GRASSHOPPERS AND ALLIED INSECTS FROM BONAIRE (ORTHOPTERA, DERMAPTERA, BLATTODEA)

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The orthopteroids of the Caribbean island of Bonaire are poorly studied and only six species of Orthoptera, one species of Dermaptera and four species of Blattodea have been reported in literature. During a survey in 2022-2023 we found respectively 23, two and seven species, raising the number of species known to occur on Bonaire from 11 to 32. Several of these could not yet be identified to the species level and it is likely that some pertain to undescribed species.

INTRODUCTION

The orthopteroid fauna of the Dutch Caribbean island of Bonaire, situated along the southeastern fringe of the Caribbean sea has been poorly studied. For Orthoptera a paper published a century ago (Werner 1925) mentions six Orthoptera species from this island. The only contribution published since is a paper by Roberts (1937) in which the presence of *Rhammatocerus cyanipes* for Bonaire is confirmed. For Dermaptera Brindle (1971) mentions a single species from Bonaire (*Anisolabis maritima*). As far as we know this is the only species mentioned from Bonaire until now. For Blattodea Werner (1925) mentions four species. A list of orthopteroids recorded from Bonaire together with references can be found on the Dutch Caribbean Species Register (Dutch-caribbeanspecies.org).

In the past century the Dutch Caribbean islands have been visited infrequently by Dutch naturalists like the malacologist P. Wagenaar Hummelinck or the entomologist R.H. Cobben. Most of their material is deposited in Naturalis Biodiversity Center in Leiden (the Netherlands) (RMNH). Compared with the other islands of the Dutch Caribbean, like Curaçao or Sint Eustatius, a relatively small amount of material from Bonaire is available in the Naturalis collection. The specimens present in the Naturalis collection have been included under the collected specimens.

Figure 1. *Helicocercus triguttatus* ♀, Tera Barra, 24.IX.2022, RMNH.INS.1571582. All photos of living specimens by Roy Kleukers, unless mentioned otherwise.

The current paper is mainly based on observations and material collected during the Bonaire Estafette Expeditie (BEE) held on Bonaire between October 2022 and March 2023 (Kalkman et al. 2025). Although all teams taking part in this expedition contributed records, most observations were made in the period 20.XI-1.XII.2022 by the first three authors and between 5.ii and 18.II.2023 by the fourth author accompanied by Aglaia Bouma. Most species which are presented in this paper are new to Bonaire (e.g. *Helicocercus trigut-tatus* in fig. 1).

MATERIAL AND METHODS

For most Caelifera sampling was done by hand during daytime, although some (*Danielatettix, Radacris*) were also recorded attracted to light at night (fig. 2). Sampling Ensifera was mostly done by locating singing males during the night but in some cases (*Conocephalus*, Grylloidea) also during the day. Between October 2022 and March 2023 various trapping devices (pan traps, pitfalls, malaise trap, light traps) were deployed by various teams and in some of these Orthoptera were found. The records on which this paper is based are available in a dataset on GBIF (doi.org/10.15468/kmrcv4). All collected material has been deposited in the collection of Naturalis Biodiversity Center in Leiden (the Netherlands) (RMNH).

Figure 2. Several orthopteroids can be found at night, for example during light trapping. Photo Roy Kleukers.

From part of the material the right mid legs were removed and stored in 70 % alcohol at RMNH, to be used for future DNA analysis.

For stacking photographs a Zeiss STEREO Discovery V12 stereomicroscope was used, combined with a Zeiss AxioCam MRC5 microscope camera. The habitus photographs were taken with a NIKON D5600 with a sigma 105 mm macrolens and a Canon EOS 5D digital camera using a Canon zoom lens EF 28-90 mm F 4-5.6 with three combined Hama Close-Up lenses 1, 2 + 4x.

Sound recordings were made by Baudewijn Odé using several devices: Mixpre III with Sennheiser K6-module with ME62 condensor microphone or with Audio-technica BP4029 stereo microphone. Ultrasonic recordings with high sample rates have been made with Batlogger 2 or Echo Meter Touch 2 Pro. The song files were analysed with Wavelab Pro 11.2 software and Wildlife Acoustics Kaleidoscope 5.6.3 software. Oscillograms usually have been prepared after filtering some low frequency noise, to get a clearer picture. Oscillograms have been made with Praat 6.2.22 software.

A selection of sound recordings has been uploaded to Xeno-canto.org, most of these pertain to taxa identified to species level but some refer to taxa identified only to the genus level.

For bioacoustics terminology we follow Baker & Chesmore (2020):
Pulse Indivisible unit of sound, typically corresponding to a single tooth impact.
Syllable Sound produced with a single complete

stridulatory movement (the opening and closing of the elytra in Ensifera, the up and down motion of the femora against the elytra in Acrididae).
Hemisyllable Sound produced with only one of the motion directions of a syllable. There may be two hemisyllables audible within a syllable.
Echeme First-order assemblage of syllables.
Echeme-sequence First-order assemblage of echemes (may include individual syllables that precede or follow the echeme).

Sound spacing of pulses, syllables and echemes in time the terminology is as follows:
Duration The duration of the element itself (in s or ms)
Interval The duration of the silence between the elements (in s or ms)
Period The duration of one element including the interval with the next element
Repetition rate The number of elements repeated per unit of time (per s)

The descriptions in this publication are based on the available sound recordings, thus sometimes based upon the song of one specimen. The recorded songs described here have been made available in full resolution via Xeno-canto.org.

RESULTS

Order Orthoptera
Suborder Caelifera
Family Acrididae
Subfamily Cyrtacanthacridinae

Schistocerca nitens (Thunberg, 1815)
(fig. 3-4)

Recognition Large locust with a straight tubercle between the front legs, rather unicolorous dark grey, the lower front corner of the sideflap of the pronotum being conspicuously pale.
Distribution Widespread across southern parts of North America, Central America and South America between 40°N and 32°S, including Atlantic and many of the Caribbean islands (Dirsh 1974).

Figure 3. *Schistocerca nitens* ♀, Slagbaai, 21.xi.2022, RMNH.INS.1452671.

Bonaire First recorded from Bonaire as *Schistocerca* sp. cf. *columbina* by Werner (1925), without an exact locality. During the BEE in 2022 and 2023 16 records were collected and the species seems to be widespread on the island but is mostly found in singletons (fig. 4).
Habitat Found in open low thorny shrublands with two main species of cacti (*Lemaireocereus griseus* and *Cereus repandus*).
DNA samples RMNH.INS.1452662 (♂), RMNH.INS.1452671 (♀).
Video Tinyurl.com/schistocercanitens.
Used sources Werner 1925 (p. 555), Dirsh 1974 (p. 90-109).

Figure 4. Records of *Schistocerca nitens* on Bonaire. All maps by Vincent Kalkman.

Figure 5. *Schistocerca pallens* ♂, Kralendijk, 20.XI.2022, RMNH.INS.1452665.

Schistocerca pallens (Thunberg, 1815)
(fig. 5-6)

Recognition Large locust with tubercle between the front legs bent backwards, head, pronotum and forewings with conspicuous white stripes.
Distribution Central and South America including many Caribbean islands. First mentioned from Bonaire by Werner (1925). Like *S. nitens* it is mostly found in singletons or very low numbers.
Bonaire The species was mentioned as occurring in Bonaire by Werner (1925). During the BEE in 2022 and 2023 16 records were collected (fig. 6).
Habitat Found in open low thorny shrublands with cacti.

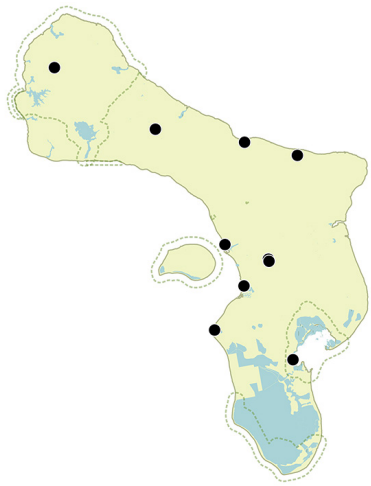


Figure 6. Records of *Schistocerca pallens* on Bonaire.

DNA samples RMNH.INS.157571 (♀), RMNH.INS.1452665 (♂).
Video Tinyurl.com/schistocercapallens.
Used sources Werner 1925 (p. 555), Dirsh 1974 (p. 130-137).

Subfamily Melanoplinae

Radacris minutus (Roberts, 1937)
(fig. 7-10)

Recognition Very small grasshopper, at first glance wingless but both male and female with very tiny lobular wingflaps (fig. 9), dark, side flap of the pronotum in the male with blackish central band bordered by whitish bottom band, first tarsal segment hind legs widened and flattened. Material from Bonaire matches the description by Roberts (1937) and has been compared with material from Curaçao from where the species has been described.
Distribution The species was only known from Curaçao.
Bonaire This species is new to Bonaire. The 20 records show that the species is widespread in the northern half of the island (fig. 10).
Habitat Found in open low thorny shrublands with cacti. Also found to be active during the night.
DNA samples RMNH.INS.1571600 (♀), RMNH.INS.1571599 (♂), RMNH.INS.1452666 (♂), RMNH.INS.1571573 (♂), RMNH.5154981 (♀), RMNH.INS.1571593 (♂).

