHANGE

Island of Change

For St. Martiners and long time visitors, the changes taking place on St. Martin are a common topic of conversation. They are praised on occasion, but more often seen as problematic: a rising landfill, new developments of uncertain value, or beaches transformed into parking spaces. This skepticism is not surprising—few places have changed so much or so quickly as St. Martin has in the last half-century.

The changes in the island's natural heritage have been happening much longer, and are often less visible. Although our mental image of introduced species may be the rat swimming to shore from a European ship, Amerindians colonized these islands centuries before. Although they left no written records, the ecological evidence suggests that they were transporting plants and animals—and transforming the Caribbean—long before Columbus arrived.



As a general rule, the introduction of a new species goes unnoticed—at least at first. There's no record of the first Cuban Tree Frog or House Sparrow. We notice them as they become established, but by then it can be too late to stop them. Innovative techniques have allowed us to remove rats and other invasive species from some uninhabited islands in order to save native species. Still, we are a long way from being able to undo all our mistakes.

For everything new on St. Martin—like strange, shovel-headed worms crawling around after a rain—we now miss things, too. The elegant Leeward Island Racer snake that once hunted lizards here and the Lesser Antillean Iguana are both gone. Some invaders we see all around us, like the Green Iguana. Many others are tiny insects that few have ever seen at all. The impact they have on the island can be surprising: a tiny beetle can fell a towering palm.

On this island of change, it can be rewarding to spend a quiet moment to consider the life around us—the bird on the doorstep, the call in the night, the spider minding its web. Where did it come from? How did it arrive, and when? How is it changing the island at this very moment in some invisible way?

Monkey Business

Invasive species have a long track record of disrupting native plants and animals, particularly on islands. As Vervet Monkey populations increase, what can we expect on St. Martin?

Although they can survive hurricanes and droughts, island ecosystems are delicate in some ways. Invasive species can cause destruction and disaster when they encounter islands where they have no predators and little competition. Since the year 1500, 80% of all animal extinctions have happened on islands.

This happens right here on St. Martin. The introduced mongoose wiped out three species: two lizards and a snake. Rats and mongoose are our most destructive invasive species. Both are omnivorous mammals—smart, fast and hungry. The raccoon is another, but we know less about how it impacts islands.

