THE LYGAEINAE AND RHYPAROCHROMINAE OF THE DUTCH CARIBBEAN ISLANDS OF ARUBA, BONAIRE AND CURAÇAO (HETEROPTERA: LYGAEIDAE)

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Between September 1956 and July 1957 the Dutch Heteroptera expert René Cobben conducted fieldwork on Heteroptera on the six main Dutch Caribbean islands. Based on his fieldwork and in cooperation with several experts, he produced a series of ten papers, each focusing on different families of Heteroptera. A large part of the collected material, however, remained unpublished. In this paper we present records and a key to the Rhyparochrominae and the Lygaeinae (family Lygaeidae) from Aruba, Bonaire, and Curaçao, based on material of Cobben and additional specimens collected on Curaçao in 2021 and 2022.

INTRODUCTION

The Lygaeidae is one of the largest and most diverse families of Heteroptera (Baranowski & Slater 2005). In recent literature, the family has often been considered a superfamily consisting of 16 families which previously were regarded as subfamilies (Henry 1997). However, this classification has not been fully accepted by the scientific community in Europe and therefore this paper will refer to Lygaeidae in its traditional sense.

Many of the species belonging to Lygaeidae, or 'seed bugs', forage on seeds of plants. Lygaeids can be found doing this on multiple levels within a habitat: in the vegetation itself (arboreals), around the base of the vegetation (laminaphiles) and in leaf litter containing seeds (geophiles) (Slater 1977). However, there are also species that primarily feed on the sap of plants, and some groups of species are known to be entomophagous or even hematophagous (Sweet 1960).

Figure 1. *Lygaeus argutus* on *Calotropis procera*. An example of the bright colours present in Lygaeinae. Photo Jonne Veldboom.

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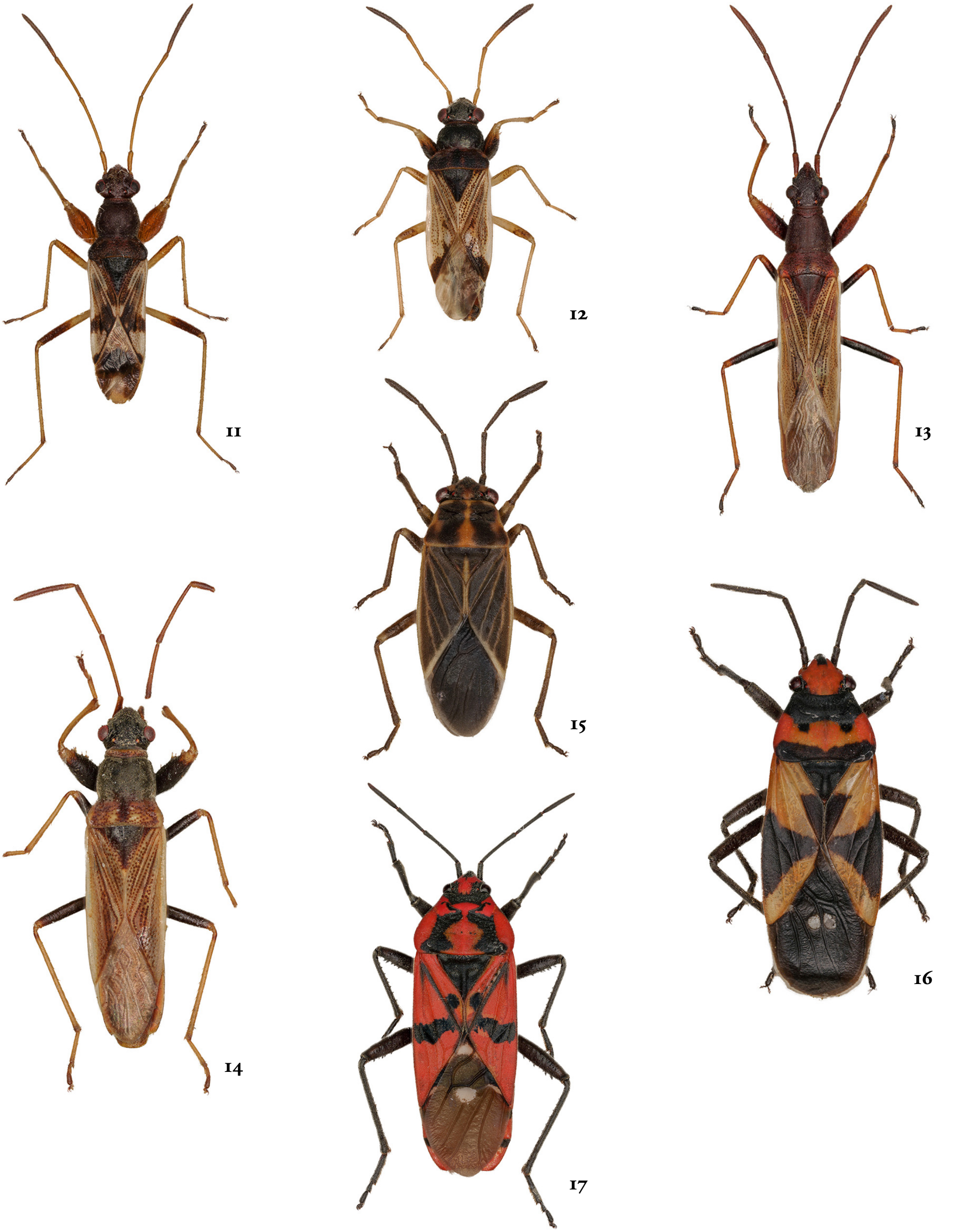