Figure 7. *Radacris minutus* copula, Tera Barra, 28.XI.2022, RMNH.INS.1571599+600.

Figure 8. *Radacris minutus* ♂, Tera Barra, 20.xi.2022, RMNH.INS.1452566.

Figure 9. *Radacris minutus* ♂, wing flaps, RMNH.INS.1571593. All photos of collection specimens by Luc Willemse and Roy Kleukers.

Figure 10. Records of *Radacris minutus* on Bonaire.

Video Tinyurl.com/radacrisminutus.
Used sources Roberts 1937 (p. 366), Ronderos & Sanchez 1983 (p. 214-215).

Subfamily Gomphocerinae

***Rhammatocerus cyanipes* (Fabricius, 1775)**
(fig. 11-13)

Recognition Medium-sized grasshopper, wings reaching beyond the hind knee, side keels of the pronotum angularly bent inward, colouration variable, wings mottled, hind tibia orange to red, in the apical third bluish
Distribution Known from Panama, the northern part of South America (Ecuador, Colombia, Venezuela, Guinanas) and the ABC islands (Pujol-Luz 1999).
Bonaire This species was mentioned for Bonaire by Werner (1925) (as *Scyllina* sp. near *pratensis* or *gregaria*) and Roberts (1937) (as *Scyllina cyanipes*). During the BEE in 2022 and 2023 53 records were collected. The species was found to be widespread across Bonaire (fig. 13).
Habitat Like most Caelifera found where there is a mix of open and shrubby vegetation with a preference for the more open patches with herbs and grasses.
Bioacoustics The calling song consists of echemes of 2.5-4 s repeated not very frequently. They consist of many ticking syllables repeated at the rate

Figure 11. *Rhammatocerus cyanipes* ♂, EEG-Boulevard, 22.xi.2022, RMNH.INS.1571567.

Figure 12. The song of *Rhammatocerus cyanipes*, a. 10 s oscillogram, b. 500 ms oscillogram (Xeno-canto.org/786883, not collected). All sound diagrams by Baudewijn Odé.

of 22-26/s. The echeme starts very quiet, possibly even with leg movements without sound production, and reaches maximum intensity near the end. Syllables show a faint indication of both an up and downstroke and last about 15 ms. The song has a very wide frequency spectrum with a maximum around 30 kHz. As far as we know, the song of this species has not been described before.
DNA samples RMNH.INS.1452663 (♂), RMNH.INS.1452664 (♀), RMNH.INS.1452661 (♀), RMNH.INS.1452670 (♀), RMNH.INS.1571564 (♀), RMNH.INS.1571567 (♂), RMNH.5155000 (juv.), RMNH.5154991 (♂).
Video Tinyurl.com/rammatoceruscyanipes.
Used sources Werner 1925 (p. 555), Roberts 1937 (p. 351), Carbonell 1995 (p. 92 key to genera of Scyllinini), Pujol-Luz 1999 (p. 1-5).

Figure 14. *Orphulella punctata* ♂, EEG-Boulevard, 22.XI.2022, RMNH.INS.1571565.

Orphulella punctata (De Geer, 1773)
(fig. 14-15)

Recognition A rather inconspicuous, small, long-winged grasshopper with a colouration ranging from green tot brown. The side keels of the pronotum curved inward, upper side of the hind knee with a tiny, medial spine and the hind femora with tiny dark dots.
Distribution From Mexico in the north to the northern part of Argentina in the south including many of the Caribbean islands: Tobago, Grenada, Saint Vincent, Guadeloupe, Dominica, Sint Eustatius, Montserrat, Martinique, Saint Croix and Saint Lucia.

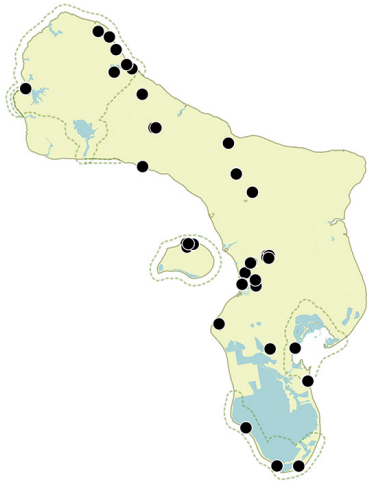


Figure 13. Records of *Rhammatocerus cyanipes* on Bonaire.

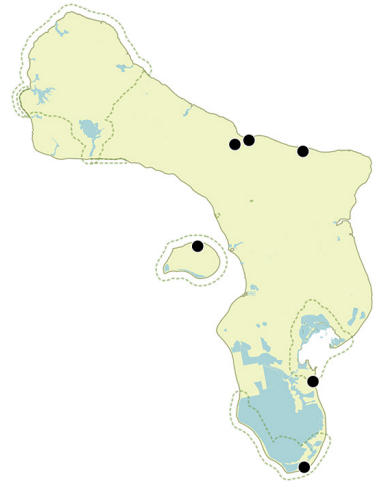


Figure 15. Records of *Orphulella punctatus* on Bonaire.

Bonaire This species is new to Bonaire. During the BEE in 2022 and 2023 seven records were collected, all at short distance from the coast (fig. 15).
Habitat Found in grassy areas in old fields, pastures, roadsides and forest edges (Otte 1979). In Bonaire it is quite local, only present in completely open shrub- and treeless habitats, close to the sea.
Bioacoustics No sound recordings available. As a representative of the Gomphocerinae, the males probably produce a song.
DNA samples RMNH.INS.1571563 (♀), RMNH.INS.1571568 (♂), RMNH.INS.1571565 (♂), RMNH.INS.1571566 (♂), RMNH.INS.1571569 (♀), RMNH.INS.1571572 (♂).
Video Tinyurl.com/orphulellapunctata.
Used sources Cigliano et al. 2024, Rowell 2013 (p. 232, key genera Orphulellini, p. 236-238, figs. G23-G25).

Family Tetrigidae
Subfamily Tetriginae

Danielatettix caudatus (Saussure, 1861)

(fig. 16-19)

Recognition Tetrigid species with pronotum very prolongated backwards (fig. 16), the middle keel somewhat undulating (fig. 17), mid femur without a keel, first tarsal segment of hind leg subequal in length to the second and third combined (fig. 18). The two females matched the genus

Figure 16. *Danielatettix caudatus*, NP Slagbaai, Kas Sientífiko, 6.XI.2022. Photo Marco de Haas.

Figure 17. *Danielatettix caudatus* ♀, pronotum lateral, RMNH.INS.1142101.

Figure 18. *Danielatettix caudatus* ♀, hind tarsus, RMNH.INS.1142101.

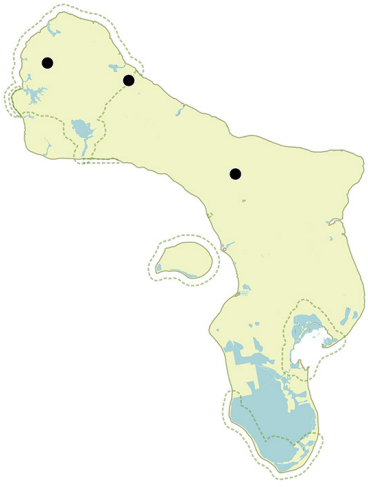


Figure 19. Records of *Danielatettix caudatus* on Bonaire.

description in Cadena-Castañeda et al. (2021) and morphological illustrations of *D. caudatus* (Cadena-Castañeda et al. 2021, fig. 6)
Distribution Widely distributed in South America, with records ranging from the north of the subcontinent in Colombia, Venezuela, and Guyana (Itrac-Brunneau & Doucet 2022), to the south in Paraguay and Argentina (Cadena-Castañeda et al. 2021).
Bonaire This species is new to Bonaire, with four records (fig. 19). A juvenile found at Put Bronswinkel (rmnh.ins.1142097) most likely also belongs to this species.
Habitat Only found in Washington Slagbaai NP near the edge of a small pool and amidst thorny shrubland where it was found attracted to light.
Used sources Cadena-Castañeda et al. 2021 (p. 137-142), Cigliano et al. 2024.

Figure 21. Records of *Ellipes minuta histrionica* on Bonaire.

Family Tridactylidae
Subfamily Tridactylinae

***Ellipes minuta histrionica* (Saussure, 1896)**
(fig. 20-21)

Recognition Tiny pygmy mole cricket with black and white colour pattern. Male cercus 2-segmented, the hind leg tarsi vestigial.
Distribution Widespread across America from southern Canada in the north to Bolivia and western Brazil in the south including some of the Antilles islands (Günther 1977).
Bonaire This species is new to Bonaire, with seven records (fig. 21).
Habitat Like all members of Tridactylidae, restricted to water edges. One observation was made in a greenhouse.
DNA samples RMNH.5154972 (♂), RMNH.INS.1571585 (juv.)., RMNH.INS.1571586 (juv.).
Used sources Günther 1977 (p. 59), Cadena-Castañeda & Cardona Granda 2015 (p. 485-489, key to genera and species).