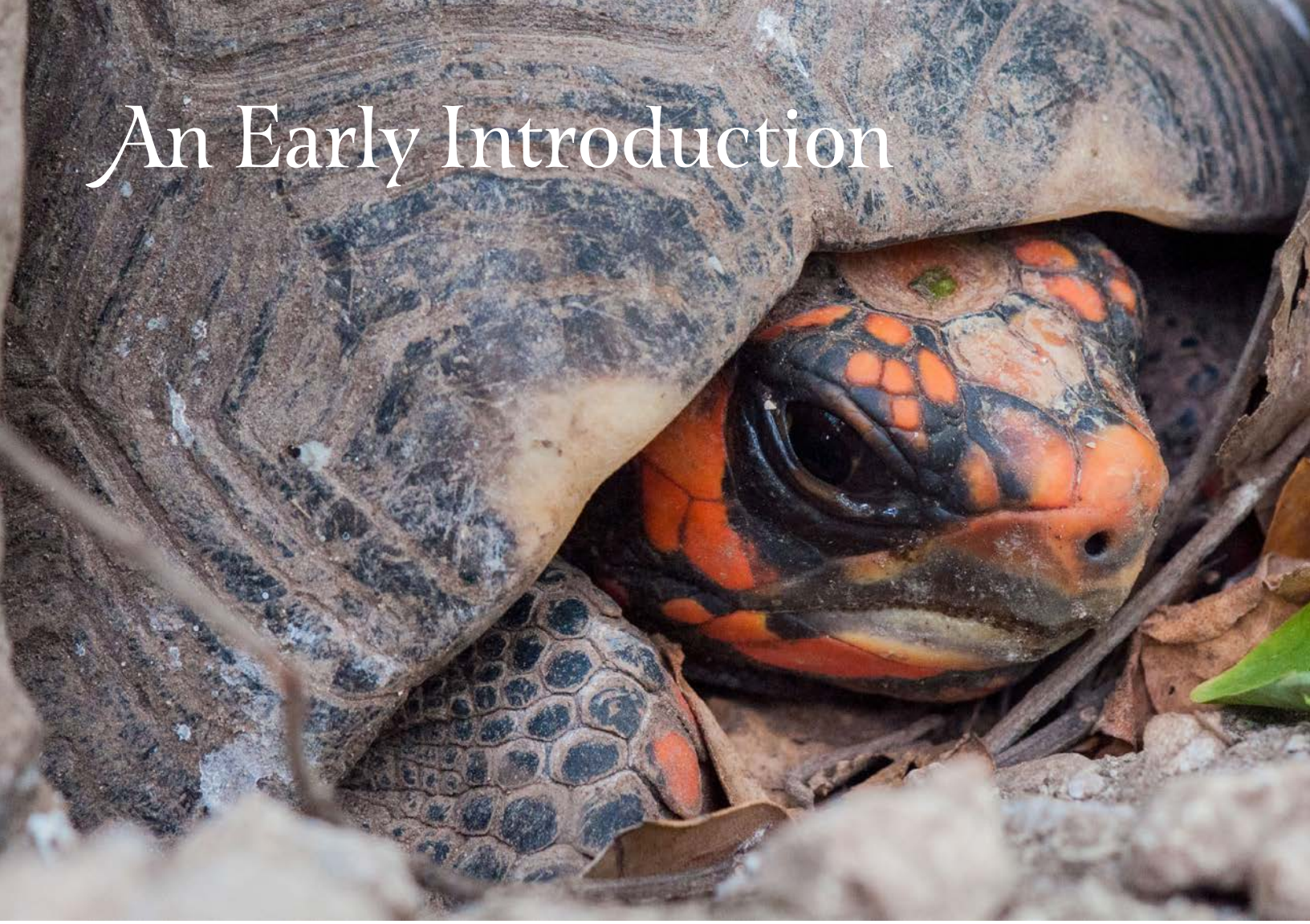
In recent years, the Vervet Monkey has been increasing its population on St. Martin. Agile and intelligent, it undoubtedly eats a wide variety of native plants and animals. Originally from Africa, this monkey was brought to St. Kitts and Barbados in the 1600s. The wild population of Vervets on St. Martin is much more recent, perhaps only a few decades old.

A look at St. Kitts may tell us a bit about one possible future on St. Martin. Monkeys are very common on the island in both the mountain forest and the dry coastal scrub. Until recently, large areas of sugarcane cultivation created a buffer between mountain-dwelling monkeys and urban areas. With the end of that industry, emboldened monkeys have spread nearly throughout the island.

In the lush, beautiful forests of St. Kitts, many animals are strangely absent. Snails, so abundant on the wet slopes of Saba and even in the dry forest of St. Martin, are almost entirely absent. One might see a few lizards per day on St. Kitts' Mount Liamuiga, compared to a few lizards per tree on St. Martin's Pic Paradis. There isn't enough research to prove that monkeys are responsible, but their presence is one of the few major differences between St. Kitts and other islands in the Lesser Antilles.

Once a rarely seen novelty, Vervet Monkeys are more common on St. Martin every year, and seem to be on the verge of becoming an island-wide menace. Will lizards found only on St. Martin be driven to extinction? Will the island's forest and scrub fill with monkeys and empty of everything else? Without action, we will find out very soon.

An Early Introduction



One of the challenges of studying the ecology of an island is uncertainty about past events. Be it twenty years, two hundred years, or two million years ago, it is impossible to go back in time to witness the first arrival of a plant or animal species. Instead, our understanding is informed by whatever historical and biological data is available.

When it comes to the Red-footed Tortoise in the Lesser Antilles, there are a few possibilities. It could have arrived on its own, floating on a raft of vegetation to each island. It could have been brought by Amerindians from South America and introduced to the islands they visited. It even could have been introduced during the colonial era or the modern era.

On St. Martin, we can probably rule out the last possibility. In 1658, Charles de Rochefort published an account of his time in the Caribbean which mentioned the presence of tortoises in the forest on St. Martin. Since St. Martin was only settled in the 1620s, it seems likely that tortoises were living on the island before it was colonized by Europeans.

Was the Red-footed Tortoise brought to these islands by Amerindian people? Many believe this is the most likely scenario. The Arawak and Carib people migrated from northern South America—where the Red-footed Tortoise is a native species—to the Lesser Antilles. It would have been very practical to bring the tortoises with them and release them, creating a renewable food supply.