Figure 2-17. Rhyparochrominae and the Lygaeinae of Aruba, Bonaire and Curaçao, 2. *Valtissus distinctus*, 3. *Gonatoides typicus*, 4. *Cryphula fasciata*, 5. *Erclada arhaphaeoides*, 6. *Heraus triguttatus*, 7. *Prytanus oblonga*, 8. *Tempyra biguttula*, 9. *Froeschneria pilligera*, 10. *Neopamera albocincta*, 11. *Neopamera bilobata*, 12. *Pseudopachybrachius vinctus*, 13. *Paromius dornii*, 14. *Paromius longulus*, 15. *Ochrimnus carnosulus*, 16. *Lygaeus argutus*, 17. *Spilostethus pandurus*. All photos Mathijn Speelman.

A large portion of lygaeid adults tend to be oligophagous, meaning they forage on a small number of host plants. The diet breadth of nymphs is often even more narrow with some species being monophagous (Baranowski & Slater 2005).

Lygaeids show a wide variety in morphology, ranging from small, brown, dull coloured bugs, to brightly coloured and large species (Schuh & Weirauch 2020). The subfamily Rhyparochrominae consists mainly of smaller brownish bugs, while the Lygaeinae include a great number of large species, often with bright red aposematic colours as shown by figure 1. Both subfamilies occur worldwide, and some species have been well studied due to their economic relevance as pest species, such as *Neopamera bilobata*, a well-known pest of strawberries in Florida (Talton et al. 2020). The subfamily of Lygaeinae currently includes over 1100 species from 147 genera and the Rhyparochrominae contain over 1940 species from 431 genera (Dellapé & Henry 2023).

Aruba, Bonaire, and Curaçao (ABC islands) are part of the Dutch Caribbean islands and are located in the Leeward Antilles. Despite being considered Caribbean islands, they are situated more closely to mainland Venezuela than to the main island chain of the Lesser Antilles. Although Bonaire and Curaçao have never been connected by land to Venezuela, their relatively dry climate is similar to that of adjacent coastal parts of Venezuela. The terrestrial invertebrate fauna of these islands has been poorly studied and for many groups of insects, even basic checklists are lacking. One of the families that have remained unstudied is Lygaeidae. The Dutch Heteroptera expert R.H. Cobben built up an extensive collection of Heteroptera from all six larger Dutch Caribbean islands from October 1956 until July 1957. The material is deposited in the collection of Naturalis Biodiversity Center in Leiden (RMNH). Cobben and several other experts used this material to produce ten papers, each focusing on one or a few families: Gerridae, Veliidae, Mesoveliidae (Cobben 1960a), Hebridae (Drake & Cobben 1960a), Saldidae (Cobben 1960b), Dipsocoridae (Wygodzinsky 1960), Tingidae (Drake & Cobben 1960b), Notonectidae (Nieser 1967), Corixidae (Nieser 1969a), Pleidae, Naucoridae, Ranatridae (Nieser 1969b), Reduviidae (Cobben & Wygodzinsky 1975), and Berytidae (Štusák & Cobben 1975). While material from other families was often identified, it was never published, resulting in gaps in our knowledge of Heteroptera in the Dutch Caribbean islands.

In this paper we provide information on the distribution and ecology of Rhyparochrominae and Lygaeinae on Aruba, Bonaire, and Curaçao. Additionally, we present an identification key to the species known from these islands.

MATERIALS AND METHOD

The records in this paper are from four different sources: (1) material collected in 1956-1958 on Aruba, Bonaire, and Curaçao by Cobben, De Jong, Van Ypenburg and Pieters Kwiers, (2) material collected in November 2021 by Vincent J. Kalkman on Curaçao, (3) material collected in September-October 2022 by Mathijn Speelman and Jonne Veldboom on Curaçao, and (4) five miscellaneous records present on Observation.org.

The material of the Cobben-collection (253 specimens, 96 records) was collected during three expeditions to the Dutch Caribbean islands during which he visited Aruba (4.IV to 27.IV.1957), Bonaire (4.I.1956 to 1.III.1958) and Curaçao (5.III.1956 to VI.1957). In 1957, Cobben was joined by entomologists De Jong and Van Ypenburg on Curaçao and by Pieters Kwiers on Bonaire, where they collected specimens attracted by light. The material was originally part of the collection of the Laboratory of Entomology Wageningen but is currently stored in Naturalis Biodiversity Center in Leiden. Most specimens of Lygaeidae were identified by G.E.E. Scudder in 1960 but the records were never published. All these specimens have been re-identified and the data on location and date has been included in the Central Registration System of Naturalis.