Figure 20. *Ellipes minuta histrionica*, Kralendijk, 25.XI.2022.

Suborder Ensifera
Family Tettigoniidae
Subfamily Phaneropterinae

***Microcentrum angustatum* Brunner von Wattenwyl, 1878**
(fig. 20-28)

Recognition Completely green bush-cricket, forewings ovoid, reaching far beyond the hind knee. Male subgenital plate elongated, hind margin excised, with short straight styli, the cerci widened near the tip with a strong tooth (fig. 25), female

Figure 22. *Microcentrum angustatum* ♂, NP Slagbaai, Kas Sientífiko, 20.XI.2022, RMNH.INS.1571607.

ovipositor short, strongly upcurved, tip truncated and crenulated. Over 40 species have currently been assigned to *Microcentrum* (Cigliano et al. 2024). The genus is in urgent need of a revision (Cadena-Castañeda 2014). The male cerci of specimens from Bonaire resemble those of other species described from the region including Venezuela and other parts of the Caribbean (*M. incarnatum*, *M. martinicum*, *M. angustatum*, *M. myrtifolium* and *M. scudderi*). Awaiting a revision and more information on bioacoustics, specimens have been provisionally assigned to *M. angustatum*, known from Venezuela, based on the overall shape of the male cercus and in particular the spined and widened apex (fig. 23-25). The stridulatory file is somewhat J-shaped, with slightly less than 50 teeth, widest in the middle, width and interspace gradually decreasing distally (fig. 26).

Distribution Because of the taxonomic confusion the distribution is unclear.

Bonaire This species was mentioned for Bonaire by Werner (1925) (as *Orophus* (*Microcentrum*) sp. near *angustatus*). The 37 new records from the BEE show that it is relatively common across the island (fig. 28). It might be underrecorded because of its nocturnal habits. It is not impossible that more

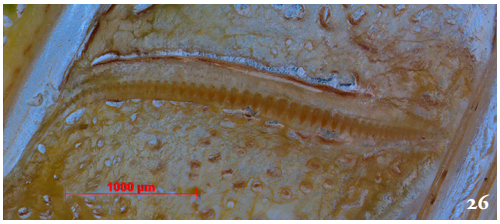


Figure 23-26. *Microcentrum angustatum* ♂, 23. cercus dorsal, 24. cercus lateral, 25. tip cercus dorsal, 26. stridulatory file. RMNH.INS.1571607.

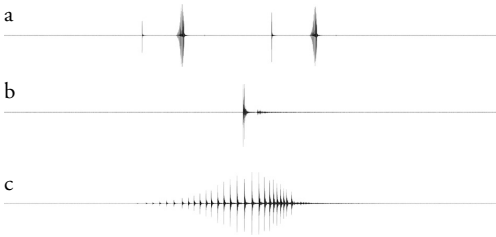


Figure 27. The song of *Microcentrum angustatum*, a. 10 s oscillogram, b. 500 ms oscillogram of tick, c. 500 ms oscillogram of buzz, Xeno-canto.org/875837, RMNH.INS.1571603.

than one species of *Microcentrum* occurs on the island.
Habitat In thorny shrubby vegetation which occurs all over the island.
Bioacoustics The calling song shows a short tick (3-5 ms), after 600-800 ms followed by a short buzz (160 ms), apparently both produced by a unilateral movement of the wings. Sometimes the calling song is repeated 2-3 times in short distance. The tick has a maximum frequency of about 20 kHz and the buzz about 22 kHz. The song differs from any of the known songs in the genus *Microcentrum*. Only few sound recordings of *Microcentrum* species have been published so far. For *M. retinerve* and *M. rhombifolium*, both from the USA, song recordings have recently been uploaded to Xeno-canto.org. Ter Hofstede et al. (2020) analysed the calling song of 50 katydid species from Panama, including two *Microcentrum* species, *M. championi* and *M.* '*polka*'.
DNA samples RMNH.INS.1571603 (♂), RMNH.INS.1571605 (♂), RMNH.INS.1571607 (♂), RMNH.5154968 (♀).
Used sources Werner 1925 (p. 555), Cadena-Castañeda 2014 (key to the genera of Microcentrini), Cigliano et al. 2024.

Figure 28. Records of *Microcentrum angustatum* on Bonaire.

Family Tettigoniidae
Subfamily Pseudophyllinae

Helicocercus triguttatus (Brunner von Wattenwyl, 1895)

(fig. 1, 29-32)

Recognition Rather large brown long-winged bush-cricket with striking green blue eyes. The name is derived from the shape of the male cercus, consisting of a spherical base followed by a twisted thread-like apical part (fig. 30). Despite small differences in colour pattern between the specimens from Bonaire and mainland Venezuela (Cigliano et al. 2024), specimens from Bonaire are considered to belong to *H. triguttatus*.
Distribution Known from Venezuela and northern Brazil (Beier 1960).
Bonaire This species is new to Bonaire, with 17 records (fig. 32).

Figure 29. *Helicocercus triguttatus* ♂, Tera Barra, 24.XI.2022, RMNH.INS.1571608.

Figure 30. *Helicocercus triguttatus* ♂, cercus caudal, RMNH.INS.1571597.

Habitat Found across the island especially in patches with more densely set shrubs and trees like in Tera Barra and Put Bronswinkel. Night active, during the day hiding in dark places such as crevices of trees.
Bioacoustics The calling song is a short syllable of about 20-30 ms, repeated every 5-20 s, or even less frequently. Syllables seem to only be produced by a wing movement in one direction. Occasionally, specimens also produce percussive noises with the legs on the substrate. This results in short series of 14-25 knocking or ticking sounds in about 1.2-2.3 s. This series shows a marked crescendo in amplitude. The calling song has a wide frequency spectrum above about 7 kHz, with a maximum between 27 and 29 kHz. As far as we know, the song of this species has not been described before.
DNA samples RMNH.INS.1571608 (♂), RMNH.INS.1571582 (♀).

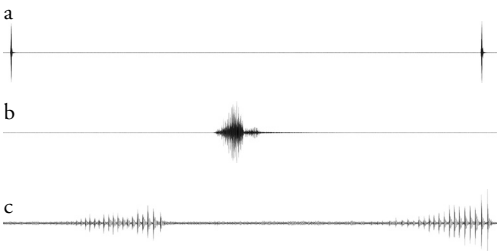


Figure 31. The song of *Helicocercus triguttatus*, a. 10s oscillogram, b. 500 ms oscillogram (Xeno-canto.org/875838, RMNH.INS.1571608), c. 10s oscillogram of percussion, Xeno-canto.org/876018, RMNH.INS.1571597.

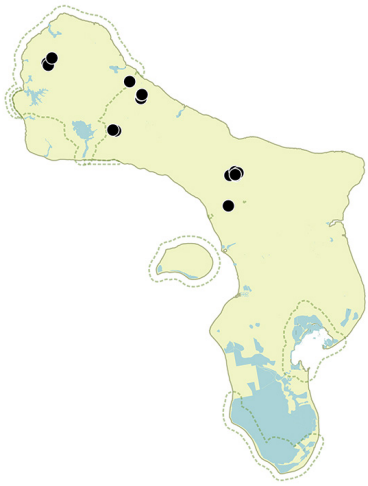


Figure 32. Records of *Helicocercus triguttatus* on Bonaire.

Video Tinyurl.com/heliocercustriguttatus.
Used sources Beier 1960 (p. 58, 154), Cigliano et al. 2024.

Subfamily Conocephalinae

Conocephalus (*Anisoptera*) *cinereus* Thunberg, 1815

(fig. 33-36)

Recognition In males the tip of the cercus is flattened and the tip of the abdomen is yellow (fig. 33).
Distribution *Conocephalus cinereus* is known from most of the Caribbean islands and from Florida (USA) in the north to Peru, French Guyana and Surinam in the south (Naskrecki 2000, Cigliano et al. 2024).
Bonaire This species is new to Bonaire, with eight records (fig. 36).
Habitat Quite rare and local in Bonaire, restricted to wetter sites with dense patches of herbal and grassy vegetation.
Bioacoustics The calling song has two different elements: series of 4-15 single syllables mixed with prolonged buzzing echemes. Single syllables last about 30 ms and are repeated at the rate of about

Figure 33. *Conocephalus cinereus* ♂, Kralendijk, sewage works, 25.XI.2022, RMNH.INS.1571579.

3-5 syllables/s. Buzzing echemes last about 1-2 s and consist of many syllables lasting about 25 ms and repeated at the rate of about 40-55 syllables/s. In all syllables both opening and closing hemisyllables produce sound. Closing hemisyllables are longer than opening hemisyllables. The song has a wide frequency spectrum above about 7 kHz, with a maximum around 25 kHz. The bioacoustics of this species in Bonaire neatly fits published descriptions of *C. cinereus* (Walker & Yawn 2024).

