

ILLUSTRATED CHECKLIST OF THE WATERBUGS OF THE DUTCH CARIBBEAN (HETEROPTERA: GERROMORPHA, LEPTOPODOMORPHA, NEPOMORPHA)

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In this paper we present new records and an updated overview of the waterbugs recorded on the Dutch Caribbean islands. This work is based on material collected by the authors in 2022–2023 and material present in several collections. A total of 45 species of waterbugs have been recorded in the Dutch Caribbean, including seven which are recorded here as new: *Belostoma minusculum*, *Lethocerus annulipes*, *L. maximus*, *Corisella edulis*, *Tenagobia spinifera*, *Rheumatobates imitator* and an undescribed species of *Rheumatobates*. A checklist of the species, habitus photographs and a discussion on the faunal composition of each island are provided.

INTRODUCTION

The Dutch Caribbean (the former Netherlands Antilles) includes the islands of Sint Maarten (Dutch part of Saint Martin), Saba, Sint Eustatius, Bonaire, Curaçao and Aruba. Based on the location of the six involved islands, the Dutch Caribbean can be divided into two groups: Sint Maarten, Saba and Sint Eustatius lie in the northeast of the Caribbean, and Aruba, Bonaire and Curaçao line up in the south of the Caribbean, not far from the coast of Venezuela. Information on the climate and habitats found on these islands together with information on entomological exploration with a focus on Coleoptera can be found in Colijn et al. (2020). All these islands are relatively small, lack larger running waters and have a low number of permanent freshwater habitats.

The waterbugs of this area are comparatively well-known mainly due to a series of papers by Dutch entomologists published in the 1960s. These publications were largely based on material collected in the 1950s and 1960s by Pieter Wagenaar Hummelinck (Utrecht University) and René Hubert Cobben (Wageningen University), with the latter intensively sampling Heteroptera on all six major

islands from October 1956 to July 1957. Cobben published the results of his fieldwork in a series of papers of which three deal with aquatic Heteroptera: Gerromorpha except Hebridae (Cobben 1960a), Saldidae (Cobben 1960b) and Hebridae (Drake & Cobben 1960). These three publications contain excellent habitus drawings and, where necessary for identification, drawings of structural details. A few years later Nico Nieser treated the Nepomorpha in a series of papers: Notonectidae (Nieser 1967), Corixidae (Nieser 1969a), families Pleidae, Naucoridae, Ranatridae (nowadays placed as Ranatrinae in Nepidae (Nieser 1969b), Notonectidae (Nieser 1969c) and Corixidae (Nieser 1970). Line illustrations of key characters were given in all these papers to aid the specific identification.

The extensive material collected by Cobben is now housed in Naturalis Biodiversity Center (Leiden, the Netherlands) (RMNH). The material collected by Wagenaar Hummelinck (1953) is mostly preserved in alcohol and is divided between the RMNH collection and the private collection of Nico Nieser and Ping-ping Chen (NCTN) in Tiel (the Netherlands).

In 2021 and 2022 several of the authors collected arthropods on Bonaire and Curaçao: Berend Aukema, Vincent Kalkman, Harry Smit, Oscar Vorst, Mathijn Speelman and Jonne Veldboom. Part of the material of Bonaire was collected during the Bonaire Estafette Expeditie (BEE), which was held from October 2022 to March 2023 (Kalkman et al. 2025). The material of waterbugs was forwarded to Nico Nieser and Ping-ping Chen for identification. Despite the extensive works on waterbugs of the Dutch Caribbean published in the 1960s the new material was found to include numerous new islands records and several species new to the Dutch Caribbean. In addition, study of the older material in the RMNH and NCTN revealed additional new species based on which a total of seven species of waterbugs can be added to the list of species occurring in the Dutch Caribbean.

In this paper we present the distribution data and information on recognition of nine species that are new to one of the Dutch Caribbean islands, seven of which being new to the Dutch Caribbean. We also present an overview of all waterbugs known from the Dutch Caribbean indicating their presence on each of the six islands, with notes on identification and discuss the faunal composition of the islands. All species known from the Dutch Caribbean are depicted, facilitating easy recognition for future studies.

MATERIAL AND METHODS

All measurements are in mm. Length is the median length from the apex of the head to the caudal tip of the hemielytra or abdomen in case the hemielytra do not cover the abdomen. Width is the maximum width of the respective part of body. Both are measured in dorsal view. The genitalia were treated with 10 % KOH and stored either in pure glycerin or glued on the labels with the specimen.

For studying Micronectidae and Corixidae, it was necessary to make slides. The whole insect was

processed in the following steps: 10 % KOH > 10 % acetic acid > 50 % ethanol > 70 % ethanol > 96 % ethanol > clove oil > Canada Balsam.