During a short nine-day visit to Curaçao in December 2021, Vincent Kalkman collected insects with a sweeping net with a focus on Heteroptera resulting in four specimens in three records (a species on a day on a locality) belonging to the subfamilies Rhyparochrominae and Lygaeinae. These records can be found on Observation.org.

Mathijn Speelman and Jonne Veldboom visited Curaçao in September and October 2022 and collected Heteroptera on 19 days which resulted in 131 specimens (28 records) belonging to the two subfamilies of interest. The fieldwork was mainly conducted using a sweeping net, in addition to sifting through leaf litter with a litter sieve, and manual collection from the ground using an aspirator. Specimens were killed using ethyl-acetate and preserved using dried leaves of *Prunus laurocerasus*, after which they have been glued on carton boards. All material was labelled and data on location and date was registered in the Central Registration System of Naturalis.

The five miscellaneous records present on Observation.org refer to *Spilostethus pandurus*. These records could be identified from the image connected to the record and are here included as they constitute new island records.

The present overview is based on a total of 393 specimens, 253 from the Cobben collection, another 135 from fieldwork in 2021 and 2022 and five from Observation.org. All sources combined result in a total of 132 records (a species on a date on a location), 14 of which are records for Lygaeinae and 118 of which are records for Rhyparochrominae. We have included records up to October 2022. Records from the Bonaire Estafette Expedition will be published elsewhere.

For identification we mostly relied on the book 'Lygaeidae of the West Indies' (Baranowski & Slater 2005). All material was identified by the first author with the assistance of Berend Aukema for the more problematic specimens.

IDENTIFICATION

This paper discusses the subfamilies of Rhyparochrominae and Lygaeinae. In order to use the keys presented below one has to be certain that (a) the specimens belong to Lygaeidae and (2) that they belong to either the subfamily Rhyparochrominae or Lygaeinae. The families occurring on the ABC islands most likely to be confused with Lygaeidae are Pyrrhocoridae and the genus *Jadera* of Rhopalidae. However, Pyrrhocoridae lack ocelli (always present in Lygaeidae) and *Jadera* has a rough surface of corium and clavus, unlike any species of Lygaeidae occurring on the ABC islands.

Species belonging to the subfamily Lygaeinae can be separated from other species of the family Lygaeidae based on their bright colours (often red) and their relatively large size. Separating species of subfamily Rhyparochrominae from the other subfamilies of Lygaeidae is more problematic. This is mainly due to the large diversity in appearance within this group and the inconvenient placement of differentiating characteristics on the abdomen. In general, species of Rhyparochrominae can be identified by a dullish brown appearance with both white and brown spots, often accompanied by medium size and patterns in their membrane.

The most important similar group is the subfamily Pamphantinae, which does occur on the ABC islands and meets many of the characteristics of Rhyparochrominae. Where Rhyparochrominae are often brown with white spots, the species of Pamphantinae occurring on the ABC islands are lighter in colour. In addition, their fore femora are much more swollen than those of Rhyparochrominae. Species of most other subfamilies of lygaeids occurring on the ABC islands are generally much smaller or less characteristically coloured than Rhyparochrominae. For the formal differen-

KEY RHYPAROCHROMINAE

1 Pronotum constricted in the middle, dividing it in a posterior and anterior section (fig. 18) 4
– Pronotum not constricted (fig. 19) 2

2 Clavus uniformly pale (fig. 20) .... *Valtissius distinctus* (fig. 2)
– Clavus with dark markings (fig. 21) 3

3 Second antennal segment with yellow to brown base and black top. Pronotum laterally flattened and lateral edges light coloured (fig. 22) .... *Gonatoides typicus* (fig. 3)
– Second antennal segment unicoloured yellow to brown. Pronotum not flattened and edges not fully light coloured (fig. 23) .... *Cryphula fasciata* (fig. 4)

4 Area behind the eyes is as long or longer than the diameter of the eye (fig. 24) 5
– Area behind the eyes less long than the diameter of the eye (fig. 25) 6

5 Femur of hind legs uniformly pale yellow (fig. 26). Head about as broad as pronotum .... *Erlacda arhaphaeoides* (fig. 5)
– Femur of hind legs partially dark brown to black (fig. 27). Head clearly less broad than pronotum .... *Heraeus triguttatus* (fig. 6)

6 Length of anterior pronotal lobe clearly broader than long (fig. 28) 7
– Length of anterior pronotal lobe longer than broad (fig. 29) 8

7 Apex of scutellum with a vertical ridge (fig. 30) .... *Prytanus oblonga* (fig. 7)
– Apex of scutellum without a vertical ridge (fig. 31) .... *Tempyra biguttula* (fig. 8)

8 Scutellum almost reaching membrane (fig. 32) .... *Froeschneria piligera* (fig. 9)
– Scutellum not nearly reaching membrane (fig. 33) 9

9 Last antennal segment dark with a broad pale ring at the base (fig. 34) *Neopamera albocincta* (fig. 10)
– Last antennal segment uniform dark, without a broad pale ring (fig. 35) 10