DNA samples RMNH.INS.1571579 (♂), RMNH.INS.1571584 (♂), RMNH.INS.1571590 (♂), RMNH.INS.1571578 (♀).

Video Tinyurl.com/conocephaluscinereus.

Used sources Naskrecki 2000 (p. 16-19), Cigliano et al. 2024.

Figure 34. *Conocephalus cinereus* ♀, Kralendijk, sewage works, 25.XI.2022, RMNH.INS.1571578.

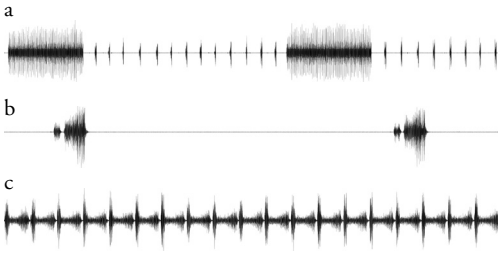


Figure 35a-c. The song of *Conocephalus cinereus*, a. 10s oscillogram, b. 500 ms oscillogram of single syllables, c. 500 ms oscillogram of buzzing echemes, Xeno-canto.org/876113, RMNH.INS.1571590.

Figure 36. Records of *Conocephalus cinereus* on Bonaire.

Conocephalus (*Anisoptera*) spec.
(fig. 37-38)

Bonaire Of this species only a sound recording is available. The song is clearly different from that of *Conocephalus cinereus*. So we conclude that a second, yet unidentified, species of *Conocephalus* occurs on Bonaire. It was recorded at Flamingo airport and Washington Slagbaai (fig. 38).
Bioacoustics The calling song has two different elements: short echemes and long buzzing echemes. Short echemes last about 200-400 ms and consist of about 7-14 syllables, each lasting 10-20 ms and repeated at the rate of about 30/s. Single or several short echemes may precede long echemes. Long echemes are more frequent than short echemes, last about 500-1400 ms and consist of many syllables lasting about 18-25 ms and repeated at the rate of about 45-50 syllables/s. In all syllables both opening and closing hemisyllables produce sound. The song has a wide frequency spectrum above about 11 kHz, with a maximum around 25-27 kHz. The song differs from any of the known songs within the genus *Conocephalus* from the America's.

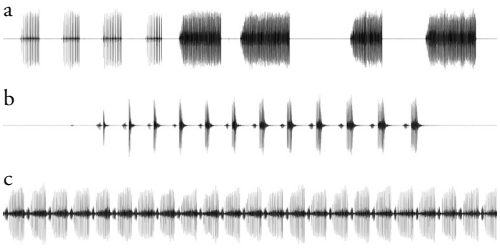


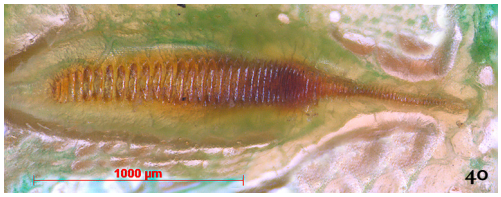
Figure 37. The song of *Conocephalus* spec., a. 10 s oscillogram, b. 500 ms oscillogram of short echemes, c. 500 ms oscillogram of long echemes, Xeno-canto.org/879857, not collected.

Figure 38. Records of *Conocephalus* spec. on Bonaire.

Neoconocephalus triops (Linnaeus, 1758)
(fig. 39-43)

Recognition *Neoconocephalus* species are medium-sized longwinged bush-crickets, about twice the size of *Conocephalus*. The genus *Neoconocephalus* includes over 100 species. The identification to the species level is often difficult and in the field or from images often impossible, due to the uniformity in the shape of the genitalia, the intraspecific variation of colouration and the existence of cryptic and acoustically isolated sympatric species (Naskrecki 2000). *Neoconocephalus triops* can be separated from other species by the shape of fastigium and the relatively low number of stridulatory teeth (fig. 40-41). Although it is not unlikely that more than one species of *Neoconocephalus* occurs on Bonaire, only one type of calling song has been recorded and consequently all observation records have been listed under *Neoconocephalus triops*.

Figure 39. *Neoconocephalus triops* ♂, NP Slagbaai, Kas Sientífiko, 22.XI.2022, RMNH.INS.1571560.



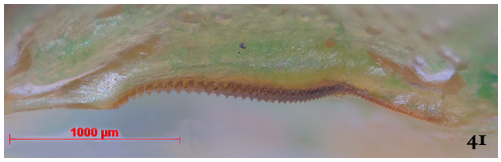


Figure 40-41. *Neoconocephalus triops* ♂, stridulatory file, 40. lateral, 41. ventral. RMNH.INS.1571580.

Figure 43. Records of *Neoconocephalus triops* on Bonaire.

Distribution *Neoconocephalus triops* is the most widely distributed species of the genus, having been recorded from southeastern Ohio to California (USA) through Central America to Peru and Guyana in South America as well as the Galapagos islands and through the Caribbean (Naskrecki 2000).
Bonaire This species is new to Bonaire, with 20 records (fig. 43).
Habitat Found on Bonaire in lush vegetation at wetter sites, often in the vicinity of water.
Bioacoustics The calling song is a repetition of buzzing echemes. Echemes last about 650-800 ms and consist of about 120-160 syllables, repeated at the rate of about 80-100/s. Both opening and closing hemisyllables are present. Intervals between echemes are very short, about 20-60 ms. The song has a wide frequency spectrum above 7 kHz, with two maxima (9-10 kHz and 16-17 kHz). The bioacoustics of this species in Bonaire does not perfectly fit published descriptions of *N. triops* (Walker & Yawn 2024). Also in this respect, the identity of this species needs to be confirmed.
DNA samples RMNH.INS.1571560 (♂), RMNH.INS.1571580 (♂), RMNH.5154974 (♀)
Video Tinyurl.com/neoconocephalustriops.
Used sources Naskrecki 2000 (p. 50-63), Walker & Greenfield 1983 (p. 371), Cigliano et al. 2024.

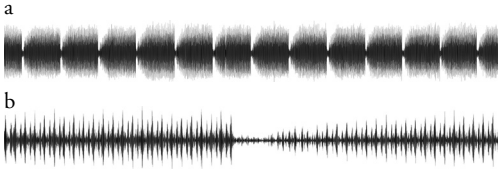


Figure 42. The song of *Neoconocephalus triops*, a. 10 s oscillogram, b. 500 ms oscillogram, Xeno-canto. org/876111, RMNH.INS.1571580.

Family Gryllidae
Subfamily Gryllinae

Gryllodes sigillatus (Walker, 1869)

(fig. 44-46)

Recognition Medium-sized yellow-brown cricket, with dark transversal bands on pronotum and

Figure 44. *Gryllodes sigillatus* ♂, Bonaire airport, 20.XI.2022, RMNH.INS.1571562.

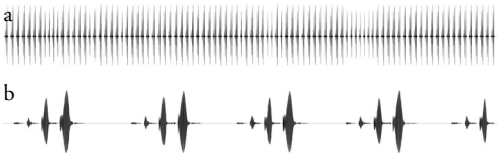


Figure 45. The song of *Gryllodes sigillatus*, a. 10s oscillogram, b. 500 ms oscillogram, Xeno-canto.org/876110, RMNH.INS.1571562.

abdomen. The male has shortened, square wings, in the female the wings are even stronger reduced to short flaps, which do not touch on top of the abdomen.

Distribution Cosmopolitan. Known from all tropical and subtropical regions of the world.

Bonaire This species was reported by Werner (1925). We have eight additional records (fig. 46).

Habitat Only found in the vicinity of Bonaire International Airport, within the city limits, in roadside verges, amidst houses.

Bioacoustics The calling song of *Gryllodes sigillatus* is an echeme, lasting about 60-90 ms, and repeated at the rate of about 9-10/s. Echemes consist of 3 syllables of which the first one is shorter and weaker than the other two and the third one is usually the loudest syllable. The first syllable may occasionally be missing. The carrier frequency of the song is around 7.2-7.7 kHz and has many harmonics at higher frequencies.

Figure 46. Records of *Gryllodes sigillatus* on Bonaire.

DNA samples RMNH.INS.1571562 (♂), RMNH.INS.1452669 (♀).

Used sources Werner 1925 (p. 555), Otte & Perez-Gelabert 2009 (p. 39, fig. 17), Cigliano et al. 2024.

Gryllus

Gryllus is distributed worldwide with some 100 valid species names. From the Americas over 70 species have been recorded, some 40 from North America and some 10-odd each from Central America, the Caribbean and South America. Various papers on *Grylllus* (Weissman & Gray 2019, Zefa et al. 2022, David et al. 2003) state that external morphological characters and phallic complex characteristics are largely similar between most American species and are not very helpful in species recognition. The male calling song is species specific and can be used for species recognition. Weissman & Gray (2019) for instance, in their review of *Gryllus* of North America, described 18 new species mainly based on song characteristics. Unfortunately hardly any song recordings are available for species recorded from the Caribbean and South America. Based on song characteristics (fig. 49, 52, 56), three species of *Gryllus* occur on Bonaire, one of which is *G. assimilis*. The other two species have not been assigned to a species. Song characteristics of all three species are presented and male genitalia illustrated (fig. 48, 51, 55).

