

St Eustatius Arachnid Project



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(Assistant National Park Ranger, July 2010 – January 2011)



1. General Information

1.1. Introduction.

Globally, arachnids are considered to be one of the less documented classes of animals on our planet. Worldwide distribution comprises all land environments except polar extremes. There are currently 40,700 described species of spider, considered to represent only one fifth of the true total (Plantnick, 2009). On a faunistic level, arachnids in some regions are considered to be reasonably well known. However this is not the case for the Caribbean with only 8 islands having species level surveys for spiders. These include Cuba (Alayón, 1995), Barbados (Bryant, 1923; Alayón & Horrocks, 2004), St. Vincent & the Grenadines (Simon, 1894; de Silva, Horrocks & Alayón, 2006), Anguilla (Sewlal & Starr, 2006), Nevis (Sewlal & Starr, 2007), St. Kitts (Sewlal, 2008) and Grenada (Sewlal, 2009a), and a family level list for Trinidad (Cutler, 2005, Sewlal & Cutler, 2003, Sewlal & Alayón, 2007, Sewlal, 2009b). Other orders within the class Arachnid appear to be even less documented.

The St Eustatius National Parks Foundation (STENAPA) is actively protecting the national parks and protected areas of the island. In order to do this it is vital to provide biological inventories which represent the biodiversity of the park and therefore provide a basis on what should be protected. A lack of knowledge of the arachnid taxa has lead to a preliminary survey which has resulted in discovering 7 arachnid orders present on the island and twenty families of spider.

1.2. Aim

The fundamental aim of the project was to survey the arachnid fauna of St Eustatius and collect and document a substantial part of the total species present in a broad range of habitats. Therefore,

- A greater knowledge of the biodiversity of the island will be achieved
- A further contribution to the present data of arachnids, on both local and global scales will be achieved.

In order to accomplish these goals a wide variety of habitats will be surveyed for the presence of arachnids. The aim is to sample as many different locations as possible to determine species richness in both natural and man made habitats.

1.3. Study Area.

St Eustatius lies in the northern Leeward Islands portion of the West Indies, southeast of the Virgin Islands and immediately to the northwest of Saint Kitts and Nevis, at 17°30'N 62°58'W / 17.5°N 62.967°W. In geographical terms the island is a saddle shape, with the 602 meter high volcano named The Quill to the southeast and smaller collection of hills to the northeast, known as the Northern Hills.

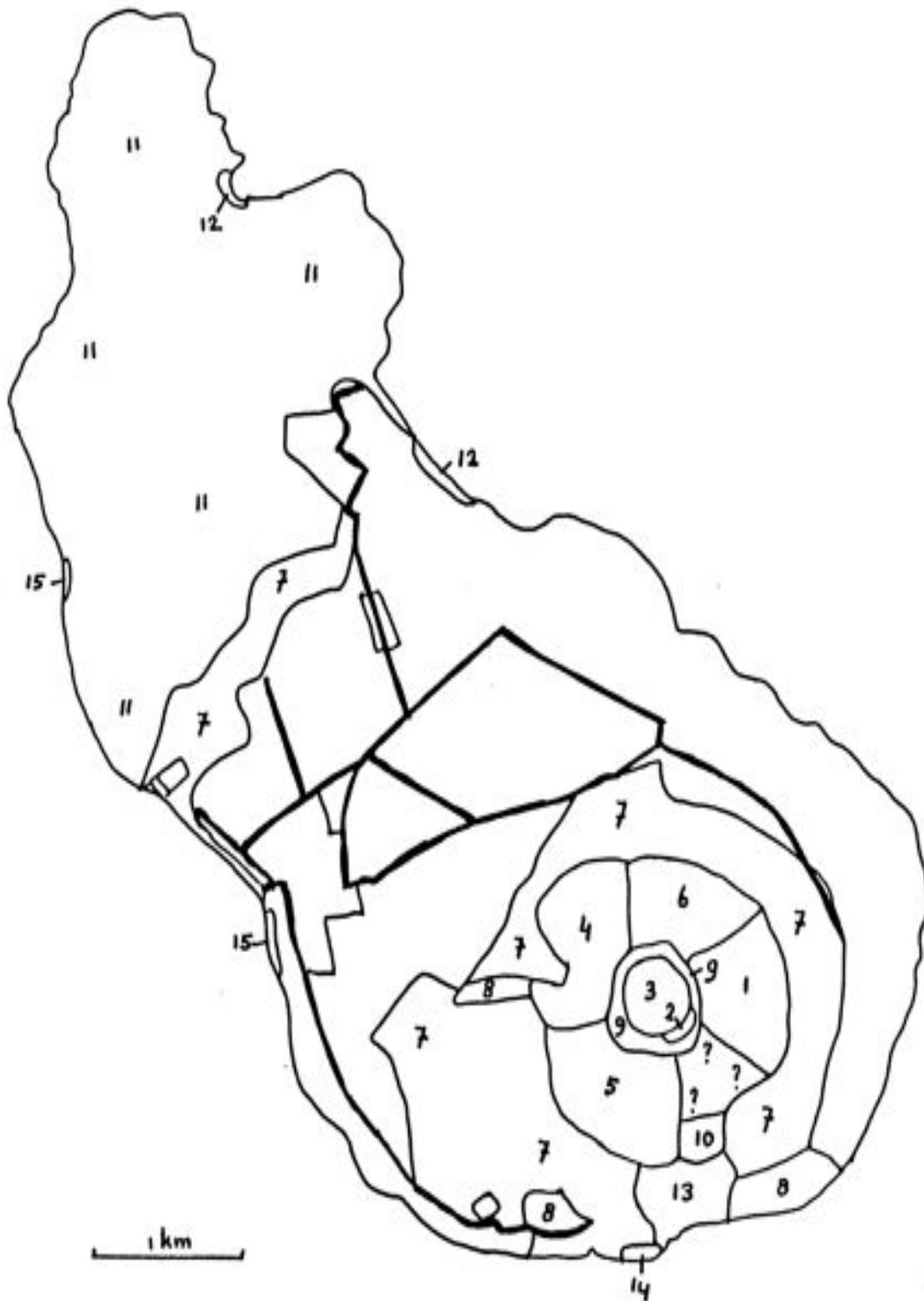
1.3.1 Vegetation

The rich biodiversity of St Eustatius is reflected in the fifteen different vegetation zones that are present. These harbour a large variety of different habitats from individual plants to complex floristic biomes, which all offer unique environments for arachnids.

Vegetation Zones of St Eustatius.