10 Apex of corium dark (fig. 36) 11
– Apex of corium pale (fig. 37) 12

11 Corium with a dark transverse band (fig. 38) .... *Neopamera bilobata* (fig. 11)
– Corium without a dark transverse band (fig. 39) .... *Pseudopachybrachius vinctus* (fig. 12)

12 Anterior pronotal lobe at least 1.9 times the length of the posterior lobe, anterior lobe reddish brown (fig. 40) .... *Paromius dohrnii* (fig. 13)
– Anterior pronotal lobe less than 1.6 times the length of the posterior lobe, anterior lobe usually black (fig. 41) .... *Paromius longulus* (fig. 14)

KEY LYGAEINAE

1 Membrane with white spots, large species (> 5 mm) (fig. 42) 2
– Membrane completely black, smaller species (< 5 mm) (fig. 43) .... *Ochrimnus carnosulus* (fig. 15)

2 Clavus without round black spot, distal half of clavus completely black (fig. 44) .... *Lygaeus argutus* (fig. 16)
– Clavus with round black spot, distal half of clavus not completely black (fig. 45) .... *Spilostethus pandurus* (fig. 17)

Figure 18-19. Pronotum, 18. constricted, 19. not constricted.

Figure 20-21. Clavus, 20. uniformly pale, 21. with dark markings.

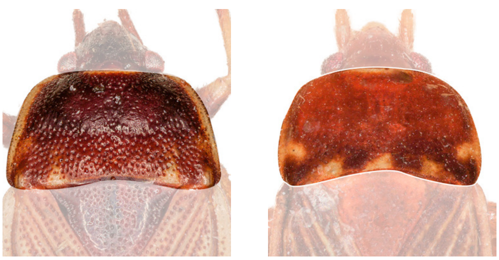

Figure 22-23. Pronotum, 22. with flattened, light-coloured edges, 23. not flattened and partly dark at edges.

Figure 24-25. Area behind eyes, 24. long, 25. short.

Figure 26-27. Hind femur, 26. uniformly pale yellow, 27. partially dark.

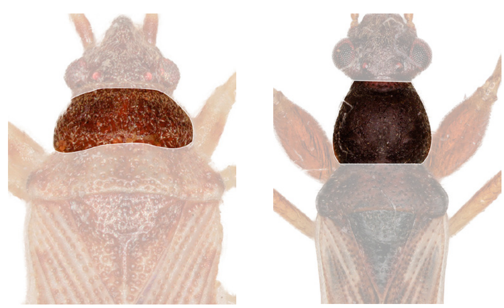

Figure 28-29. Anterior pronotal lobe, 28. broader than long, 29. longer than broad.

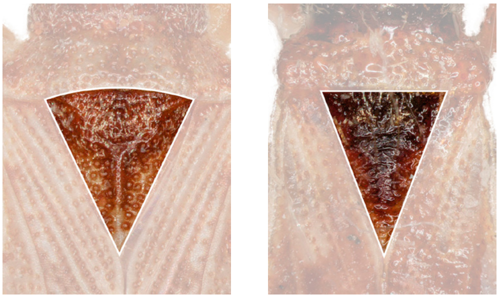

Figure 30-31. Scutellum, 30. with vertical ridge, 31. without vertical ridge.

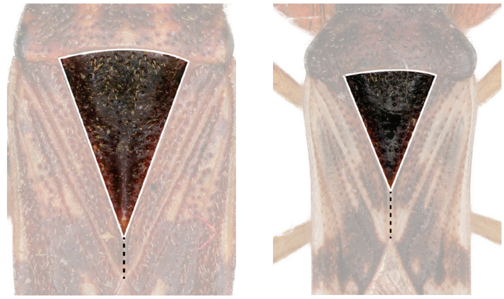

Figure 32-33. Scutellum, 32. almost reaching membrane, 33. not reaching membrane.

Figure 34-35. Last antennal segment, 34. with pale ring, 35. uniformly dark.

Figure 36-37. Apex of corium, 36. dark, 37. pale.

Figure 38-39. Corium, 38. with dark band, 39. without dark band.

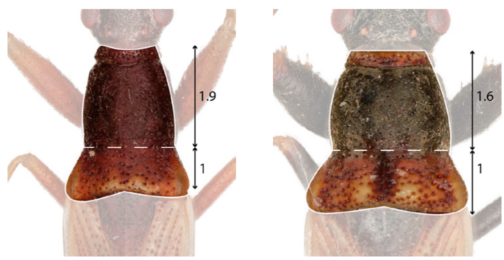

Figure 40-41. Anterior pronotal lobe, 40. 1.9 x posterior lobe, 41. 1.6 x posterior lobe.

Figure 42-43. Membrane, 42. with white spots, 43. black.

Figure 44-45. Clavus, 44. without black spot, 45. with black spot.

tiating characteristics, we refer to Baranowski & Slater (2005).

The keys above should facilitate easy identification of the species of Rhyparochrominae and Lygaeinae from the ABC islands. Users should be aware that the occurrence of additional species on the islands is likely.