Gryllus assimilis (Fabricius, 1775)

(fig. 47-50)

Recognition *Gryllus* are rather large, fully winged dark crickets. *Gryllus* species are morphologically quite similar, but display different male calling songs. *Gryllus assimilis* can best be distinguished from other *Gryllus* species by the male calling song. Hindwings shortened, not extending beyond the forewing.

Distribution Widespread in North America, the Caribbean and South America.

Figure 47. *Gryllus assimilis* ♂, Salina Matijs, 30.xi.2022, RMNH.INS.1452642.

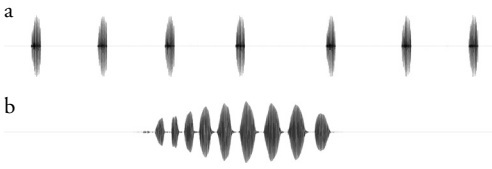


Figure 49. The song of *Gryllus assimilis*, a. 10 s oscillogram, b. 500 ms oscillogram, Xeno-canto.org/773184, RMNH.INS.1571591.

Figure 48. *Gryllus assimilis* ♂, genitalia dorsal, RMNH.INS.1571591.

Bonaire This species was mentioned by Werner (1925). We have many additional records for Bonaire, mostly sound recordings (fig. 50).
Habitat Lives on the soil hiding in crevices and under all kind of objects.
Bioacoustics The calling song of *Gryllus assimilis* is an echeme of 180-200 ms fairly regularly repeated at a maximum rate of about 0.7 echemes/s. Echemes consist of 9-10 syllables, the first ones are shorter and repeated faster than the latter ones. Mean repetition rate is 50 syllables/s. The carrier frequency of the song is 4.9 kHz, with

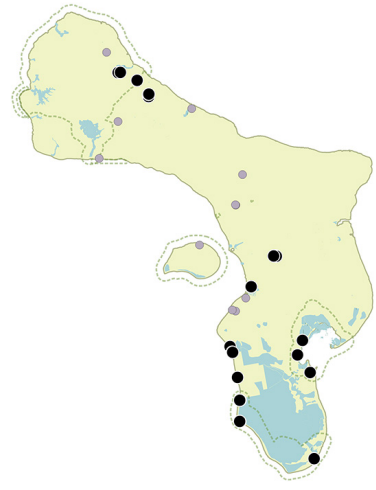


Figure 50. Records of *Gryllus assimilis* (black dots) and *Gryllus* spec. (grey dots) on Bonaire.

many harmonics at higher frequencies.
DNA samples RMNH.INS.1452642 (♂), RMNH.INS.1571591 (♂).
Used sources Werner 1925 (p. 555), Otte & Perez-Gelabert 2009 (p. 37, fig. 9), Weissman & Gray 2019 (p. 74), Cigliano et al. 2024.

Gryllus spec. 1
(fig. 51-53)

Recognition Similar to *G. assimilis*, but differing in the male calling song. Hindwings in males extending beyond forewings.
Bonaire This species is new to Bonaire, with records around Kralendijk and Washington Slagbaai, mostly sound recordings (fig. 53).
Bioacoustics The calling song is an echeme of 70-75 ms fairly regularly repeated at a maximum rate of about 0.7-1.8 echemes/s. Echemes consist of 3 syllables of which the first one is usually weaker and shorter. The repetition rate is 29-37 syllables/s. The carrier frequency of the song is

Figure 51. *Gryllus* spec. 1 ♂, genitalia dorsal, RMNH.INS.1452668.

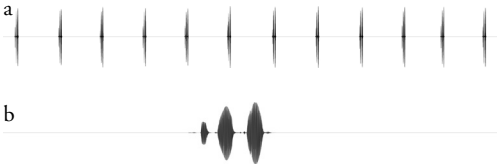


Figure 52. The song of *Gryllus* spec. 1, a. 10 s oscillogram, b. 500 ms oscillogram, Xeno-canto.org/879836, RMNH.INS.1452668.

6.1-6.5 kHz, with many harmonics at higher frequencies.
DNA samples RMNH.INS.1452667 (♂), RMNH.INS.1452668 (♂).

Figure 53. Records of *Gryllus* spec. 1 on Bonaire.

Gryllus spec. 2
(fig. 54-57)

Recognition Similar to *G. assimilis*, but differing in the male calling song, overall colour being black and the hindwings in males extending beyond forewings.
Bonaire This species is new to Bonaire, with only two records, Salina Matijs and Sewage works Kralendijk (fig. 57).
Bioacoustics The calling song is a repetition of echemes of very variable duration, lasting as short as single or double syllables or lasting up to 1(-2) s. Echemes consist of one to many syllables.

Figure 54. *Gryllus* spec. 2, ♂, Salina Matijs, 30.XI.2022, RMNH.INS.1117595.

Figure 55. *Gryllus* spec. 2, ♂, genitalia dorsal, RMNH.INS.111759.

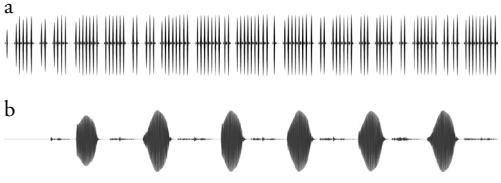


Figure 56. The song of *Gryllus* spec. 2, a. 10 s oscillogram, b. 500 ms oscillogram, Xeno-canto.org/879854, RMNH.INS.1117595.

Figure 57. Records of *Gryllus* spec. 2 on Bonaire.

The repetition rate is 15-22 syllables/s and the interval between echemes is about 50-200 ms. The opening hemisyllable seems to be relatively loud. The carrier frequency of the song is 5.9-6.1 kHz, with many harmonics at higher frequencies.
DNA samples RMNH.INS.1117595 (♂).

Gryllus spec.

Recognition As it proved difficult to reliably assign *Gryllus* specimen to a species using morphological characteristics, this even more so applies to observations that include images. All observations for which no sound recording was available have been listed as *Gryllus* spec.
Bonaire All these records have been added to the map of *G. assimilis* (fig. 50).
DNA samples RMNH.INS.1571598 (♀), RMNH.INS.1571604 (♂).

Figure 58. *Oecanthus allardi* ♂, NP Slagbaai, Kas Sientífiko, RMNH.INS.1571606.

Family Oecanthidae
Subfamily Oecanthinae

Oecanthus allardi Walker & Gurney, 1960

(fig. 58-61)

Recognition Slender and delicate, pale green cricket, the head pointing forward. Characterised by the black spots on the first two antennal segments, the one on the first segment being round.
Distribution Widespread on the Caribbean (Bland & Desutter-Grandcolas 2003, Otte & Perez-Gelabert 2009).
Bonaire This species is new to Bonaire, with many records in and near Washington Slagbaai (fig. 61).
Habitat Found in open low thorny shrublands, on low shrubs and herbs.

Figure 59. *Oecanthus allardi* ♂, NP Slagbaai, Kas Sientífiko, RMNH.INS.1571606.

Bioacoustics The calling song of this species are very short echemes that are repeated in short sequences of about 7-13 echemes. Echeme sequences are repeated at the rate of 0.3/s. Echemes

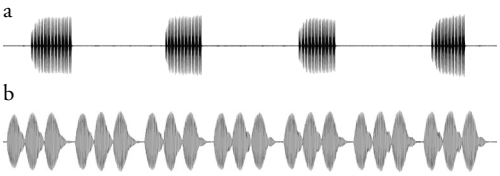


Figure 60. The song of *Oecanthus allardi*, a. 10 s oscillogram, b. 500 ms oscillogram, Xeno-canto.org/773816, not collected.

Figure 61. Records of *Oecanthus allardi* on Bonaire.

consist of 3 syllables (rarely 1 or 2 at the start of an echeme-sequence), last about 50-60 ms and are closely repeated at the rate of about 12-14 echemes/s. The carrier frequency of the song is 2.7-2.8 kHz, with several harmonics at higher frequencies. The bioacoustics of this species in Bonaire neatly fits published sound recordings of *O. allardi* (Cigliano et al. 2024).
DNA samples RMNH.INS.1571606 (♂).
Video Tinyurl.com/oecanthusallardi.
Used sources Walker 1967 (key to genera and species Oecanthinae), Otte & Perez-Gelabert 2009 (p. 492), Cigliano et al. 2024.

Figure 63. Records of *Hapithus?* spec. on Bonaire.

Subfamily Podoscirtinae

Hapithus? spec.
(fig. 62-63)

Bonaire This species is new to Bonaire, with only one record (Tera Kora) (fig. 63).
Bioacoustics The calling song consists of a repetition of 3-4 echemes of about 60-70ms. Echemes are repeated at the rate of about 4-6/s and consist of about 13-16 very fast and adjacent syllables, repeated at the rate of about 270-280/s. The carrier frequency of the song is 6.5 kHz. The affinity of the sound to the genus of *Hapithus* (*Antillicharis*) is based upon the very dense syllables known from some species within Eneopterinae and the presence of this genus in the Caribbean (e.g. Saint Lucia and Martinique) (Otte & Perez-Gelabert 2009).