1. Dry Evergreen Forest – Located on the outer rim of the crater, above 350 meters.
2. Pioneer Forest – present in a few localised areas of the crater in clearings left by fallen trees.
3. Evergreen Seasonal Forest. – found within the crater of the Quill from 273 meters above sea level to the crater rim residing at 602 meters. This rich forest type is considered to be the closest in form to rainforest with three layers of trees, a bush layer and a herb layer present.
4. Semi Evergreen Seasonal Forest – covering the north western slope of the Quill and considered to be one of the best examples in the Windward Islands of the Dutch Caribbean.
5. Deciduous Seasonal Forest – at the same height as the semi evergreen seasonal forest, although on the southern and south western slopes.
6. Montane Thickets – located between 250 -350 meters above sea level on the windward side of the Quill, and generally containing only one tree layer.
7. Thorny Woodland – residing below 250 meters altitude of the Quill only thorny woodland is found.
8. Undetermined. Resembles less dense Thorny woodland, due to land use and topography.
9. Elfin Forest – situated at the southeast part of the crater, Elfin Forest covers a small part (roughly four hectares) of the highest part of the crater rim
10. Cliff – Little vegetation present, mainly limited isolated pockets of bush and herb layers.
11. The vegetation of the Northern Hills is mainly classed as Thorny woodland although it has isolated pockets of dry evergreen forest.
12. Windward coastal areas.
13. White Wall. Limestone cliff formation with limited vegetation.
14. Southern coastal areas
15. Leeward coastal areas

Figure 1. Vegetation zones of St Eustatius.

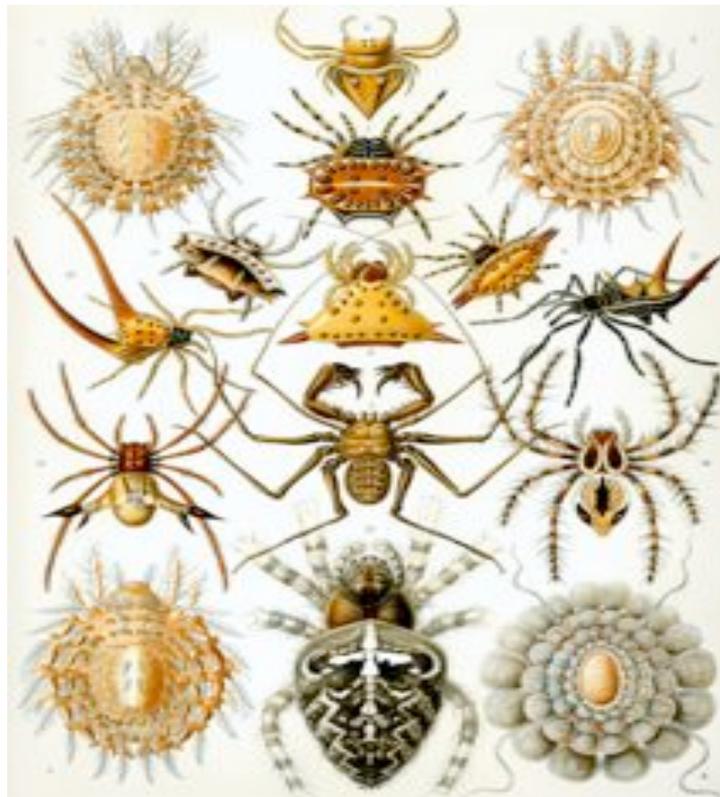


2. Arachnids

Arachnids are a class that falls under the Subphylum Chelicerata, resting within the Phylum Arthropoda (Arthropods). This is estimated to contain 1,170,000 described species and account for 80% of all known living animal species (Thanukos, 2008). All adult arachnids have eight jointed legs, making them easily identifiable from insects that have six. Besides the four pairs of legs, arachnids also have two more pairs of appendages which have been adapted for feeding, defence and sensory perception. The first pair, the chelicerae, have been adapted for feeding and defence and the second pair, the pedipalps, are used for feeding, defence and /or reproduction. Like all arthropods, arachnids have an exoskeleton.

2.1. Scientific Classification - Orders

Figure 2. *Ernst Haeckel's (1834–1919) diagram of arachnid orders.*



Extant orders of arachnid:

- | | |
|---------------|--------------------|
| -Acarina | -Pseudoscorpionida |
| -Amblypygi | -Schizomida |
| -Araneae | -Scorpiones |
| -Opiliones | -Solifugae |
| -Thelyphonida | -Palpigradi |

2.1.1. Araneae: - Spiders

Araneae has to be the most familiar and most numerous when only taking into account the described species and the typical creature that comes to mind when discussing arachnids. All spiders produce silk, which is in turn used for the building of webs to catch their prey, although some hunt freely. This silk, a thin but extremely strong strand of protein, is extruded from the spinnerets commonly found on the abdomen. This is also used to construct egg sacs, aid climbing and strengthen burrows. All families within this order, except Uloboridae and Holarachaeidae, can inject venom to protect themselves and kill their prey. This venom is one of the major catalysts in the feared reputation that spiders have throughout the world; however only 200 species have bites that cause serious health issues to humans (Diaz, 2004). However many more species will cause a painful bite with no lasting effects.

2.1.2. Amblypygi: - also known as Tailless Whip Scorpions or Whip Spiders.

Their name, “whip” derives from the elongated front legs that have modified into sensory organs. These can extend to several times their body length, and with no venom or silk glands they rely on their powerful pedipalps to immobilise their prey after locating it with the “whips”. This order contains species such as *Phrynus marginemaculatus* and *Damon diadema*, which are considered to be one of very few that display signs of social behaviour. Females have been documented by Cornell University comforting their young by rubbing them with their “whips”, and when two or more siblings were placed in an unfamiliar environment they would seek each other out, gathering back into a group. (Bryner, 2007)

2.1.3. Thelyphonidae – also known as ‘Whip Scorpions’.

These have similar characteristics to the previous order with the addition of a whip-like tail extending from their abdomen. Like amblypygids, their pedipalps are modified as hunting weapons to grab and hold their prey. Thelyphonidae lack venom-producing glands, although they have the ability to eject a foul-smelling fluid when threatened.

2.2.4 Opiliones – also known as ‘Daddy Long-legs’

Known for their exceptionally long legs, hence the name, and often mistaken for a spider, the ‘daddy long-legs’ is in fact its own order. The most significant difference is that their bodies look like small spheres, with no visible partition between the cephalothorax and abdomen. Unlike most arachnids which are exclusively predatory, Opiliones also scavenge or feed on plants and fungi.

2.2.5. Scorpiones: - Scorpions

The clear characterisation of their tail makes the scorpion easily identifiable from other arachnids. This metasoma (tail) contains six segments, the last of which containing the anus, the telson (sting), a pair of venom glands and the venom-injecting barb. All scorpion pedipalps have evolved into pincers which are used to restrain and tear apart their prey. All species follow the same basic body plan. All locomotive appendages are attached to the

prosoma (frontal) section. The underside of the prosoma harbours a pair of specialized sensory organs which are used to detect vibrations.