RESULTS

Subfamily Rhyparochrominae

Cryphula fasciata Distant, 1882

Identification Pronotum not constricted. Clavus with dark markings and corium without multiple light spots. Second antennal segment unicoloured yellow or brown.
Similar species *Valtissius distinctus* (in which clavus is uniformly pale) and *Gonatoides typicus* (in which the end of the second antennal segment is black and corium with multiple isolated light spots).
Ecology Largely unknown. Swezey (1945) mentions a record of this species being intercepted from Colombia on plants of the orchid genus *Cattleya*.
Distribution Recorded from Guatemala south to Bolivia (Swezey 1945). Found by Cobben at four locations on Curaçao, which are the first and only records of the species in the West Indies.

Erlacda arhaphaeoides Signoret, 1863

Identification Pronotum constricted in the middle. Head with distinct 'neck' and area behind the eye about as large as the diameter of the eye. Femur of hind legs yellow.
Similar species Rather distinctive species but could be confused with *Heraeus triguttatus* (in which thorax is bigger and head is proportionately smaller).
Ecology *Erlacda arhaphaeoides* is thought to mimic the pompilid wasp *Euplaniceps saussurei* Kohl, 1885. Collection data suggests that the species is ground-dwelling, its host plant remains unknown (Faúndez et al. 2016, Baranowski & Slater 2005). On Curaçao, Cobben recorded the species underneath *Stylosanthes hamata* and *Euphorbia adenoptera.*
Distribution The species is known from multiple South American countries, including Chile, Paraguay and Brazil. There is only one record from the West Indies (as *Sphaerobius gracilis* Uhler, 1893) from St. Vincent (Baranowski & Slater 2005). Only one record is available from the ABC islands: five specimens from Piscerada (Curaçao) collected by Cobben on 15.III.1957. Scudder identified these specimens as a new species and gave them the manuscript name *Erlacda cobbeni* without ever publishing a formal description. The second author studied the material collected by Cobben on Curaçao in 2022 and concluded that these are *E. arhaphaeoides*.

Froeschneria piligera Stål, 1862

Identification Pronotum constricted in the middle. Scutellum long, almost reaching membrane.
Similar species None, the long scutellum reaching midway of the abdomen, almost reaching the membrane, makes this species easy to recognise.
Ecology *Froeschneria piligera* is recorded from several hostplants including *Stuessya michoacana* (Asteraceae), *Melampodium* spec. (Asteraceae), *Senecio prionopterus* (Asteraceae), *Helianthus debilis* (Asteraceae), *Ficus cotinifolia* (Moraceae), *Ficus insipida* (Moraceae) and under leaves of *Dasylirum* spec. (Liliaceae). The species is frequently associated with oak and pine forests and lowland jungle (Baranowski & Slater 2005).
Distribution The species is recorded from the West Indies, Central and South America, being most recorded in Mexico (GBIF 2023, Baranowski & Slater 2005). The only two records of this species on the ABC islands are from Cobben from Curaçao at Hofje Knip (1956) and Hofje van der Mark (1957).

Gonatoides typicus Distant, 1882

Identification Pronotum not constricted. Clavus with dark markings and corium with multiple light spots. End of second antennal segment black.
Similar species *Valtissius distinctus* (in which clavus is uniformly pale) and *Gonatoides fasciata* (in which second antennal segment is unicoloured yellow or brown and corium without multiple light spots).
Ecology The ecology of this species is largely unknown. Swezey (1945) mentions a record of this species being intercepted from Colombia on plants of the orchid genus *Cattleya* spec. On Aruba, Cobben recorded four adult specimens, also mentioning nymphs, underneath dry herbs.
Distribution Widely distributed from Central America to the south of Bolivia (Baranowski & Slater 2005). The species is reported from Trinidad and Tobago, as well as Aruba (O'Donnell 1986). In addition to Aruba, the material collected by Cobben shows that the species also occurs on Curaçao and Bonaire and is therefore present on all of the ABC islands.

Heraeus triguttatus Guérin-Méneville, 1857

Identification Pronotum constricted in the middle. Head with distinct 'neck'. Femur of hind legs dark brown or black.
Similar species Rather distinctive species but could be confused with *Erlacda arhaphaeoides* (in which thorax is smaller and head is proportionately bigger).
Ecology Based on observation on Cuba, Myers & Salt (1926) stated that the species mimics the ant species *Pseudomyrmex flavidulus* (Baranowski & Slater 2005, Myers & Salt 1926).
Distribution The species is known from southern Florida and several West Indian islands (Baranowski & Slater 2005). Only one record is known from the ABC islands: Curaçao, Carmani, 3.VII.1957.

Neopamera albocincta Barber, 1952

Identification Pronotum constricted in the middle with the sides of the anterior part of the pronotum convex. Last antennal segment with pale ring. Corium with transverse dark band.
Similar species *Neopamera bilobata* (in which no ring on last antennal segment is present and

Figure 46. Habitat of *Neopamera bilobata*, Malpais, Curaçao. Photo Mathijn Speelman.

cuneus is pale), *Pseudopachybrachius vinctus* (in which corium is without brown band).
Ecology Ground-dwelling lygaeid, which often occurs at wet conditions and has been found to mainly forage on *Carex* and *Scirpus* (Sweet 1964). On Curaçao, Cobben recorded the species on *Typha latifolia*.
Distribution The species occurs from the eastern USA to the West Indies and southern Central America (GBIF 2023, Baranowski & Slater 2005). Recorded from Bonaire and Curaçao.