There are other reasons to believe the tortoise did not arrive on its own. Most of the reptiles that colonized the Lesser Antilles by their own means diverged into different species on each island or group of islands. The Red-footed Tortoise seems essentially the same throughout the Caribbean. This suggests it arrived recently.

Also, we know what can happen with tortoises on islands: they become giants, like the tortoises of the Seychelles and Galápagos. It seems reasonable to guess that if these tortoises had colonized Caribbean islands millions of years ago, they would have had ample time to become giants on Caribbean islands, too.

As it turns out, we don't need to guess that giant tortoises could exist in the Caribbean. About 40 miles from St. Martin, Sombrero Island was once home to the Sombrero Giant Tortoise. Remains of this tortoise were found in guano extracted from the island. Several other extinct species of giant tortoise are known from other parts of the Caribbean. It is possible that existing populations of giant tortoises were hunted to extinction by the earliest humans who arrived here and then replaced by the tortoises we see here today.

The Huntsman

The Pantropical Huntsman Spider is huge. It's smaller than your hand, but it's bigger than any other spider on the island except our tarantula. It probably came from Asia, but humans have brought it to tropical regions around the world. It is sometimes called the Banana Spider because it has a habit of stowing away in bunches of bananas.

Here on St. Martin, this species doesn't seem particularly common, but they do tend to live in and around homes, increasing the chance that you might see one. Although they have a painful bite, they will generally run away from humans if they have a chance. They are often considered beneficial because they eat cockroaches and other insect pests.

It is hard to say if this introduced species is good or bad for the island. While some introduced species cause severe damage to island ecosystems, others may have very little impact. Chances are, this spider mostly eats introduced cockroaches in urban areas. If that's the case, it probably is doing little to harm or compete with native species.

Love Songs

Love is always in the air on steamy Caribbean nights, and you can hear the songs that prove it. A gentle hum, a sawing drone, or a piercing chirp, these calls broadcast into the darkness, pleading for partnership.

A nocturnal lifestyle has certain advantages here on St. Martin, especially if you are very small. Birds and lizards are dangerous predators to the insects and tiny frogs living on the island. One way to escape their prying eyes and hungry mouths is to hide during the day. Many of the nocturnal critters on St. Martin do just that. Johnstone's Whistling Frog often waits out the daylight in the dampness beneath stones or under dead leaves. Many crickets and katydids hide in plain sight, camouflaged to look like the plants they live on.

Conducting all of one's business at night does pose certain difficulties when it comes to love. When predators can't see you, neither can your prospective mate. Although there are numerous ways to find a partner in the dark, sound is one of the most common methods.

Males are usually the ones to sing these moonlight love songs. There is a fairly simple reason for this. Producing eggs requires more effort than producing sperm, so female frogs and insects are selective about who will get to fertilize them. Males are the ones that need to prove their worth, so they do the calling. The calls they make advertise both their location and their fitness.

A nighttime stroll in a garden, field or forest will be filled with song. The Snowy Cricket—a tiny, delicate insect—rubs its transparent wings together to produce an airy buzz. The song from a single cricket is slight, but in a field of Bellyache Bush the chorus of hundreds can be enveloping.

The Money Bug prefers to call from tall grasses. It has a file on one forewing and a scraper on the other. Its song is determined by the shape of these sound-making features and how it plays them. It chooses loud and grating, in a near-continuous drone broken by occasional momentary silences.

The island's most famous nighttime singer is Johnstone's Whistling Frog. This tiny frog fills up a huge air sac in its throat to create its trademark whistle. It is surprisingly loud, and many sleepless people have discovered how hard it is to find its source. A chorus of whistling frogs on a rainy night may be the most typical sound of the Caribbean.

Terror on Many Legs

Many of the dangerous-looking animals on St. Martin are pretty harmless. The Hairy Tarantula is mild-mannered, and the Whip Spider doesn't bite at all. However, the Vietnamese Giant Centipede is feared by many for its painful bite, and it does seem to be more aggressive than most of our tough-looking critters.

Originally from Asia, this species has become established in many tropical areas, including the Caribbean. The region also has its own native giant centipedes, but the Vietnamese Giant Centipede seems to be the most common one in the areas where people live.