2.2.6. Pseudoscorpionida - Psuedoscorpions

Pseudoscorpions are arachnids belonging to the order Pseudoscorpionida, also known as Pseudoscorpiones or Chelonethida. They are often referred to as ‘false scorpions’ or ‘book scorpions’, the latter due to certain species living in houses and frequently feeding on booklice along with dust mites, ants and small flies. They usually range in size from 2 to 8mm. The largest known species is *Garypus titanius* of Ascension Island reaching a size of 12mm. (Pennsylvania State University, Department: Entomological Notes: Pseudoscorpion Fact Sheet). The abdomen is made up of 12 segments, protected by plates, and is rounded at the rear rather than extending into a tail and stinger-like scorpions. Hence their name derives from the fact that they look exactly like a scorpion aside from having a tail.

2.2.7. Solifuga – also known as Solfugids or Sun Spiders

Solifuga means "that which runs away from the Sun", owing to their nocturnal habits and the fact that they tend to hide from even artificial light sources. Solfugids are considered to be one of the least studied arachnid orders. They have a segmented abdomen like scorpions and opilionids, but perhaps their most extraordinary trait is their massive and proportionally powerful jaws that resemble a double set of beaks.

2.3. Scientific Classification – Families

Orders of Arachnids can be further broken down into suborders, superfamilies and families. Spiders are currently divided into three suborders with 38 superfamilies and 111 families. Seven of the 111 families are incertae sedis, meaning that their placement into superfamilies is not agreed upon. Each family discovered on the island is discovered further throughout the results section.

3. Methodology

All specimens collected were photographed by Hannah Madden (STENAPA National Park Ranger/Education Officer), either in the field or after collection. These photographs were then sent to Dr. Rolando Teruel at Cuba’s Museum of Natural History for identification. Searches were carried out using simple yet effective techniques, primarily involving searching for specimens within all biomes of the habitat being studied (e.g. under rocks, within soil and leaf litter, under bark, within vegetation and on/in webs). Specimens were captured in jars and released safely to the same location in which they were found. Figure 3 displays the locations of the study areas. Originally, scorpions were search for by peeling back bark and turning rocks during the day. This proved unsuccessful and techniques were modified to night searches with a UV light. This proved to be successful and also gave insight into the diversity of spider species at night compared to day.

3.1. Material Examined

Photographs and certain samples were sent to Dr. Rolando Teruel at Cuba's Museum of Natural History for professional identification. Resources were not available to analyse specimens of spider, however the photographic evidence reliably identified 75% of the spiders photographed. Whenever possible the photo was taken to see the eyes of the spider, which is vital for identification purposes. The exceptions could not be identified due to their extremely small size, meaning they were difficult to photograph clearly, or due to the fact that it was not possible to photograph the eyes.

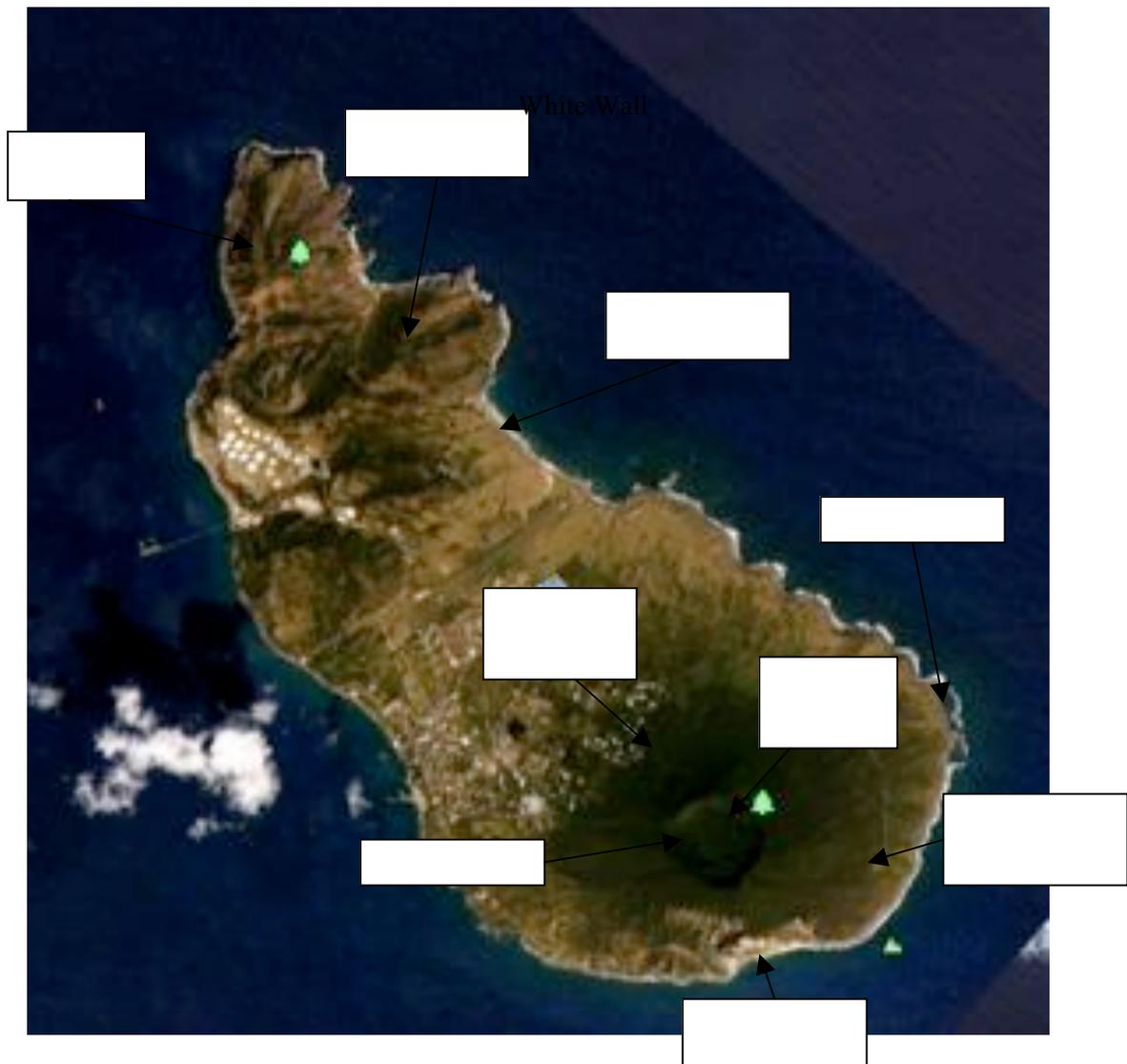
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3.2. Areas studied

A number of different vegetation types (described in 1.3.1.) were studied in order to determine arachnid diversity across a wide range of environments. In general a similar amount of time was spent within each study site, with accessible areas such as the lower slopes of the Quill researched at both day and night.

Botanical Garden

Figure 3. Study Areas



4. Results

4.1. Spiders

The following list is of all the species discovered during the survey. Each one will be discussed further in the following section.

Araneidae:

Cyrtophora citricola
Cyclosa caroli (Hentz, 1850)
Eustala sp.
Neoscona sp.
Eriophora sp
Kapogea sp.