Neopamera bilobata Say, 1832

Identification Pronotum constricted in the middle with the sides of the anterior part of the pronotum convex. Last antennal segment without pale ring. Corium with transverse dark band.
Similar species *Neopamera albocincta* (in which pale ring on last antennal segment is present), *Pseudopachybrachius vinctus* (in which corium is without brown band).
Ecology Was found to be very common on Curaçao in 2021 occurring in a variety of habitats but most common in disturbed habitats such as parking lots and fallow grounds. In the literature it is mentioned to occur mainly in disturbed vegetation such as roadsides and old fields (Baranowski & Slater 2005, Rodríguez & Lucas 1998), which is consistent with our findings. It is a common pest species of strawberries in the southern USA (Talton et al. 2020). They were most often found on the ground but do also climb low vegetation.
Distribution Occurs from the state of New York (USA) southwards to southern Brazil and is widespread in the West Indies (GBIF 2023, Baranowski & Slater 2005). During fieldwork in 2022, the species was found to be common and often abundant on Curaçao. Also known from Aruba and Bonaire.


Figure 47. *Neopamera bilobata*. Photo Mathijn Speelman.

Paromius dohrnii Guérin-Méneville, 1857

Identification Pronotum constricted in the middle, with the anterior part of the pronotum reddish and rectangular shaped. Anterior part of the pronotum is ca. 1.9 times the posterior length.
Similar species *Paromius longulus* (in which anterior part of pronotum is 1.6 times posterior length and anterior lobe is dark brown to black).
Ecology The species has been reported on the seedheads of the grass *Andropogon bicornis* (Baranowski & Slater 2005). The only record during fieldwork in 2022 was made at an abandoned field in the center of Willemstad, Curaçao (no host plant recorded).
Distribution Although few records are available, the species seems to be well distributed over the West Indies (Baranowski & Slater 2005). The only record from the ABC islands is from Willemstad, Curaçao, 2022.

Paromius longulus Dallas, 1852

Identification Pronotum constricted in the middle, anterior part of the pronotum black and rectangular shaped. The anterior part of the pronotum is approximately 1.6 times the posterior length.
Similar species *Paromius dohrnii* (in which anterior part of pronotum is 1.9 times posterior length and anterior lobe is reddish).
Ecology Baranowski & Slater (2005) mention that *Paromius longulus* is often found together with *Neopamera bilobata* and *Pseudopachybrachius vinctus* in disturbed habitats where it can be

found above ground in the vegetation. Although we collected *N. bilobata* and *P. vinctus* on many locations in 2021 and 2022, we did not find any specimens of *P. longulus*. Hostplants on which the species has been recorded are *Digitaria sanguinalis* and *Andropogon* spec. (Baranowski & Slater 2005, Alayo 1973). On Curaçao, Cobben recorded the species on *Pennisetum setaceum.*
Distribution *Paromius longulus* has been recorded in many countries in North and South America and has a wide distribution in the West Indies (GBIF 2023, Baranowski & Slater 2005). On the ABC islands only recorded from Curaçao on multiple locations in 1956 but not found during the fieldwork in 2021 and 2022.

Prytanes oblongus Stål, 1862

Identification Pronotum constricted in the middle, with the anterior part being trapezium shaped. Apex of scutellum with vertical ridge. Third antennal segment largely light-coloured and the fore femur yellow with dark ring.
Similar species Resembles *Tempyra biguttula* (in which no apical vertical ridge on scutellum is present).
Ecology Found to be present in seed litter underneath *Amaranthus* spec. at a ruderal habitat near a beach on Tobago. Specimens were found in the shade of the plant, together with the lygaeids *Nysius raphanus* Howard, 1872 and *Neopamera bilobata* (Baranowski & Slater 2005).
Distribution The species occurs from Mexico through northern South America and is present on many West Indian islands (Baranowski & Slater 2005). Only one record of three specimens is available from the ABC islands: Curaçao, Pannekoek, 5.III.1956.

Pseudopachybrachius vinctus Say, 1832

Identification Pronotum constricted in the middle with the sides of the anterior part of the pronotum convex. Last antennal segment without pale ring. Corium without transverse dark band.
Similar species Resembles *Neopamera bilobata* (in which a brown band on corium is present) and *Neopamera albocincta* (in which pale ring on last antennal segment is present).
Ecology During fieldwork in 2021 and 2022 this species was found to be common on Curaçao mainly occurring at roadsides, fallow grounds and parking lots. This agrees well with literature which mentions the species from temporary

Figure 48. Habitat of *Ochrimnus carnosulus*, Muizenberg, Curaçao. Photo Mathijn Speelman.

habitats such as roadsides, abandoned fields and gardens (Baranowski & Slater 2005). The species has also been recorded from hot and arid sites such as beaches. Although *P. vinctus* is primarily observed to be macropterous in other locations, in these extreme sites, the species develops sub-macropterous and brachypterous populations, which suggests that these locations can serve as relatively permanent habitats (Zheng & Slater 1984). Several of the records made by Cobben are from specimens attracted by light.
Distribution Occurs from the eastern USA to the West Indies and southern Central America (GBIF 2023, Baranowski & Slater 2005). The species is common on all ABC islands and during fieldwork in 2021 and 2022 was found to be the most common species of Rhyparochrominae on Curaçao.