For the morphological study and identification of the specimens a Zeiss Discovery V8 STEREO binocular and a Nikon Eclipse E600 compound microscope was used. The habitus and paramere photographs were taken at Naturalis by using a Zeiss STEREO Discovery V12 microscope with a Zeiss Planapo S 1.0x FWD 60 mm lens and SYCOP control driven by the Zeiss CL 1500 ECO light source and AxioVision SE64 Rel. 4.9.1 software. The photographs were further processed by using Adobe PhotoShop CC.

Most specimens are pinned and a few will be deposited in the slide collection. The material collected in 2022-2023 is be stored at the Nieser & Chen Collection (Tiel, the Netherlands) (NCTN) and the collection of Naturalis Biodiversity Center (Leiden, the Netherlands) (RMNH). In the future all material will be included in the collection of Naturalis. The records on which this paper is based are available in a dataset on GBIF (doi.org/10.15468/frputk).

The following terminology is used.

Anterior width of vertex: in dorsal view, the width between the eyes anteriorly.

Pala: the modified, one segmented fore tarsus of Corixoidea, in males often diagnostic on species level.

Rostral prong: paired lateral outgrowth of the third rostral segment in male *Buenoa* (Nieser 1969c).

Synthipsis: the shortest distance between the eyes posteriorly.

Tylus: in *Buenoa* the somewhat swollen clypeus, dorsally of the labrum.

Ventral diverticulum: the posterior part of the phallus in Belostomatidae (figure 5).

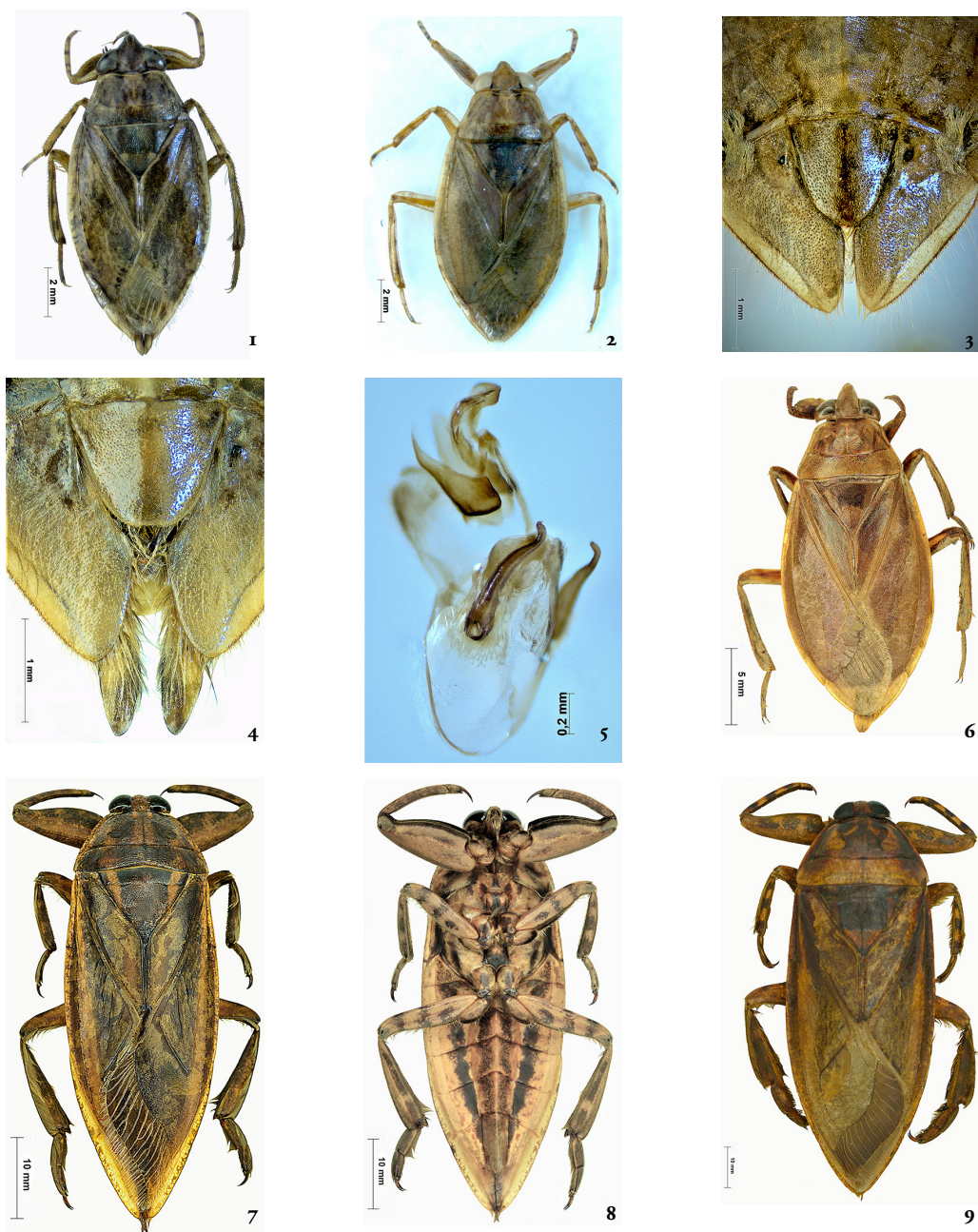
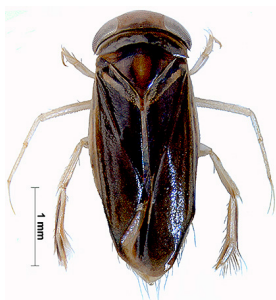