Tetragnathidae

Leucauge venusta (Walckenaer, 1841), ♀.
Leucauge regnyi (Simon, 1897)
Alcimosphenus licinus (Simon, 1895)
Leucauge argyra (Walckenaer, 1842)

Thomisidae

Misumenops bellulus (Banks, 1896)

Scytodidae

Scytodes sp.
Scytodes fusca Walckenaer, 1837

Sparassidae

“*Olios*” sp

Theraphosidae

Tapinauchenius sp. ♀

Pholcidae

Smeringopus sp
Modissimus sp

Miturgidae

Teminius sp.
Gen(*i*) et sp(*i*).

Barychelidae

Gen (?) et sp (?).

Salticidae

Menemerus bivittatus (Duffour, 1831)
Lyssomanes sp. (*portorricensis*?)
Petrunkevitch, 1933)
Corythalia (?) sp.

Filistatidae

Kukulkania hibernalis (Hentz, 1842)

Theridiidae

Latrodectus mactans (Fabricius, 1775)
Argyrodes sp
Anelosimus studiosus (Hentz, 1850)
Latrodectus geometricus (C.L. Koch, 1841)
Faiditus sp

Sicariidae

Loxosceles caribbaea (Gertsch, 1958)

Lycosidae

Hogna sp

Gnaphosidae

Herpyllus sp
Gen(?) et sp. (?).

Ochyroceratidae

Gen(?) et sp. (?);

Anyphaenidae

Hibana sp.

Segestriidae

Ariadna

4.1.1. Araneidae

Cyclosa caroli (Hentz, 1850)
Eustala sp.
Araneidae: Gen(?) et sp(?) ; ♀
Neoscona sp.
Eriophora sp
Kapogea sp.

Sample 1.

Family: Araneidae
Species: *Eustala* ♀
Location: Lower Quill
Vegetation: Thorny Woodland
Description: A number of specimens were found under the bark of trees and noted to have very good camouflage. Some seemed to be darker than others but it is not documented whether they have the ability to change colour. However, others in the Thomisidae family do change colour. After sending the sample for identification it appears that this is possibly a new species within the *Eustala* genus. This cannot be confirmed, however, until specimens are taken and sent off for DNA analysis.
Photo ID: DSC_2915.JPG



Sample 2.

Family: Araneidae
Species: *Cyrtophora citricola* (Female)
Location: Courtar Mountain
Description: This discovery has to be officially confirmed as it has not yet been recorded in the Dutch Caribbean. It is an African invasive species which colonizes new areas very quickly and can reach huge populations in a short time period. Its webs can cover entire trees and bushes and there are reports of them covering power lines for up to 1 kilometre. This is an important discovery if confirmed as it will confirm the presence of this spider in the Dutch Caribbean. So far only isolated pockets of populations of this spider have been discovered, and due to its reproductive nature this suggests it is reasonably new to the island.
Photo ID: Courtar Mountain 034



Sample 3

Family: Araniadae

Species: *Eriophora* sp. ; ♂

Description: Discovered at night in a large web in the lower hills of the Quill. *Eriophora* is a genus of the orb-weaver family and occurs in the Americas, Australasia and Africa. Most species within this genus have once been described as *Araneus* in their descriptive history. This genus presents one of the most obvious cases of sexual dimorphism in the orb weaver family with males being $\frac{1}{4}$ to $\frac{1}{3}$ the size of females.

Location: Lower Quill (Thorny Woodland)

Photo ID: DSC 3254



Sample 5

Family: Araniadae

Species: *Eriophora* sp. ; ♂

Location: Lower Quill (Thorny Woodland)

Photo ID:



Sample 4

Family: Araniadae

Species: *Eriophora* sp. ; ♀

Description: The female *Eriophora* was found in the same area as the male, varying slightly with a duller coloration but of similar size. The females of this species bite more often than males, who prefer to flee or feign their own death.

Location: Lower Quill (Thorny Woodland)

Photo ID: Quill Sept 14 (12)



Sample 6

Family: Araneidae:

Species: *Eustala* sp. (with prey); ♀

Location: Lower Quill (Thorny Woodland)

Photo ID: Quill Sept 14 (26)



Sample 7

Family: Araniidae

Species: *Eustala sp.* ; ♀

Description:

Location: Lower Quill (Thorny Woodland)

Photo ID: DSC_3251



Sample 8

Family: Araniidae

Species: *Eustala sp.*

Location: Lower Quill (Thorny Woodland)

Photo ID: Quill Sept 14 (21)



Sample 9

Family: Araniidae

Species: *Eustala*

Location: Lower Quill (Thorny Woodland)

Photo ID: Quill Sept 14 (15)



Sample 10

Family: Araniidae

Species: *Eustala sp.* ; ♀

Location: Courtar Mountain (Montane Thickets)

Photo ID: DSC_3261



Sample 11.

Family: Araneidae

Species: *Eustala*

Location: Lower Quill (Thorny Woodland)

Photo ID:



Sample 12.

Family: Araneidae

Species: *Eustala sp.* (juvenile)

Location: Quill Crater (Seasonal Evergreen Forest)

Photo ID: 1590



Sample 13

Family: Araneidae

Species: *Eustala*

Location: Lower Quill (Thorny Woodland)

Photo ID: Quill Sept 14 (16)



Sample 14.

Family: Araniidae

Species: *Eustala*

Location: Lower Quill (Thorny Woodland)

Photo ID: DSC_3246



Sample 15.

Family: Araneidae

Genus: *Eustala*

Species: Unknown

Location: Courtar Mountain (Montain Thickets)

Description: Female. Large spider (about the size of an adult *Argiope argentata*) in a large web. First discovery of this spider. Possibly a *Neoscona crucifera*, *Neoscona* meaning spotted orb weaver. This is a nocturnal spider which constructs its web at night and removes it at sunrise or by being fooled by the full moon. A bridge with a few supporting webs is left for the construction the next night. During the day the spider takes refuge in leaves or under bark.

Photo ID: DSC_3223



Sample 16.

Family: Araneidae

Genus: *Eustala* ♀

Species:

Location: Courtar Mountain (Montane Thickets)

Description: A defensive pose was taken with the specimen remaining motionless while being photographed.

Photo ID: DSC_3219



Sample 17

Family: Apparently Araneidae

Species: Unknown

Location: Botanical Garden.

Description: sub-adult male

Photo ID: Bot Gdn 107



Sample 18.