Tempyra biguttula Stål, 1874

Identification Pronotum constricted in the middle, with the anterior part being trapezium shaped. Apex of scutellum without vertical ridge.
Similar species Resembles *Prytanes oblonga* (in which a apical vertical ridge on scutellum is present).
Ecology The ecology is largely unknown. Two different records describe the habitat of the species. One refers to its hibernation under sycamore tree bark (Blatchley 1926) while the other mentions its occurrence on *Canavalia* in Hawaii (Zimmerman 1948). Several of the records made by Cobben refer to specimens attracted by light.
Distribution Widespread species ranging from Maryland (USA) to the West Indies where it is present on several northern islands, as well as introduced specimens in Hawaii (Baranowski & Slater 2005). Two records are known from the ABC islands: Aruba (Hofje St. José, palm beach, 18.IV.1957), and Curaçao (Julianadorp V-VI.1957).

Valtissius distinctus Distant, 1901

Identification Pronotum not constricted and clavus pale.
Similar species *Gonatoides typicus* (in which end of second antennal segment is black and corium has multiple isolated light spots) and *Cryphula fasciata* (in which end of second antennal segment is unicoloured yellow or brown and corium without multiple light spots).
Ecology Reported to occur on grasses and sedges in damp meadows, on abandoned fields, and in marshy areas. One record mentions specimens swept from *Cyperus luzulae* (Baranowski & Slater 2005). Cobben recorded the species underneath *Acacia villosa* and collected specimens on light.
Distribution Widespread in the Americas, occurring from Texas (USA) to Argentina and recorded from multiple islands in the West Indies (Baranowski & Slater 2005). Cobben collected the species on Bonaire (one location) and Curaçao (seven records from six locations).

Subfamily Lygaeinae

Lygaeus argutus Brailovsky, 1982

Identification Large species, membrane with white spots. Distal half of clavus completely black.
Similar species No particular similar species are reported.
Ecology Little is known about the ecology of the species. Perfetti & Moreno (2019) report the species on *Calotropis procera* in Venezuela. This is in line with our observation of both nymphs and adults on *C. procera* in fallow grounds on Curaçao (2022).
Distribution The species has been reported from Central America and Venezuela (GBIF 2023, Baranowski & Slater 2005). The only record for the ABC islands was made in 2022 on Curaçao (Kaya Grote Berg, 18.IX.2022).

Figure 49. *Ochrimnus carnosulus*. Photo Mathijn Speelman.

Ochrimnus (Parachrimnus) carnosulus Van Duzee, 1914

Identification Small species, membrane completely black.
Similar species No particular similar species are reported.
Ecology The species has been recorded on goldenrod *Solidago* and was found reproducing on *Baccharis trinervis* in 1982 (Baranowski & Slater 2005). In 2022, the species was found to be present at the wet depression of the Muizenberg in Curaçao where it was found to be very abundant.
Distribution The species occurs from the southwest of the USA to Central America with one record known from Trinidad (Baranowski & Slater 2005). In 2022 the species was found to be present in large numbers in four locations in Curaçao.

Spilostethus pandurus Scopoli, 1763

Identification Large species, membrane with white spots, clavus with round distal black spot.
Similar species No similar species are reported.
Ecology Reported on *Calotropis procera* in Sudan (Abushama & Ahmed 1976). This is in line with our observation of copulas on leaves of *C. procera*. In other regions, the species has been found to feed on many other species and families of plants and has been shown to develop cannibalistic traits in opportunistic situations (Fois 2021).
Distribution *Spilostethus pandurus* is originally a Palaeartic species which has been introduced in various other continents. The species currently has a very wide geographic range including the Mediterranean, central Europe, southern Africa, the Middle East, and is also reported for Australia (GBIF 2023, Péricart 2001, Silvestri 1939). First recorded in the Caribbean region in 2018. Only recent records are available for Bonaire and Curaçao. Not reported on Aruba.

DISCUSSION

The 132 records presented in this paper for the Rhyparochrominae and the Lygaeinae of Aruba, Bonaire and Curaçao are from the period 1956-1958 (96 records) and from 2021-2022 (31 records), including two records from Observation.org.
In total 16 species were recorded, 12 during the period 1956-1958 and six during the recent period.

The larger number of species collected in the period 1956-1958 could at least partly be explained by the more extensive fieldwork during that period. This covered a larger variety of seasons and all three islands were sampled. However, all of the species found in the period 1956-1958 were also recorded on Curaçao so that the additional sampling on Aruba and Bonaire does not explain the difference. It is remarkable that only two of the 16 species were found in both periods. This shift in species composition is unexpectedly large. This could be explained by observer bias or by genuine changes in the fauna due to changes in vegetation cover.