This fierce centipede will eat just about anything smaller than itself. That mostly means insects, but it will hunt mice and lizards as well. Females will also fiercely defend their eggs and young, protecting them until after they hatch and molt for the first time.

There are many myths about these centipedes: that they are always found in pairs, or that drinking rum with centipedes in it will make you immune to their bite. It is unlikely that any of these tales are true, but they are a testament to the place this centipede has in our imagination.

A Giant Problem?

Giant can be a relative term. The Giant African Land Snail is definitely a giant among land snails, even if it is only a few inches long. It also manages to be one of the world's worst invasive species, but is it a giant problem on St. Martin?

This snail has certainly become a big problem in many places. Originally from Africa, it has been spread by humans throughout much of the world's tropics. Once it becomes established, it can transform its new home in a variety of ways, endangering local ecosystems, agriculture and even human health.

The Giant African Land Snail is hermaphroditic, so every single one is able to lay eggs. They do so 100-400 eggs at a time, up to 1200 eggs per year. Once they are introduced, they are quick to take over. Getting rid of them is hard. In Florida, an infestation was eradicated in the early 1970s. The effort involved killing 18,000 snails and cost over $4 million in today's dollars.

These snails are known to eat over 500 different kinds of plants, including many agricultural crops. They eat leaves, fruits and roots, scraping away at them with 80,000 tiny teeth on their file-like radula. They can also transmit diseases to plants, including diseases impacting crops like cocoa, tangerines and eggplants.

In some parts of the world, these snails are also responsible for spreading diseases to other animals and even humans, including some caused by nematode worms that live in the snails. Luckily, humans usually catch these diseases by eating raw or undercooked Giant African Land Snails, something that most of us will have no problem avoiding.

In the Caribbean, this snail was first noticed in Guadeloupe in 1984. By some accounts, it arrived in St. Martin along with supplies imported when the island was rebuilding after Hurricane Luis. Whether that's true or not, Guadeloupe does seem like a likely source for our snails. Today, these snails can be found all over the island.

Since St. Martin's major industry is tourism, not agriculture, this snail probably has a bigger impact on local ecology than it does on the local economy. It may harm native plants and outcompete local snails. Like many other invasive species, understanding the extent of its impact would require extensive research that has not yet been done here. On St. Martin, it may not be the giant problem it is in some places.

Land of the Blind

St. Martin was once home to a rather beautiful snake, the Leeward Island Racer. It was given the scientific name *Alsophis rijgersmaei* in honor of St. Martin's 19th century physician and naturalist Dr. Hendrik Elingsz van Rijgersma. If you're lucky, you might still see it on Anguilla or St. Barts. On this island, it seems the mongoose has hunted it to extinction. But that doesn't mean that there are no snakes on St. Martin...

The one snake that is definitely living on St. Martin is odd, but it's not surprising to find it here. It is known by many names: Brahminy Blind Snake because it is thought to come from India, Flowerpot Blind Snake because it often travels in potted plants, and Island Blind Snake because it has been so successful in colonizing islands.

As you may have guessed, this snake is blind. It has eyes, but they are feeble and covered in scales. They can sense light and dark, but probably not much more than that. This is not a problem for them because they live underground, eating ants of all ages—eggs, larvae, pupae and adults—straight from the nest.

If you've never seen one, that's probably because they're rarely out and about. They're also very small—just a few inches long and thinner than a chopstick. There's no need to fear the blind snake, because its mouth is far too small to bite you.

How did this strange snake get here? Probably in potted plants or trees, the same way it has hitchhiked its way around the globe. This species is also parthenogenetic. This means they are all female and can

reproduce entirely on their own. They give birth to genetically identical offspring. This is a serious advantage when colonizing an island, and surely a big part of their success in establishing themselves around the world.

Could there be more to St. Martin than a tale of two snakes? It is possible. Native blind snakes are now known from many nearby islands. If there's one on St. Martin, it could have gone unnoticed. Today, it could be mistaken for the introduced Brahminy Blind Snake. If one is found—and several have been found in the Caribbean in recent years—it would likely be a species new to science.