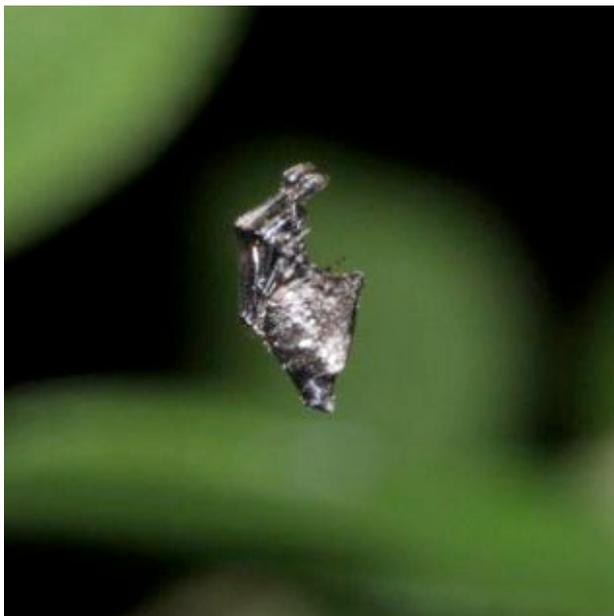
Family: Araniidae

Species: *Argyrodes* sp. ; ♂

Description: Spiders of the genus *Argyrodes* are more commonly known as the Dewdrop spider. They occur worldwide and are kleptoparasites, meaning they steal other spiders' prey, since they invade and hide in their webs even though they can spin their own (Guarisco 1999). In certain cases this relationship can be mutual since the dewdrop spider can feed on insects too small for the host, whereas in more extreme cases the host may be preyed upon.

Location: Lower Quill

Photo ID: DSC_3257



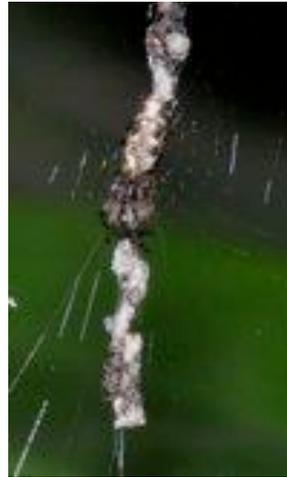
Sample 19.

Family: Araneidae

Species: *Cyclosa caroli* (Hentz, 1850); ♀

Location: Lower Quill

Photo ID: DSC-0675



4.1.2. Tetragnathidae

Leucauge venusta (Walckenaer, 1841), ♀.

Leucauge regnyi (Simon, 1897)

Alcimosphenus licinus (Simon, 1895)

Leucauge argyra (Walckenaer, 1842)

The orb weaving spider, family Tetragnathidae, includes about 1000 described species in 51 genera (Platnick, 2009), at their most diverse in tropic regions. Many species within the family are associated with the world's most delicate ecosystems of wetlands and rivers. Little is known about the species *Leucauge*, although the family itself holds some other very interesting and dynamic species. The genus *Tetragnatha*, for example, provides a solid example of

dispersion abilities and ecological plasticity. Within the genus are more than 340 described species and a distribution range that spans from the Arctic to the most remote oceanic islands. “*Tetragnatha* is one of the champions of the animal kingdom”. (Dimitar Dimitrov and Gustavo Hormiga, 2009).

Sample 20.

Family: Tetragnathidae

Species: *Leucauge venusta* (Walckenaer, 1841)

Description: ♀. Although abundant in the Greater Antilles, initial feedback has suggested that this is a first record for the Dutch Caribbean. This is clearly another important species to be studied in more detail. Abundant throughout the Quill, they have also been sighted on Gilboa Hill. Upon close inspection they are vibrant and colourful and one of the most distinctive spiders on the island. Their common name is the Orchard spider.

Location: Quill Crater (Seasonal Evergreen Forest)

Photo ID: DSC- 0026



Sample 21

Family: Tetragnathidae

Species: *Luecauge*

Description: The island holds a substantial population of a number of species from the genus *Luecauge* which are at their most abundant both within the crater of the

Quill and along the rim. Their webs are often complex, with as many as six or seven individual interlocking webs. The species seems to thrive between the large volcanic boulders scattered around the rim of the crater. Their presence was obvious throughout a four-hour hike around the rim, and they seem to be by far the most abundant species in the higher grounds around Mazinga Peak (602 meters).

Location: Mazinga Peak (Elifin Forest)

Photo ID: Bot Gdn 024



Sample 22

Family: Tetragnathidae

Species: *Alcimosphenus licinus* (Simon, 1895); ♀

Description: This spider imitates a beetle, positioning its web close to the ground, in close proximity to the locally named ‘love bugs’ which are common throughout the Quill.

Location: Quill Rim (Elfin Forest)

Photo ID: DSC-0198



Sample 23.

Family: Tetragnathidae
Species: *Leucauge regnyi* (Simon, 1897);
♀ juvenile
Location: Quill Crater
Photo ID: DSC-0680



Sample 24.

Family: Tetragnathidae:
Species: *Leucauge argyra* (Walckenaer, 1842) ♀
Description: Another common species from the *Leucauge* genus which seem to thrive throughout the island.
Photo ID: DSC-0631



4.1.3. Theraphosidae

Sample 25.

Family: Theraphosidae
Species: *Tapinauchenius sp.* ♀
Description: Photo identification feedback identified this specimen to be a possible new species within the *Tapinauchenius* genus. It is not an everyday occurrence to spot a tarantula on the island, but they do leave clues which suggest their presence, especially in the Quill.
Photo ID: 0841



Approximately 900 species have been identified under the family Theraphosidae, the main family within which the famous Tarantulas are located. Using ambush as their main hunting tool, the tarantulas of St. Eustatius reside in burrows, waiting patiently for prey to pass, upon which they pounce. The biggest species are known to kill animals as large as lizards and birds, however most prey on insects and other arthropods. The name Tarantula derives from the town of Taranto in Italy and was first used to describe the unnamed European wolf spider. This was then borrowed by Europeans to describe Theraphosidae in newly explored regions of the world. Tarantulas are renowned for their fearsome reputation; however they are not immune from predators themselves. One of the most sophisticated of these, and commonly seen in the forests of the Quill, is the *Pepsis ruficornis* wasp, termed as a 'tarantula hawk' as they are parasitoids of tarantulas. These unique insects rely entirely on the tarantula for

their existence. Upon locating a spider the wasp must sting it in the abdomen, paralyzing it and then depositing an egg. The egg hatches and then feasts on spider's non essential parts, as the tarantula is simply paralyzed throughout this process (Piper, R 2007). *Pepsis* wasps are often seen throughout the Quill, suggesting a healthy population of Tarantulas to harbour their young.

While most species are covered by distinctive hairs, some of these have developed in a defensive mechanism. A dense covering of irritating hairs, known as urticating hairs on the opisthosoma, are used as protection from enemies (Cooke, J.A.L., et al 1972). These hairs can be shot at a predator by the spider 'flicking' them with their back legs. Species which hold this defensive ability have only been discovered in the 'new world', and most commonly in Central and Southern America.

Photo ID: 0845



4.1.4. Scytodidae

Sample 26.

Family: Scytodidae

Species: *Scytodes fusca* (Walckenaer, 1837); ♀

Location: Courtar Mountain (Montane Thickets)

Description: - Eight *Scytodes fusca* individuals were found under the bark of two fallen trees in approximately a 10 meter square area. All individuals were directly protecting their egg sack and remained motionless when exposed. Size was approximately 15mm.