Besides the sampling performed in the period 1956-1958 being more extensive, it was also conducted over a larger period of the year. The fieldwork in 2021 and 2022 took place in the dry season or at the very start of the wet season. In this part of the year the number of adult individuals is probably smaller and their activity is probably lower so fieldwork in January or February might

Table 1. Records (species on a date on a location) of Rhyparochrominae on the ABC islands. Records for Curaçao are split into records from the collection Cobben and records from 2021-2022.

	Aruba	Bonaire	Curaçao	
	Cobben	Cobben	Cobben	2021-2022
Cryphula fasciata	0	0	4	0
Erlacda arhaphaeoides	0	0	1	0
Froeschneria piligera	0	0	3	0
Gonatoides typicus	4	2	1	0
Heraeus triguttatus	0	0	1	0
Neopamera albocincta	0	0	9	0
Neopamera bilobata	2	2	14	13
Paromius dohrnii	0	0	0	2
Paromius longulus	0	0	7	0
Prytanes oblongus	0	0	1	0
Pseudopachybrachius vinctus	4	7	24	4
Tempyra biguttula	1	0	1	0
Valtissius distinctus	0	1	7	0

be more productive. The fieldwork in 2022 was largely conducted by using a sweeping net. This method is very effective for collecting specimens from shrubs and herbs, but not all species are present in this layer of the vegetation. In 2021 and 2022 the use of a litter-sieve was found unproductive as the amount of litter was generally very low and generally contained few insects. Other successful methods such as the use of pitfall- or malaise traps were not used in 2021 or 2022. At least some of the species caught in the 1950s were collected on light, a method not used in 2021 or 2022.

The magnitude of the shift in species composition makes that it is unlikely to be fully explained by differences in fieldwork. Since the 1950's, the vegetation of Curaçao has changed dramatically. In colonial times, the trees and shrubs of the ABC islands were largely removed, after which a large part of the island experienced further habitat degradation due to intensive grazing activity of sheep and mainly goats (Van Buurt 2010). Due to the abundance of introduced herbivores, the vegetation was for a long period largely dominated by older trees with thorns and fast-growing grasses and herbs (Hoen 2021, Coolen 2015). In the period between 1980 and 1990 measures were taken to limit overgrazing by goats which led to a fast regeneration of woody vegetation since (Hoen 2021). It might be that in the period 1956-1958 the general vegetation on Curaçao was more favourable for Lygaeidae but available data and

Table 2. Records (species on a date on a location) of Lygaeinae on the ABC islands. Records for Bonaire are split into records by Cobben and records published on Observation.org. Records on Curaçao are split into records by Cobben and records from 2021 and 2022.

	Aruba	Bonaire		Curaçao	
	Cobben	Cobben	Observation.org	Cobben	2021-2022
Lygaeus argutus	0	0	0	0	1
Ochrimnus (Parochrimnus) carnosulus	0	0	0	0	5
Spilostethus pandurus	0	0	2	0	4

understanding of the development of vegetation is too limited to be certain. Some changes in fauna might be related to the introduction of species. *Spilostethus pandurus* is a Palaearctic species and has been introduced into the Caribbean and was probably really absent in the 1950s. This species and *Lygaeus argutus* was found on *Calotropis proce*ra (Apple of Sodom), a species native to the Old World but nowadays common in urban areas of Aruba, Bonaire and Curaçao. It is not unlikely that *Calotropis procera* was absent or at least rare on Curaçao in the 1950s which might explain the absence of these two lygaeids in this time period.

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SAMENVATTING

Bodemwantsen van de subfamilies Lygaeinae en Rhyparochrominae van Aruba, Bonaire en Curaçao (Heteroptera: Lygaeidae)

Tussen september 1956 en juli 1957 voerde de Nederlandse Heteroptera-expert René Cobben veldwerk uit op zes Nederlandse Caribische eilanden. Op basis van zijn verzamelde gegevens en in samenwerking met andere experts publiceerde hij een serie van tien artikelen over verschillende wantsenfamilies. Grote delen van het verzamelde materiaal bleven echter ongepubliceerd, wat voor sommige families tot gevolg heeft gehad dat er een beperkte kennis is over het voorkomen op deze eilanden. In dit artikel presenteren we waarnemingen en een identificatiesleutel voor de subfamilies Rhyparochrominae en Lygaeinae (familie Lygaeidae) van Aruba, Bonaire en Curaçao, gebaseerd op het materiaal van Cobben en aangevuld door monsters verzameld in 2021 en 2022. In totaal zijn er 132 waarnemingen verzameld van in totaal 13 soorten van Rhyparochrominae en 4 soorten Lygaeinae. Alhoewel veel soorten in vergelijking met de jaren 1950 niet teruggevonden zijn in 2021-2022, is er ook een opvallend aantal wantsen nieuw voor de eilanden. Het is nog onduidelijk waardoor deze verandering in de soortsamenstelling plaats heeft gevonden, maar waarschijnlijk is deze minimaal deels toe te schrijven aan veranderingen in de vegetatie en het milieu sinds de jaren 1950.

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