CARIBBEAN CURIOSITIES

PART THREE: NATIVE NATURE

Origin Stories

The Caribbean is full of stories. There are stories of people and events, tall tales and true ones. Nature in the Caribbean is full of stories, too. Birds travel thousands of miles each year to connect these islands with faraway lands. Natural landscapes are transformed over and over again. New species—brought on purpose or by accident—bring death and destruction to local ecosystems.

Some of the best stories are origin stories. How did these creatures get onto these little islands in the sea? How did they transform into new forms that don't exist anywhere else? How did they come together into unique communities? The unique wonders of Caribbean nature all blossom from chance beginnings, incredible journeys and the isolation of distance.

Blessed with an incredible variety of unique animals found nowhere else, the Caribbean makes a wonderful laboratory. We have the opportunity to investigate the big ideas of biology, like adaptation, competition and extinction. We can compare each island to its neighbor, and learn from the differences. Here we can learn how diversity came to be.

Right now, the Caribbean is a fascinating place to do science. Although it is not as remote as it once was, in many areas work is just now beginning. There are hundreds, or even thousands of new species waiting to be discovered and described—new origin stories waiting to be told.

The Caribbean is undergoing great changes. The region is no stranger to change. Populations have risen and fallen. Crops have been exploited and abandoned under the influence of global markets. The pace of development—especially on St. Martin—surely tests the resilience of the island's ecosystem. Some of our unique animals have already disappeared.

It is the perfect time to learn about the wild wonders around us. The tools at our disposal are better than ever, and the need has never been more urgent. Much natural heritage is on the edge of destruction, even as a new generation becomes inspired to protect it. We have the chance to celebrate what makes the island unique in an era when local customs are being swallowed up by global culture. This is the moment to learn and share the stories of our exceptional native animals.

On Evolution's Trail

Evolution is happening all around us, but the processes that create new species are also being undone at the same time.

There are no bird species that live only on St. Martin. It's not too surprising—on a clear day you can watch birds flying across to Anguilla or arriving here from Saba. Some birds even fly thousands of miles to live here each winter. But not all birds are such avid travelers.

Many of the birds on St. Martin are found only in our region. You can often tell by the names, like Lesser Antillean Bullfinch, Caribbean Elaenia, Antillean Crested Hummingbird, Carib Grackle and Green-throated Carib. Some other local birds have wider ranges, but distinct subspecies or varieties in the Caribbean. Although they can fly across the sea, they usually don't.

Like all living things in nature, these birds are in the process of evolving. Over generations, Sugar Birds on St. Martin might adapt ever so slightly to the conditions on this island. They might get better at harvesting nectar from the flowers found here or nesting out of the reach of the mongoose. These could be the first invisible steps towards becoming a St. Martin Sugar Bird, found nowhere else in the world.

While this is happening, other events are reversing this evolution. A hurricane strike on a nearby island might send desperate birds here in search of food. As they integrate with the local Sugar Bird population they smooth out the tiny differences that were beginning to develop in the St. Martin population. The balance of isolation and movement can create regional varieties that never develop into distinct new species.

The ability to analyze genetic differences has given us a window into the subtle differences between Sugar Birds and a look into their past. A recent study compared over 40 different Sugar Birds from different areas with surprising results. Over the past several million years, there have been three separate periods when Sugar Birds from the Greater Antilles expanded into the Lesser Antilles. Each new wave mixed with the Sugar Birds here, and the birds living here today still carry the evidence of these movements in their genes.

Have Wings, Will Travel

Animals have developed the power of flight several times. The insects were the first to take to the skies, and they became the most diverse group of animals in the world. Feathered dinosaurs grew wings and became birds, surviving when the rest died out. A third group used flight to colonize St. Martin while their fellow mammals could not.

Bats are St. Martin's only native mammals. At least, they are the only ones alive today. Two prehistoric rodents lived on St. Martin, but they were long gone by the time recorded history began here. All other mammals on the island were brought by humans. This includes the wild ones—rat, mongoose, mongoose, raccoon, monkey—as well as our pets and farm animals.

Bats have used the power of flight to diversify, adopt many different lifestyles, and travel. There are over 1,000 species of bats in the world, and eight are found on St. Martin. Our bats pursue a variety of foods and make their homes in a variety of places.

The Velvety Free-tailed Bat eats insects and often lives beneath corrugated zinc roof sheets. It is a small bat, often seen in neighborhoods. It comes out around dusk to catch flying insects. To our benefit, mosquitos are often part of its dinner.