Commonly known as the 'spitting spider', Scytodidae subdue their prey by "entangling them, at a distance, in a spitted mixture of silk, glue, and venom that immobilizes and may also kill them" (Suter, R.B and Stratton G.E.) This web is clearly visible in the photograph below and was at each location of all specimens found.

Subduing prey or deterring predators by spitting upon them apparently occurs exclusively in spiders from the families Scytodidae and Oxyopidae. In the latter group, green lynx spiders, *Peucetia viridans*, sometimes spray a liquid from their fangs in self-defense or when protecting eggs (Fink 1984); this behaviour has not been reported in other oxyopids.

Photo ID: Courtar mountain 015



Sample 27.

Family: Scytodidae

Species: *Scytodes sp.* ♀

Description: Common throughout the island and seemingly most abundant in the Northern Hills. Their webs start with a narrow entrance which extends into a funnel up to 6 cm long, usually in dead wood.

Location: Gilboa Hill (Thorny Woodland)

Photo ID: 0104



Sample 28.

Family: Scytodidae

Species: *Scytodes sp.* ♀

Description: Commonly found within the rock walls which cross the Northern Hills.

Location: Gilboa Hill (Thorny Woodland)

Photo ID: 0699



4.1.5. Sicariidae

Sample 29.

Family: Sicariidae:

Species: *Loxosceles caribbaea* (Gertsch) 1958; ♀

Description: The family Sicariidae contains two genera (*Loxosceles* and *Sicarius*) and 122 species. Species within the family are known for their necrotic venom, such as the brown recluse spider which is responsible for a very painful bite. The venom attacks tissue and can lead to large open sores, which in extreme cases may require a skin graft. The *Loxosceles* genus, also known as recluse or violin spiders, is reasonably common in the warmer climates of the world.

Location: Gilboa Hill (Thorny Woodland)

Photo ID: -032



4.1.6. Sparassidae

Sample 30

Family: Sparassidae

Species: *Olios* sp. ♀

Description. - Commonly known as the Banana spider, the *Olios* is very common throughout the island, often found in long grass and between leaves. It is nocturnal and can often be found in houses. Sparassidae is the eighth largest arachnid family worldwide with 922 species. The Brazilian Wandering Spider, also belonging to this family, is now widely considered to be the most deadly spider in the world.

Photo ID: Bot Gdn 096



Sample 31

Family: Sparassidae

Species: *Olios* sp.

Description: Another example of the 'Banana Spider' although a clear difference in the coloration of legs and abdomen to sample 4.



4.1.7. Philodromidae,

Sample 32.

Family: Philodromidae

Species: *Olios*

Location: Lower Quill (Thorny Woodland)

Description: Found resting under loose bark on dead wood, this was a very docile specimen which made no effort to move even when moved to get a better photograph. It was a large specimen approximately 6-7cm across (estimate as its legs were folded). The distinctive red/orange colour to its chelicerae was very interesting and the only one we have seen like this. The family Philodromidae is commonly known as 'philodromid crab spiders'.

Photo ID: DSC_2929.JPG.



4.1.8. Theridiidae

Latrodectus mactans (Fabricius, 1775)

Argyrodes sp

Anelosimus studiosus (Hentz, 1850)

Latrodectus geometricus (C.L. Koch, 1841)

Faiditus sp

Sample 33

Family: Theridiidae

Species: Unknown

Description: Theridiidae are described by Plantick as "three-dimensional space web builders found throughout the world."

Commonly known as tangle-web spiders, they belong to a large family with over 2200 species in over 100 genera. Many theridiids trap ants and other ground-dwelling insects with elastic silk trap lines leading to the soil surface from above. This is just one example of the huge range of webs that the tangle-web spiders have.

Photo ID: Bot Gdn 103



Sample 34.

Family: Theridiidae

Species: *Latrodectus mactans* (Fabricius, 1775) ♀

Description: *Latrodectus* is the genus containing the formidable widow spider, relating this specimen to the famous black widow. It is not as common on the island as the brown widow pictured opposite.

Location: Boven



Sample 35

Family: Theridiidae

Species: *Latrodectus geometricus* (Brown Widow) ♀

Description: - Discovered inside the tool shed of the Botanical Garden.

The Brown Widow has a fondness for buildings and will often construct its webs near our presence. Related to the Black Widow, one of the more feared spiders in the world, the Brown Widow shares some similar characteristics. They are generally non-aggressive and will not defend their webs, choosing flight rather than fight wherever possible. Luckily for us, since according to Dr. G.B. Edwards, an arachnologist with the Florida State Collection of Arthropods, the Brown Widow's venom is twice as potent as the Black Widow's. However, they do not inject as much venom and are generally very timid. Another way to detect its presence is to identify its egg sack which is unique and distinctive to the genus. Unlike other Widows which have a smooth tanned egg sack, that of the Brown Widow is covered with pointed projections and is described by Santana (2009) as "fluffy looking".

Photo ID: Bot Gdn 038



Egg Sack

Sample 36

Family: Theridiidae

Species: *Faiditus* sp.

Description: A small spider which at first glance was thought to be another 'dewdrop' spider as it took a similar position.

Location: Botanical Garden

Photo ID: 031



Sample 37

Family: Theridiidae

Species: *Anelosimus studiosus* (Hentz, 1850) ♀

Location: Botanical Garden

Photo ID: 053



4.1.9. Lycosidae

Sample 38

Family: Lycosidae

Species: Unknown

Description: Nocturnal and very common to see from the reflection of its eyes in a flashlight. All sightings were in short grass, and on a given night there could be up to 20 in a 10m square area of the lawn.

The name Lycosidae derives from the Greek word "lycosa" meaning wolf, hence their common name 'wolf spider'. They are quite easy to identify due to two distinctive features. First, they have eight dark, uneven eyes in three rows, and second their abdomen is as long as it is wide. They also have three microscopic claws on the end of their legs. The images below illustrate their distinctive eye layout.



Wolf spiders live on the ground and hunt at night, with their dark coloration providing camouflage. A female will spin a spherical egg sack and attach it to her spinnerets, dragging it around until the young emerge. They then clamber onto her back and are carried until they are ready to survive independently.

Photo ID: Bot Gdn 070.



4.1.10. Filistatidae

Sample 39.

Family: Filistatidae

Species: *Kukulkania hibernalis* (Hentz, 1842) ♀

Description: The Filistatidae family, known as Crevice Weaver spiders, construct funnel or tube webs. The family contains 17 genera and more than 100 described species worldwide. This species is one of the more common in the Americas and is known as the Southern House Spider. Its name derives from the Meso-American god Kukulcan. Females are dark coloured (up to 20mm) and males are smaller (10mm) with a lighter brown colouration. Males also have a dark streak down their dorsal carapace, often causing them to be mistaken for the brown recluse spider.