Figure 62. The song of *Hapithus* spec., two or more specimens, a. 10 s oscillogram, b. 500 ms oscillogram, Xeno-canto.org/879841, not collected.

Family Trigonidiidae
Subfamily Nemobiinae

Hygronemobius? spec.
(fig. 64-65)

Bonaire This species is new to Bonaire, with only one record (Tera Kora) (fig. 63).
Bioacoustics The calling song of this species is an echeme lasting about 140-180 ms and repeated at the rate of about 1.2-1.5/s. Echemes consist of about 5-8 syllables, loosely repeated at the rate of 30-40/s. The carrier frequency of the song is 5.3-5.5 kHz. We assigned this recording provisionally to this genus because it shows some affinity with the song of *H. alleni* (Walker & Yawn 2024) and supposedly the genus is present in Venezuela and the Lesser Antilles.

Figure 64. The song of *Hygronemobius* spec., two or more specimens, a. 10 s oscillogram, b. 500 ms oscillogram, Xeno-canto.org/879843, not collected.

Figure 65. Records of *Hygronemobius?* spec. on Bonaire.

Figure 67. *Anaxipha* spec. ♀, EEG Boulevard, 24.XI.2022, RMNH.INS.1571576.

Subfamily Trigonidiinae

***Anaxipha* spec.**
(fig. 66-71)

Recognition *Anaxipha* are small, dark crickets, with a dark face and short hindwings, hidden under the forewing.
Bonaire This species is new to Bonaire, with only one record (EEG-Boulevard) (fig. 71).
Habitat Found in shrubs along the (salt) water edge.

Bioacoustics The calling song consists of echemes that may be repeated in short series of about 2-30 echemes. Echemes last about 100-175 ms and are repeated at the rate of about 1.8-2.9 echemes/s. They consist of 11-19 syllables, repeated at the rate of 114-116 syllables /s. The first few syllables are weaker than the following ones. The carrier frequency of the song is 7.1-7.5 kHz, with few harmonics at higher frequencies. The songs easily fits other songs in the genus *Anaxipha*, but can not easily be assigned to a specific species.
Used sources Otte & Perez-Glabert 2009 (p. 127), Cigliano et al. 2024.

Figure 66. *Anaxipha* spec. ♂, EEG Boulevard, 24.XI.2022, RMNH.INS.1571577.

Figure 68. *Anaxipha* spec. ♂, genitalia dorsal, RMNH.INS.1571574.

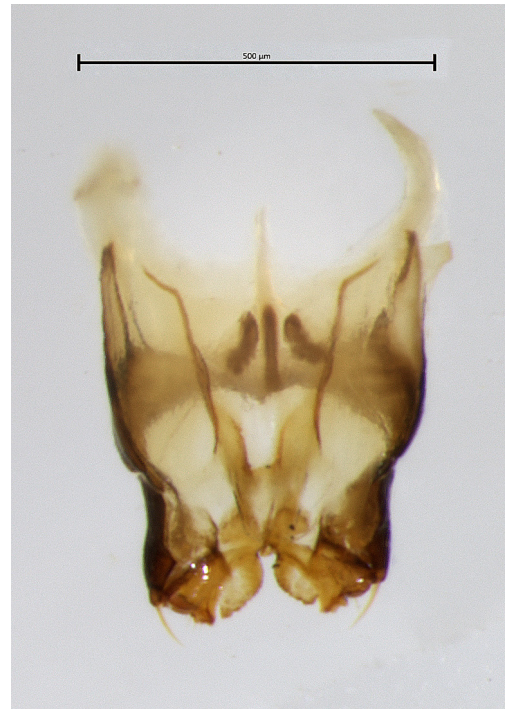


Figure 69. *Anaxipha* spec. ♂, genitalia ventral, RMNH.INS.1571574.

Cyrtoxipha

Among the material collected during the BEE (October 2022 - March 2023), two species of uniform light (green or straw coloured) Trigonidiidae were caught, both belonging to the genus *Cyrtoxipha* (Otte & Perez-Gelabert 2009 (p. 143), Cigliano et al. 2024).

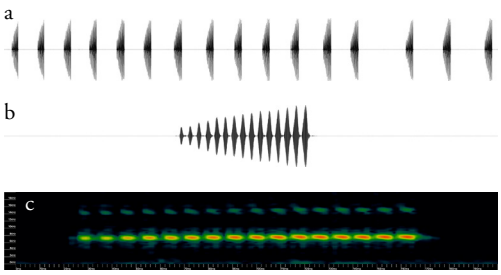


Figure 70. The song of *Anaxipha* spec., a. 10 s oscillogram, b. 500 ms oscillogram, c. 200 ms spectrogram, Xeno-canto.org/879839, RMNH.INS.1571574.

Figure 71. Records of *Anaxipha* spec. on Bonaire.

Cyrtoxipha spec. 1
(fig. 72-74)

Recognition *Cyrtoxipha* resemble *Anaxipha*, but are light brown or green, with fully developed hindwings extending beyond the forewing.
Bonaire New to Bonaire, with only one record (sewage works, Kralendijk) (fig. 74).
Habitat Found in a rather wet environment with lush vegetation and grasses, together with *Conocephalus cinereus* and *Neoconocephalus triops.*
Bioacoustics The calling song consists of echemes that are repeated in long series. Echemes last about 90-180 ms and are repeated at the rate of about 2.8-3.2 echemes/s. They consist of 10-20 syllables, repeated at the rate of 113-119 syllables/s. Apparently, syllables consist of two elements, so possibly both opening and closing of the tegmina produce sound. The first few syllables are weaker than the following ones. The carrier frequency of the song is 7.1-7.2 kHz, with few harmonics at higher frequencies. Singing males have not been collected.
DNA samples RMNH.INS.1571594 (♀), RMNH.INS.1571595 (♀), RMNH.INS.1571596 (♀).

Figure 74. Records of *Cyrtoxipha* spec. 1 on Bonaire.

Figure 72. *Cyrtoxipha* spec. 1 ♀, Kralendijk, sewage works, 28.XI.2022, RMNH.INS.1571594.

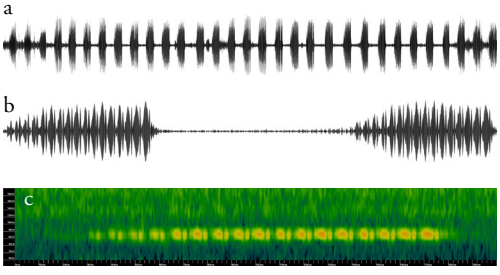


Figure 73. The song of *Cyrtoxipha* spec.1, a. 10 s oscillogram, b. 500 ms oscillogram, c. 200 ms spectrogram, Xeno-canto.org/879835, not collected.

Cyrtoxipha spec. 2
(fig. 75-77)

Recognition *Cyrtoxipha* resemble *Anaxipha*, but are light brown or green with hindwings fully developed extending beyond the forewing.
Bonaire This species is new to Bonaire, with many records, mostly based on sound (fig. 77).
Habitat Inhabits shrubs and trees
Bioacoustics The calling song consists of very short echemes that are repeated in short sequences of about 5-10. Echeme-sequences are repeated at the rate of 1.5-1.7/s. Echemes consist of 2 syllables, last about 30-35 ms and are repeated at the rate of about 19-21 echemes/s. The carrier frequency of the song is 7.1-7.5 kHz, with several harmonics at higher frequencies. The song of this species is quite like *Cyrtoxipha nola* (Walker & Yawn 2024).
DNA samples RMNH.INS.1571602 (♀), RMNH.5154959 (♂), RMNH.5155039 (juv. ♀), RMNH.5155034 (juv.).

Figure 75. *Cyrtoxypha* spec. 2 ♀, Tera Barra, 28.xi.2022, RMNH.INS.1571602.

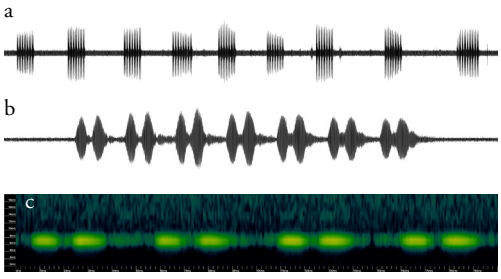


Figure 76. The song of *Cyrtoxipha* spec. 2, a. 10 s oscillogram, b. 500 ms oscillogram c. 200 ms spectrogram, Xeno-canto.org/879834, not collected.

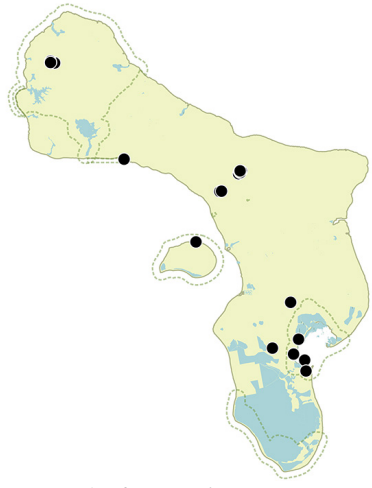


Figure 77. Records of *Cyrtoxipha* spec. 2 on Bonaire.