The Jamaican Fruit Bat and Antillean Cave Bat are larger, and they eat fruit. They are often seen around fruit trees at night, including almond, mango and palm trees. These bats nest in large groups in caves, especially the Grotte du Puits in the lowlands. The floor of the cave is covered in fruit pits brought back to the cave by the bats.

One of our most remarkable bats is the Fisherman Bat. This species uses echolocation to sense ripples made by fish on the surface of the water. Then it swoops down and grabs the fish with its large feet. Of course, all of this is done in complete darkness!

Bats have adapted to Caribbean islands, becoming new species along the way. The Antillean Cave Bat is found only in the Caribbean. The Lesser Antillean Tree Bat and Lesser Antillean Funnel-eared Bat are found only in the Lesser Antilles. The only mammals to fly, and our only native mammals, they have truly made the Caribbean their home.

Between Worlds

On St. Martin, one is never far from the sea. Most obviously, we find it at the edge of every beach and at the bottom of each seaside cliff. But the sea also has ways of invading the island itself.

The sea seeps into the land through the porous limestone, adding its salty essence to well water. It washes upstream in the few spots where fresh water running down a gut reaches the sea. And, of course, salty water from the sea fills many of our salt ponds.

These brackish waters—neither part of the sea, nor totally separate from it—are a rich and unique habitat. The creatures that live here must adapt to the changing conditions of this zone: a rainstorm pushing the balance towards freshness, a dry spell pushing it to salty.

For some, life between two worlds is just a passing phase. Many juvenile fish use brackish mangrove wetlands as a nursery. In the shallow water, sheltered in mangrove roots, they find a safe place to grow. They then swim out to the coral reef to live. Some freshwater species—like the Mountain Mullet and many freshwater shrimp—float in the sea as eggs. After hatching they travel with the current, then swim into fresh water to mature.

Fish like the Crested Goby spend a lifetime on the borderline. They often live around mangroves, digging out a hollow in the sand or finding a root-sheltered hiding spot. They also live in estuaries where streams and rivers empty into the sea. Unlike most fish, they can live perfectly fresh water, pure seawater and anything in-between.

The Crested Goby is also flexible when it comes to food. Algae is on the menu, but so are crabs, insects, snails and even small fish. It is an integral part of the wetland community that captures nutrients washed down from the island. It plays a part in keeping the seas both clean and full of life.

The adaptable Crested Goby has found a niche that allows it to occupy the cracks and crevices between two worlds. In doing so, it has also turned its back on life in the open ocean. It is a creature of the sea, tied forever to the edge of the land.

The Little Things

They're all around us, but we rarely notice them. They're specially-equipped for climbing, but mostly live on the ground. They're probably the most common reptiles on St. Martin, but few people know their names.

St. Martin's dwarf geckos are some of its most unique and mysterious residents. The island has two species. The smaller one is known as the Little Woodslave or Anguilla Bank Dwarf Gecko. The larger is called the Least Island Gecko or Leeward Banded Dwarf Gecko. Hidden in their confusing names are some clues to how unique they are.

The Little Woodslave is found on only a few islands in the world: Anguilla, St. Martin, St. Barts and the smaller islets in the immediate area. Combined, these islands make up the Anguilla Bank featured in the name Anguilla Bank Dwarf Gecko. When the last ice age lowered sea levels by locking water in glaciers, these islands were connected into a larger island. Hop over to Saba or Statia—which have never been connected to St. Martin—and you won't find the Little Woodslave. Its cousin, the Saban Dwarf Gecko, lives there.

It's hard to say what the name Least Island Gecko is supposed to mean. It doesn't live on the fewest islands—it's found from Anguilla down to Nevis. It also isn't the smallest—there is a smaller dwarf gecko on every island where it lives. It's other name, Leeward Banded Dwarf Gecko, isn't much better. Sometimes they are banded, but other times not at all.

Dwarf geckos may be small, but they do have strength in numbers. There are over 100 species of dwarf gecko in the genus Sphaerodactylus, and the vast majority live only in the Caribbean. This vibrant diversity is one reason the Caribbean is considered a biodiversity hotspot.