Photo ID: IMG-1855



4.1.11. Thomisidae

Sample 40

Family: Thomisidae

Species: *Misumenops bellulus* (Banks, 1896), ♀

Description: The Thomisidae family are known as Crab spiders due to similarities in their look and movement. The two front pairs of legs are generally angled outward and are often flattened and angular. They move from side to side and backwards and are hunters and ambushers which do not

construct webs. Some species will sit patiently amongst flowers and fruits, waiting to pounce on visiting insects. In certain cases such as the *Misumena vatia*, the species has developed the ability to change colour to blend in with its surroundings, making it virtually impossible to detect.

Location: Princess Gardens (residential area)

Photo ID: DSC-0071



4.1.12 Pholcidae

Species: *Smeringopus* sp
Modissimus (?) sp

Sample 41

Family: Pholcidae

Species: *Modissimus* sp; Juvenile

Description: Pholcids have a worldwide distribution and are often confused with Daddy Long Legs (harvestmen). They hang inverted in irregular webs which are usually located in dark places such as caves and under rocks. Their webs don't have any adhesive qualities; prey simply get tangled in their irregular web designs.

Location: Courtar Mountain (Montane Thickets)

Photo ID: 031 (Pictured below)



Sample 42.

Family: Pholcidae

Species: *Smeringopus sp.*

Description: This female *Smeringopus* is carrying her egg sack which is held together by a few strands of silk. With similar web dynamics to the previous sample, the spider will hang inverted waiting for prey. If disturbed in a threatened manner this species has been noted to vibrate so vigorously it becomes a blur to the naked eye (Koh, J, 2000).

Location: Northern Hills

Photo ID: DSC-0888



4.1.13. Miturgidae

Species: *Teminius sp.*
Gen(¿) et sp(¿).

Sample 43.

Family: Miturgidae

Species: *Teminius sp.* ♀

Description: The family Miturgidae contains 30 genera and nearly 400 species worldwide. This genus is noted for its thick Velcro-like scopula on the underside of its legs which gives it the ability to walk up panes of glass. Its distribution is mainly restricted to the new world tropics.

Photo ID: 1198



Sample 44.

Family: Miturgidae:

Species: *Teminius sp.* juvenile

Description:

Photo ID: 028:



4.1.14. Migalomorphae

Sample 45

Family: Migalomorphae

Species: Undetermined

Location: Gilboa Hill

Photo ID: 04059



4.1.16 Barychelidae

Sample 47.

Family: Barychelidae

Species: Gen (?) et sp (?)

Description: The Barychelidae family (Trapdoor spider) contains over 300 species in 44 genera. They build trapdoor burrows in order to trap their prey, and some species have evolved to avoid drowning by either plugging their nests or trapping air bubbles on the tiny hairs on their body to create an air pocket in which they can breathe. Their chelicerae have also developed to rake and compact the walls of their burrows (Valerio, C.E. 1986).

Photo ID: 1455:



4.1.15. Gnaphosidae

Sample 46

Family: Gnaphosidae

Species: Undetermined

Description: This is the seventh largest known family with nearly 200 species in over 100 genera.

Location: Gilboa Hill



Sample 48

Family: Gnaphosidae

Species: *Herpyllus* (?) sp

Location: Botanical Garden



Sample 49

Family: Gnaphosidae
Species: Undetermined
Location: Gilboa Hill



4.1.17 Oecobiidae

Sample 51
Family:
Species: *Oecobius* sp. Male
Description:
Location: Gilboa Hill
Photo ID: 04054



4.1.18 Ochyroceratidae

Sample 50

Family: Ochyroceratidae
Species: Undetermined
Description: Discovered in decomposing leaf litter. Unfortunately it was not possible to identify as it was too small to photograph the eyes clearly. Its body was a metallic blue colour which instantly stood out when hit with natural light. Ochyroceratidae are common inhabitants of the tropical forest litter and caves in the Caribbean as well as Southern Africa and Asia. They build irregular sheet-like webs within leaf litter and under rocks and are known to carry their egg sacks in their chelicerae until they hatch.
Location: Courtar Mountain
Photo ID: 044



4.1.19 Clubionoidae

Sample 52

Family: Clubionoidae
Species: Undetermined
Location: Gilboa Hill
Photo ID: 04075



4.1.20. Oxyopidae

Sample 53

Species: *Peucetia viridans* (Hentz 1832)
Spiderlings
Location: Gilboa Hill



4.2. Scorpions

4.2.1. Buthidae, *Centruroides barbudensis*

Family: Buthidae

Species: *Centruroides barbudensis*

Description: The technique used to locate these specimens was simple but very effective. After searching during the day with little success it was decided to explore at night with a UV light. This proved successful almost immediately, with seven specimens (pictured opposite) discovered on the first night expedition. The majority were discovered on the branches of trees and one was found in the leaf litter. *Centruroides* are found throughout southern USA, Central America, Northern South America and the Caribbean. They contain several highly venomous species and fatalities have been known to occur. The picture below displays the scorpion glowing under the UV light.

Photo ID: Courtar Mountain 013



Photo ID: DSC_3230



4.2.2 Buthidae, *Isometrus maculatus*

Family: Buthidae

Species: *Isometrus maculatus*

Isometrus maculatus has managed to become dispersed worldwide due to its habit of hitching a ride on human produces. Originally from Asia, it is now found on many Caribbean islands as well as the rest of the Americas. This was by far the least common of three scorpion species found on the island and was only discovered on a couple of occasions in and around human structures. According to Dr. Rolando Teruel, most of the records for this species were produced before 1950 and numbers have dramatically decreased or even become extinct in some countries. The last official sighting on Statia of this species was in 1942 by A.C.J Burgers with the collection of one adult male and female pair “near Oranjestad” described.



4.2.3. Oiclus

Family: Oiclus

Species: *Oiclus* sp.

Description: So far specimens of this species have only been discovered in and around the Quill, with a distribution stretching from the lower slopes to inside the crater. Although the technique used to locate specimens was the same as that described for *Centruroides barbudensis*, capturing specimens proved somewhat more difficult. This was due to two factors: Firstly, *Oiclus* reside in burrows at ground level, waiting at the entrance for prey to pass, therefore giving them a quick escape route. Secondly, they can see the UV light (unlike *C. barbudensis*), which caused them to retreat into their burrow and made it difficult to make a capture. In general, adult specimens were located in and around small burrows on the hiking trails, whereas juveniles were mostly located under rocks.



Oiclus sp. (Collected by Alejandro Sanchez in the Quill, January 2010)

4.3. Pseudoscorpiones (False Scorpion)

Family: Atemidae

Species: *Paratemnoides*

Description: Discovered under the bark of a fallen tree. At first glance it was assumed to be a juvenile scorpion, however it was later discovered to be a Pseudoscorpion, and the first discovery of this species on the island. The adult displayed some distinctive characteristics, most notably its aggressive behaviour, using its pincers defensively numerous times and quickly moving from hole to hole. This could be a trait found throughout the species or because it was with its young (also pictured). Estimated body size was 5mm.