Family Mogoplistidae
Subfamily Mogoplistinae

***Cycloptilum* spec.**
(fig. 78-85)

Recognition Tiny brownish cricket with a distinct sexual dimorphism. The pronotum is extended backwards In the males and larger than in the females. The female is wingless, in males the wings covered for the most part by the pronotum. Pronotum cylindrical narrowing form the back to the front, in males extended backwards. Body covered with scales. More than 50 species of this genus have been described (Cigliano et al. 2024), about half of them from Hispaniola (Otte & Perez-Gelabert 2009), more than 20 from the USA (Love & Walker 1979) and singletons from some Caribbean islands, Galapagos and mainland South America. The species on Bonaire resembles other species found in the region, such as *C. thoracicum* Hebard, 1928 (described from the Caribbean coast of Colombia), *C. eustatientis* Bland & Desutter-Grandcolas, 2003 (described from Sint Eustatius) and *C. antillarum* (Redtenbacher, 1892) (known from the USA and the Caribbean). The male stridulatory file (fig. 80) is somewhat S-shaped, the distance between the teeth rather constant across its length, with about 70 teeth. The ectophallic invagination of the male genitalia is spiral-shaped (fig. 81), spinner-shaped in lateral view. Based on the male genitalia, *Cycloptilum* specimens from nearby Curaçao (fig. 83) probably belong to the same species. Bioacoustics do provide useful diagnostic characters but only for very few *Cycloptilum* species the song is known.
Distribution On Bonaire common across the whole island.
Bonaire This species is new to Bonaire, with many records, mostly based on sound (fig. 85).
Habitat Living in shrubs in open low thorny shrublands, very common and found all over the island.
Bioacoustics The calling song is an echeme of 34 ms repeated fairly regularly at a maximum rate of about 4 echemes/s. These series usually last several

Figure 78. *Cycloptilum* spec. ♂, NP Slagbaai, Kas Sientífiko, 21.XI.2022, RMNH.INS.1571558.

Figure 79. *Cycloptilum* spec. ♀, NP Slagbaai, Kas Sientífiko, 21.XI.2022, RMNH.INS.1571559.

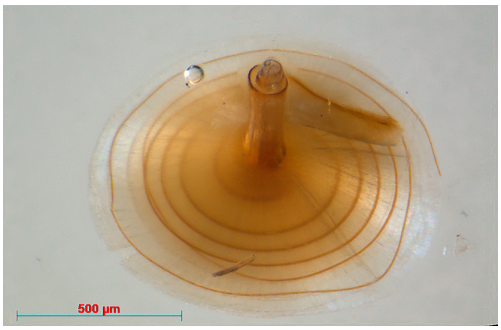


Figure 81. *Cycloptilum* spec. ♂, ectophallic invagination, RMNH.INS.1571570.

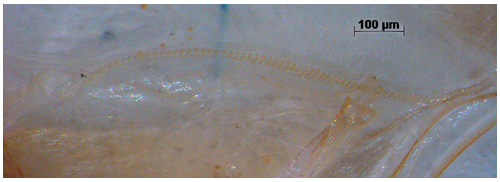


Figure 80. *Cycloptilum* spec. ♂, stridulatory file, RMNH.INS.962816.

up to several tens of echemes. Echemes consist of 4 syllables that are repeated at the rate of 100-120 syllables/s. The carrier frequency of the song is 7.7-8.4 kHz. As far as we know, the song of this species has not been described before. However, the song is similar to a species of an unidentified species of Mogoplistidae from Bahia, Brazil (FNJV: 0053521).

DNA samples RMNH.INS.1452672 (♀),RMNH.INS.1452673 (♂), RMNH.INS.1452674 (juv.), RMNH.INS.1452675 (juv.), RMNH.INS.1452676 (juv.), RMNH.INS.1571558 (♂), RMNH.INS.1571559 (♀), RMNH.INS.1571570 (♂), RMNH.INS.1571575 (♂), RMNH.INS.1571587 (♂), RMNH.INS.1571588 (♂).

Used sources Chopard 1956 (p. 250, key to American genera Mogoplistidae), Love & Walker 1979 (p. 6, key to genera of the eastern USA).

Figure 82. *Cycloptilum* spec. ♂, genitalia dorsal, Bonaire, RMNH.INS.962816.

Figure 83. *Cycloptilum* spec. ♂, genitalia dorsal, Curaçao, RMNH.INS.962848.

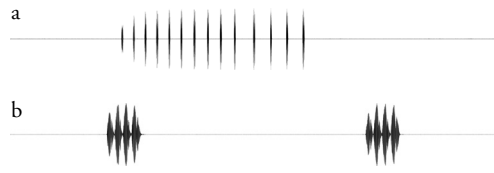


Figure 84. The song of *Cycloptilum* spec., a. 10 s oscillogram, b. 500 ms oscillogram, Xeno-canto.org/774820, RMNH.INS.1571575.

Figure 85. Records of *Cycloptilum* spec. on Bonaire.

Order Dermaptera
Family Anisolabididae
Subfamily Anisolabidinae

Anisolabis maritima (Bonelli, 1832)

(fig. 86)

Recognition Relatively large wingless earwig.
Distribution Cosmopolitan species.
Bonaire This species was already mentioned by Brindle (1971). We have one additional record, from Laguna (fig. 86).
Used sources Brindle 1971 (p. 9).

Figure 86. Records of *Anisolabis maritima* on Bonaire.

Euborellia annulipes (Lucas, 1847)
(fig. 87)

Recognition Small wingless earwig.
Distribution Cosmopolitan species.
Bonaire This species is new to Bonaire. It has been found once, at Tera Barra (fig. 87).
Habitat The specimens were found in a heap of cuttings.
Used sources Brindle 1971 (p. 9), Hebard 1922.

Figure 87. Records of *Euborellia anullipes* on Bonaire.

Order Blattodea
Werner (1925) mentions four cockroach species: *Supella supellectilium* (synonym of *S. longipalpa*), *Periplaneta truncata* (synonym of *P. brunnea*), *Rhyparobia maderae* and an unidentified species ('gen. sp. perhaps near *Dasyposoma*'). We could not confirm the presence on Bonaire of *P. brunnea* and *R. maderae* and confirmation of the records of Werner (1925) is needed.

Family Blattidae
Subfamily Blattinae

Periplaneta americana (Linnaeus, 1758)
(fig. 88)

Recognition A large fully winged brown cockroach (up to 40 mm long and 7 mm wide), pronotum with a yellowish margin. Distal segment of cercus elongated, length more than twice width. Male with caudal tergite deeply notched, distal portion of plate thin, projecting as hood over corresponding terminal sternite. Median segment unspecialised.
Distribution Probably originates from Southeast Asia and has been spread via trading ships around the world since the sixteenth century. The most

Figure 88. Records of *Periplaneta americana* on Bonaire.

famous pest cockroach in the world. The bad name of cockroaches can be traced back to this species, which is certainly not representative of all other cockroaches in the world.
Bonaire Possibly Werner (1925) used *Periplaneta truncata* as the name for this species. We have gathered two records from Bonaire (fig. 88).
Habitat Original habitat unknown. Synanthropic with a circum-tropical distribution. Outside the tropics, the species can only survive in heated buildings.
DNA samples RMNH.INS.1571561 (♀).
Used sources Djernæs & Murienne 2022, Choate without year.

Subfamily Eurycotiinae

Pelmatosilpha coriacea Rehn, 1903
(fig. 89)

Recognition Rather large, short-winged, shiny cockroach (body length: 20 mm), the rear third of rather broad pronotum with yellow band. The continuation of the yellowish lateral bar on the tegmina and reddish tibiae and tarsi are conspicuous.
Distribution Known from Puerto Rico, Virgin Islands, Grenadines (Saint Vincent) and Grenada.
Bonaire New to Bonaire. Only one record is known, caught at light at Tera Barra (fig. 89).
Habitat Not described. Often considered to be arboreal. *Pelmatosilpha coriacea* was collected in bromeliads during the day but has also been found on woody substrates in the leaf litter zone.
Used sources Djernæs & Murienne 2022.

Family Blaberidae
Subfamily Epilamprinae

Colapteroblatta nigra (Brunner von Wattenwyl, 1892)
(fig. 90-91)

Recognition Large (22-32 mm) dark cockroach, wings of the males and females reduced to small flaps, side and front margin pronotum yellowish.
Distribution The genus is known from tropical South America, the Caribbean and the West Indies. *Colapteroblatta nigra* is known from the Lesser Antilles: Saint Lucia, Saint Vincent, Grenadines, Grenada and Curaçao.
Bonaire This species is new to Bonaire. In total four records are known (fig. 91).
Habitat On Bonaire in leaf litter under bark.

Figure 89. Records of *Pelmatosilpha coriacea* on Bonaire.