In terms of population, one study measured dwarf gecko density equivalent to 21,000 geckos per acre. In theory that would work out to about 450 million dwarf geckos on St. Martin, if the entire island were perfect habitat for them. Probably there are far fewer, but the real number could be almost unimaginably high.

What do these tiny lizards do? They eat insects. Mostly ants and other very small things, and probably a lot of them. Perhaps enough to impact the whole ecosystem of the island. They turned their miniature size into an advantage that made them incredibly successful. In the Caribbean, their tiny feet leave a big footprint.

The Last Refuge

The ravines on the western slope of Pic Paradis feature a forest unlike anything else on St. Martin—or neighboring Anguilla and St. Barts for that matter. It is the homeland of our Bearded Anole, and may have been its birthplace, too.

In ecology, endemic means something that is only found in one specific place. There are a couple ways this can happen. A neoendemic species is a new species that evolves in a unique location. This happens a lot on islands. The term paleoendemic describes almost the opposite situation: the last refuge of a species that was once more widespread. This can happen on an island, too.

Our beautiful Bearded Anole—like most of our native reptiles—is a great example of a neoendemic species. Little lizards spread from island to island, blossoming into a wide variety of species as they adapted to their new homes. Lush forest may have been ancestral home of this species. It is ill-suited to the full heat of the tropical sun, and is primarily found in shady areas.

For most of the last 100,000 years, the Bearded Anole probably had lots of habitat. Sea levels were lower, and St. Martin was part of a much bigger island that included present-day Anguilla, St. Barts and beyond. Surely there were many shady forests where this lizard could live.

Around 12,000 years ago, rising sea levels separated St. Martin, Anguilla and St. Barts. The Bearded Anole probably lived on all three islands, but St. Barts and Anguilla are both lower than St. Martin. Because of this, they lacked the water and wind protection to develop the type of broadleaf forest that stretches from Colombier up to Pic Paradis.

We have no record of the Bearded Anole on St. Barts, and it was last recorded on Anguilla in the 1920s. Today it lives only on St. Martin, a relict population in its last refuge. It is both a neoendemic species that arose here, and a paleoendemic species that disappeared from the other places it lived.

Many of natures most miraculous creatures evolved on islands. They make up a tiny percentage of the land mass of the earth, but are home to much of the planet's diversity. Unfortunately, over half of animal extinctions have also happened on islands, a trend that continues. The individuality of the island—in richness and struggle—is reflected in our Bearded Anole.

Hiding in Plain Sight

People have spent more than 200 years systematically describing and naming the plants and animals around us. One could be forgiven for thinking that process is winding down. The truth is almost the opposite: we're still finding about 10,000 new species of animals every year.

To be fair, many of these new species are insects. We've described a million insect species, but there may be six to ten million more. But we're also discovering bigger animals: lizards, frogs, birds and even whales.

Chances are, there are unknown species right here on St. Martin. We've already become the home of three "new" lizard species in the 21st century. None of them were unknown exactly, but none of them were considered distinct species until recently. The Bearded Anole, for example, was considered a subspecies

of a lizard called Watts' Anole until DNA analysis determined that they had more differences than we originally thought.

In some cases, two species look so similar it is almost impossible to tell them apart. These are called cryptic species. Genetic analysis can be used to distinguish two species hiding in one form. In other cases, two identical animals may have different parasites—parasites that can tell them apart even when we cannot.

Many of the new species we will find on St. Martin will be small, plain animals: beetles that live under rocks, tiny moths and little spiders. The process of identifying and describing them will take a long time. Much of the work will be done under the microscope and in DNA sequencers.

There are some colorful and engaging bugs that we are still uncertain about. The soapberry bug of St. Martin remains undescribed, although specimens have been delivered to a group of scientists for study. Our stick insect may be a new species as well.

Does it matter if we identify all the tiny creatures that live on St. Martin? In some ways, it could be more an issue of philosophy than practicality. Who would we be if we lost the desire to learn more about the world around us? On the other hand, perhaps this seemingly obscure knowledge does have a future use. Could we someday bring life to a distant planet without understanding it first here on earth?

This book was created by the Les Fruits de Mer association to share some of the amazing nature stories that are also featured at Amuseum Naturalis, a free museum about St. Martin nature, history and culture. Many of these stories were originally published in *The Daily Herald*'s Weekender section.