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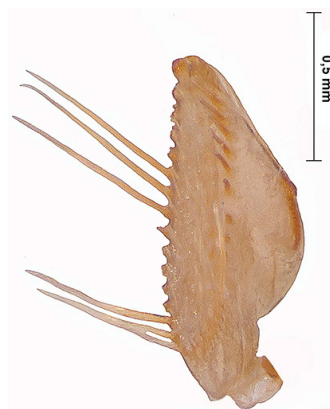
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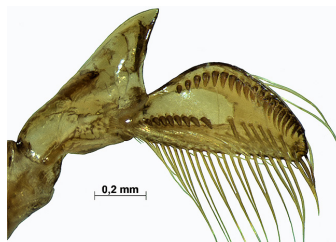
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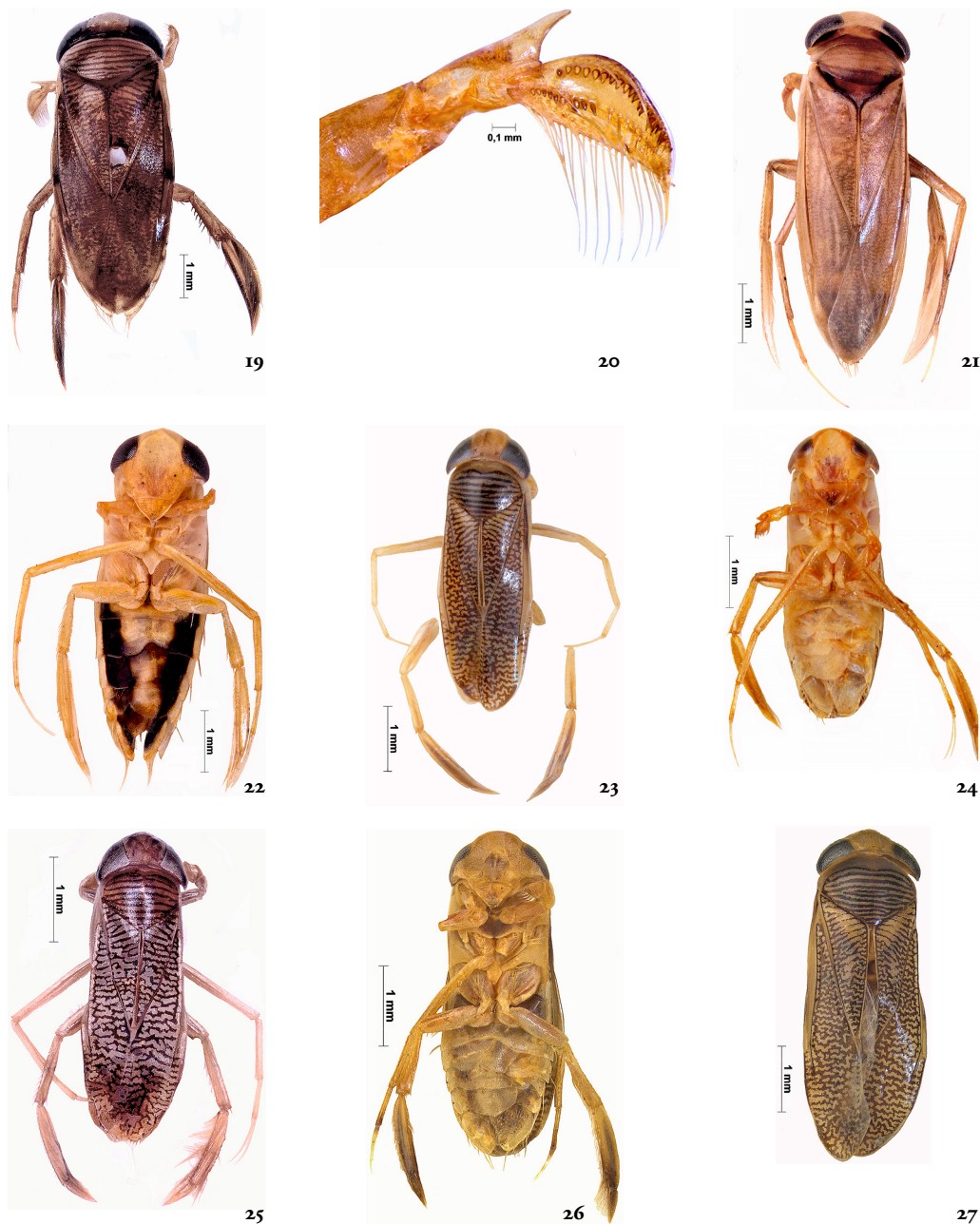