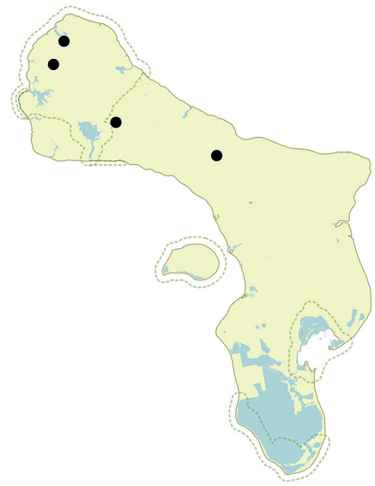


Figure 91. Records of *Colapteroblatta nigra* on Bonaire.

Figure 90. *Colapteroblatta nigra* juvenile, NP Slagbaai, Put Bronswinkel, 30.XI.2022, RMNH.INS.1452639.

DNA samples RMNH.INS.1571589 (juv. ♀), RMNH.INS.1452641 (juv. ♀), RMNH.INS.1452639 (juv. ♀), RMNH.5154984 (♀).
Used sources Roth & Gutiérrez 1998.

Subfamily Pycnoscelinae

***Pycnoscelus surinamensis* (Linnaeus, 1758)**
(fig. 92-93)

Recognition Medium-sized cockroach, with a black pronotum contrasting to the light coloured wings. Front wing light brown; pronotum dark brown, pale in front; basal fourth of front wing with numerous small round pits, many in double rows; front femur bordered with stiff hairs and single stout spine at base.

Figure 92. *Pycnoscelus surinamensis* ♀, EEG-Boulevard, 24.XI.2022, RMNH.INS.1571581.

Distribution The species originates from the northern parts of tropical South-East Asia and has spread across the world via soil and compost transport.
Bonaire This species is new to Bonaire, with two records (fig. 93).
Habitat Synantropic. Original habitat not described. Occurs mainly in gardens, greenhouses and flower boxes/pots. During the day adult females and the nymphs stay in the soil. Females may fly at night to disperse.
DNA samples RMNH.INS.1571581 (♀), RMNH.INS.1571583 (♀).

Figure 93. Records of *Pycnoscelus surinamensis* on Bonaire.

Used sources Djernæs & Murienne 2022, Choate without year.

Family Pseudophyllodromiidae
Subfamily Pseudophyllodromiinae

Supella longipalpa (Fabricius, 1798)
(fig. 94)

Recognition Relatively small cockroach (11-15 mm), fast running when disturbed. Tan to dark brown, with two dark stripes running the length of the pronotum. They lack the two dark vertical stripes visible on the pronotum of German cockroaches. Ventral margins of femora supplied with numerous spines. Ventro-anterior margin of anterior femora with rows of spines that either decrease gradually in size and length toward apex or are of nearly equal length throughout. Front wings slightly reduced in females, with discoidal (cubital) sections oblique and extending to hind margin of front wings.
Distribution Synantropic. The genus *Supella* originates from tropical West to Central Africa. *Supella longipalpa* is by far the most widespread representative and occurs throughout the world.
Bonaire This species was already mentioned from Bonaire by Werner (1925). We have one additional record (fig. 94).
Habitat Synantropic. Original habitat not described. *Supella longipalpa* has been a peri-domestic pest for thousands of years and is actually one of the most notorious house hold pest cockroaches. Oothecae are stuck under furniture and behind wall decorations. The cockroach mainly breeds indoors and depends on the food left behind by humans. The species is extremely well adapted to surviving in relatively dry environments.
Used sources Djernæs & Murienne 2022, Choate without year.

Family Blattellidae

Symploce pallens (Stephens, 1835)
(fig. 95)

Recognition Relatively small cockroach (9-12 mm). Front femur with 3 spines on ventral margin and 2 spines at the tip. The males are fully winged, the females brachypterous.
Distribution The large genus *Symploce* is extremely widespread and its range includes the Greater Antilles, Africa, tropical Asia, including parts of the Chinese mainland and reaching south as far

Figure 94. Records of *Supella longipalpa* on Bonaire.

Figure 95. Records of *Symploce pallens* on Bonaire.

Figure 96-97. Blattodea indet. ♂, Tera Barra, 28.XI.2022, RMNH.INS.1571601.

as New Guinea. *Symploce pallens* probably originated from eastern Africa but it is nowadays widespread in the (sub)tropical world.
Bonaire This species is new to Bonaire, with one record (fig. 95).
Habitat Synantropic. The unadorned cockroach is a forest inhabitant and an occasional inhabitant of greenhouses around the globe. It is not considered to be a destructive pest species.
Used sources Roth 1986.

Unknown genus/species
(fig. 96-98)

Figure 98. Records of Blattodea indet. on Bonaire.

Recognition Medium-sized cockroach (12-15 mm). Adults chestnut-brown, both adult sexes long winged. Nymphs dark brown. No markings on the head, body or wings at all stages of development.
Bonaire We have five records of this species (fig. 98).
Habitat On Bonaire both adults and nymphs have been found in pitfalls suggesting that this is a bottom dweller. Adults were also captured on light, suggesting that they can fly well.
DNA samples RMNH.INS.1571601 (♂), RMNH.INS.1571592 (♂).

DISCUSSION

The number of Orthopteroid species occurring on Bonaire is limited, which is not surprising considering the size of the island and the little rainfall. Except for some cricket species, not only the number of species but also the number of individuals encountered is low on Bonaire. With 23 species, including species only assigned to genus level, the Orthoptera fauna of Bonaire (288 km²) is comparable with the 22 species reported from the much smaller Windward island of Sint Eustatius (21 km²) (Bland & Desutter-Grandcolas 2003). Both islands show similar ratios between Caelifera and Ensifera and on both islands crickets are the most species rich group. Differences between Bonaire and Sint Eustatius are found in species(groups) that prefer wetter habitats with lush vegetation which are present on Sint Eustatius

but are almost lacking on Bonaire. Podoscirtidae and Phalangopsidae for instance, seven species of which occur on Sint Eustatius, are almost completely absent on Bonaire. Other differences are linked to the geographical location of both islands and for instance the genera *Helicocercus* and *Radacris*, reported from Venezuela and Curaçao respectively, are present on Bonaire but absent on Sint Eustatius.

Out of the 23 Orthoptera species listed here for Bonaire, nine have been assigned to genus level only. For three of them (*Conocephalus* spec., *Hapithus* spec. and *Hygronemobius* spec.) only the song has been recorded but no specimen was collected. Species assignment in *Gryllus*, *Cyrtoxipha*, *Anaxipha* and *Cycloptilum* proved difficult due to the large number of species, poor descriptions and lack of song recordings. For the time being specimens are only assigned to genus level, in wait of taxonomic revisions including full descriptions, keys and bioacoustic data of these genera.

From two other orders belonging to Orthopteroidea, Mantodea and Phasmodea, no specimens were encountered during the half year fieldwork by the various teams who participated in the Bonaire Estafette Expeditie. Nonetheless, it is likely that these groups do occur on Bonaire. Johan van Blerk, who lived on the island for 20 years, encountered a praying mantis once or twice.

ACKNOWLEDGEMENTS

We wish to thank Johan van Blerk for his hospitality in allowing us to collect in Tera Barra and sharing with us his enthusiasm for nature conservation. We are very grateful to Stichting Nationale Parken Bonaire (STINAPA) in general and its staff at Washington Slagbaai National Park in particular, for offering us a smooth stay at the guesthouse Kas Sientífiko. We are of course indebted to all recorders for providing us with additional and often interesting findings: Hannco Bakker, Jordy van der Beek, Johan van Blerk, Michiel Boeken, Andele Boorsma, Aglaia Bouma, Jelle Devalez, Tjomme Fernhout, Frans Groenen, Marco de Haas, J. Haines, J. Heijstek, P. Janssen, Vincent Kalkman, Wim Klein, Sylvia van Leeuwen, Theo Peeters, Gert Meester, Jan-Joost Mekkes, E. Molenaar, Micha d'Oliveira, P. Rikken, S. Rincker, Peter-Paul Schets, Herman Sieben, Oscar Vorst & Jan Wieringa. We are grateful to Vincent Kalkman who initiated and organised the Bonaire Estafette Expeditie. Last but not least we like to thank the Commissie Natuurbeheer Bonaire for providing the collecting permit.

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SAMENVATTING

Sprinkhanen en verwante groepen van Bonaire (Orthoptera, Dermaptera, Blattodea)
De sprinkhanen en verwanten van Bonaire waren nog slecht onderzocht. Uit de literatuur waren slechts zes soorten sprinkhanen en krekels (Orthoptera), één soort oorworm (Dermaptera) en vier soorten kakkerlakken (Blattodea) bekend. Gedurende de Bonaire Estafette Expeditie werden respectievelijk 23, 2 en 7 soorten uit deze groepen aangetroffen. Diverse soorten konden nog niet tot op soortniveau worden gedetermineerd en in sommige gevallen betreft het mogelijk onbeschreven soorten.

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