Pseudoscorpions are arachnids belonging to the order Pseudoscorpionida, also known as Pseudoscorpiones or Chelonethida. They are often referred to as false scorpions or book scorpions, the latter due to certain species living in houses and frequently feeding on booklice along with dust mites, ants and small flies.

They usually range from two to eight mm. The largest known species is *Garypus titanius* of Ascension Island reaching a size of 12mm (Pennsylvania State University, Department: Entomological Notes: Pseudoscorpion Fact Sheet). The abdomen is made up of 12 segments, protected by plates, and is rounded at the rear rather than extending into a tail and stinger like scorpions. Hence, their name derives from the fact that they look exactly like a scorpion aside from having a tail. They vary in colour from yellow/tan to dark brown, with their claws often a contrasting colour. They may have two, four or no eyes. Each leg is made up of five to seven segments, the family and genus being determined by the number of fused segments on each one of their eight legs. They have two very long pedipalps (pincers) which strongly resemble that of a scorpion. The pedipalps consist of one immobile and one mobile 'finger'. The mobile finger is operated by an adductor muscle, and a venom gland and duct are usually located in it. This poison immobilizes its prey, after which a mildly corrosive liquid is poured onto the prey. The pseudoscorpion then ingests the liquefied remains. Pseudoscorpions spin silk from a gland in their jaws which make cocoons for mating, moulting and waiting out cold weather.

More than 3,300 species of pseudoscorpions have been discovered in 430 genera. The most dense and diverse populations are found in the tropics and subtropics, although they range throughout the world and certain specimens have been recorded in temperate to cold regions such as the Rocky Mountains. Species have been found under tree bark, in leaf litter, under rocks, in soil, in caves and even in the intertidal zones of coastlines. The oldest known fossilised pseudoscorpion dates back to the Devonian period 380 million years ago and has all the modern traits of today's pseudoscorpions, indicating that the order evolved early on in the evolution of land animal.

4.4. Amblypygi (Tailless Whip Scorpion Spider)

Family: Phrynidae

Species: *Phrynus goesii*

Description: The tailless whip scorpion or whip spider (*Phrynus goesii*) is a nocturnal arachnid that may be found beneath stones or logs during the day. Despite their appearance, they are harmless and have no venom. They feed on insects and other small invertebrates. They are very common throughout the Quill area and less common in the northern hills, with only two specimens found during the study. Unlike many spiders, they carry their young on their back and their eggs underneath their abdomen. A large specimen may be 45 mm. As in some other arachnid orders, the first pair of legs has been modified to act as sensory organs, while the animal uses the other six legs for walking. The sensory legs are very thin, have numerous sensory receptors, and can extend several times the length of body. Typically, the animal holds one of these legs out in front of it as it moves and uses the other to probe the terrain to the side (Barnes, 1982).



A recently-moulted *Phrynus goesii* from the northern hills

4.5. Acari

Species: Unknown

Description: The Acari order encompasses the ticks and mites of the arachnid world. The most common one of these is the ‘dog tick’, which acts as a parasite rather than a predator like most other arachnids. In general there is little known about this order and the relationship of Acari to other arachnids is still up for debate. This is due to some distinctively different characteristics that occur in this order alone. Acari have been described by Walter (2006) as having a truly extraordinary diversity and a fossil history dating back to the Devonian period. This specimen was only 1.5 mm long and proved to be quite a challenge to capture when it was found under a rock in a coastal area of the island.

Location: Corre Corre



4.6 Opiliones.

Species: Unknown.

Description: Opiliones are an order commonly known as Harvestmen, and as of 2006 over 6,400 species have been discovered. Many species are often mistaken for spiders, however the most distinctive difference between the orders is that the two main body sections of Opiliones are broadly joined, making them look oval shaped. This specimen was discovered on the lower slopes of the Quill and was no more than 1.5 mm long. Its striking colours

immediately stood out and the picture clearly depicts how this specimen's front legs have developed differently from the rest and are most likely used for sensory purposes.



4.7. Schizomida

Species: Unknown

Description: This was found on Gilboa Hill in the Northern Hill and to date is the only specimen to be found within this order. Schizomida means 'split' middle, referring to the way the cephalothorax is divided into two separate plates. They generally live in top layers of soil and have no eyes. They use only six legs as their front two legs have developed into sensory organs. They also have well-developed pedipalps (pincers) just behind the sensory legs.



5. Conclusion

Islands hold unique evolutionary histories, and their ecosystems are irreplaceable treasures. A fundamental aim of STENAPA is to better understand the biodiversity of St. Eustatius, and this preliminary study has provided one more piece to the puzzle of its dynamic ecological structure. Island species are also unique in their vulnerability, and of the 724 recorded animal extinctions in the last 400 years, about half were island species (Convention of Biological Diversity). The past century has seen an increase in the pressure asserted on island biodiversity from invasive alien species, habitat change, exploitation and climate change.

This study has provided a great deal of insight into the true diversity of arachnids on the island of St. Eustatius. It is now clear that there are some potentially important species present which require further study in order to clearly see the true dynamics of the arachnids of St. Eustatius.

Seven different orders were discovered, and it is likely that Solifugals are also present due to their general abundance in the Caribbean region. From the seven orders discovered, five of them only contain only one species to date (Section 4.3 – 4.7). There may well be more species within these orders waiting to be found, and certain aspects of a future survey should place emphasis on researching likely environments for these. It is also proposed that more research should be undertaken within the crater of the Quill. Due to time and accessibility restrictions, less time was spent studying this area than intended. Vegetation and climatic conditions are at their greatest variation in this part of the island, therefore producing a different environment and generally a higher biodiversity to the rest of the island. Certain species are evidently common throughout the crater; however some may argue that this environment may hold the most potential for certain species to thrive.

Twenty different families of spiders were found - far more than previously expected. The most important species of these, in terms of requiring additional future research are Sample 1 (*Araneidae*, *Eustala* sp) and Sample 25 (*Theraphosidae*, *Tapinauchenius* sp). Both of these have been identified to genus level, however initial feedback suggests that it is possible that they are a new species within the genus. It is, however, early days and further samples will need to be taken to confirm these theories. *Leucauge venusta* has been identified as a first record for the Dutch Caribbean - another important factor resulting from this research. Due to its abundance on the island, especially in and around the Quill, it would be interesting to discover if it is also present on any neighbouring islands. Sample 2 (*Araneidae*, *Cyrtophora citricola*) is also of significant interest if confirmed. Reports of this species from other areas state that it is highly invasive with a fast reproduction rate. In general, juveniles stay within close proximity to where they hatch and the population can multiply rapidly, overcoming entire structures. Further study into the impact of this species colonizing a small island should be researched in order to gain a greater understanding of the potential impact in ecological terms.

It would be very beneficial to have the assistance of a professional arachnologist in the field and to begin a collection of specimens. This would enable STENAPA to have direct insight into the species discovered and to introduce new techniques and a 'trained eye' to the study.

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