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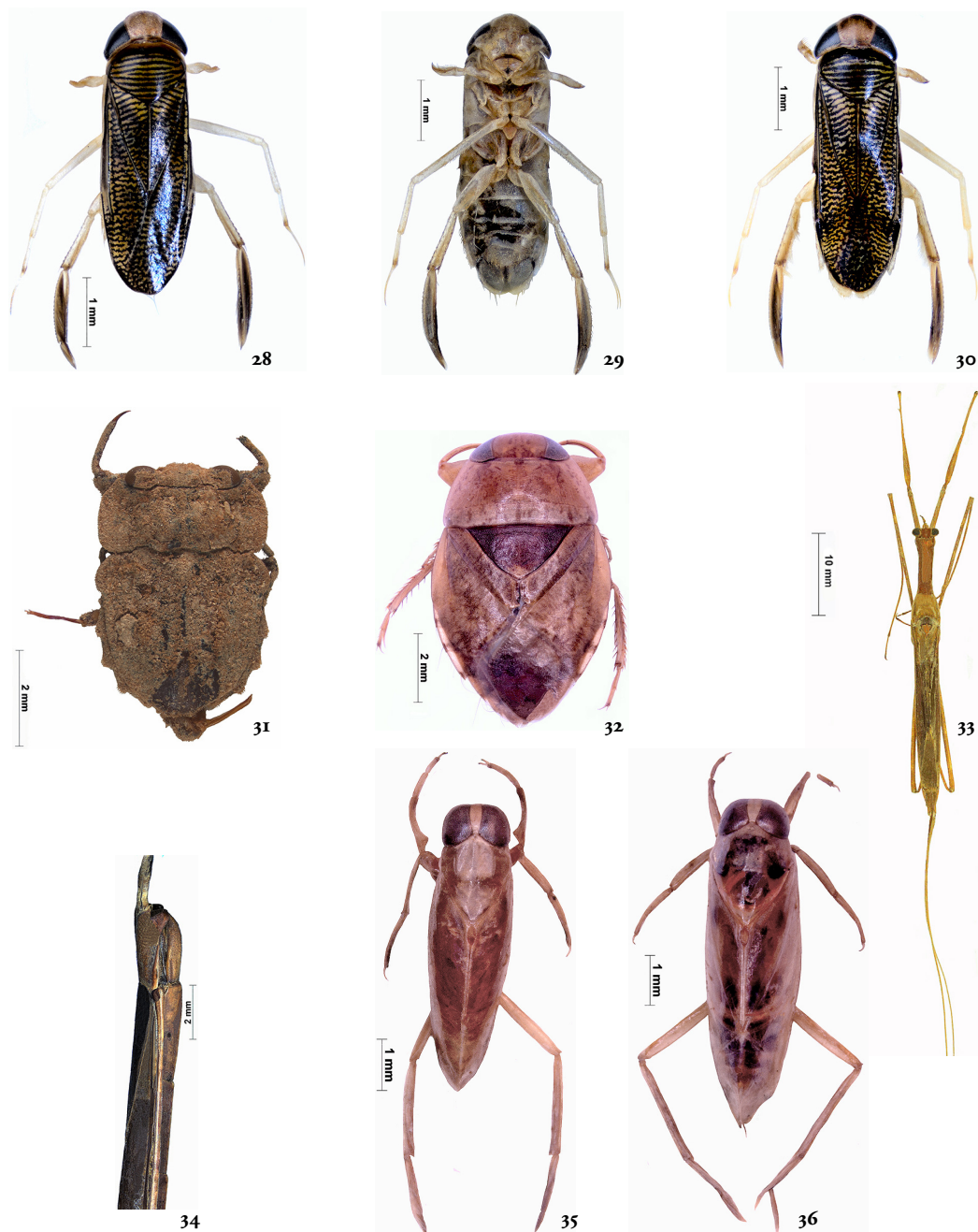


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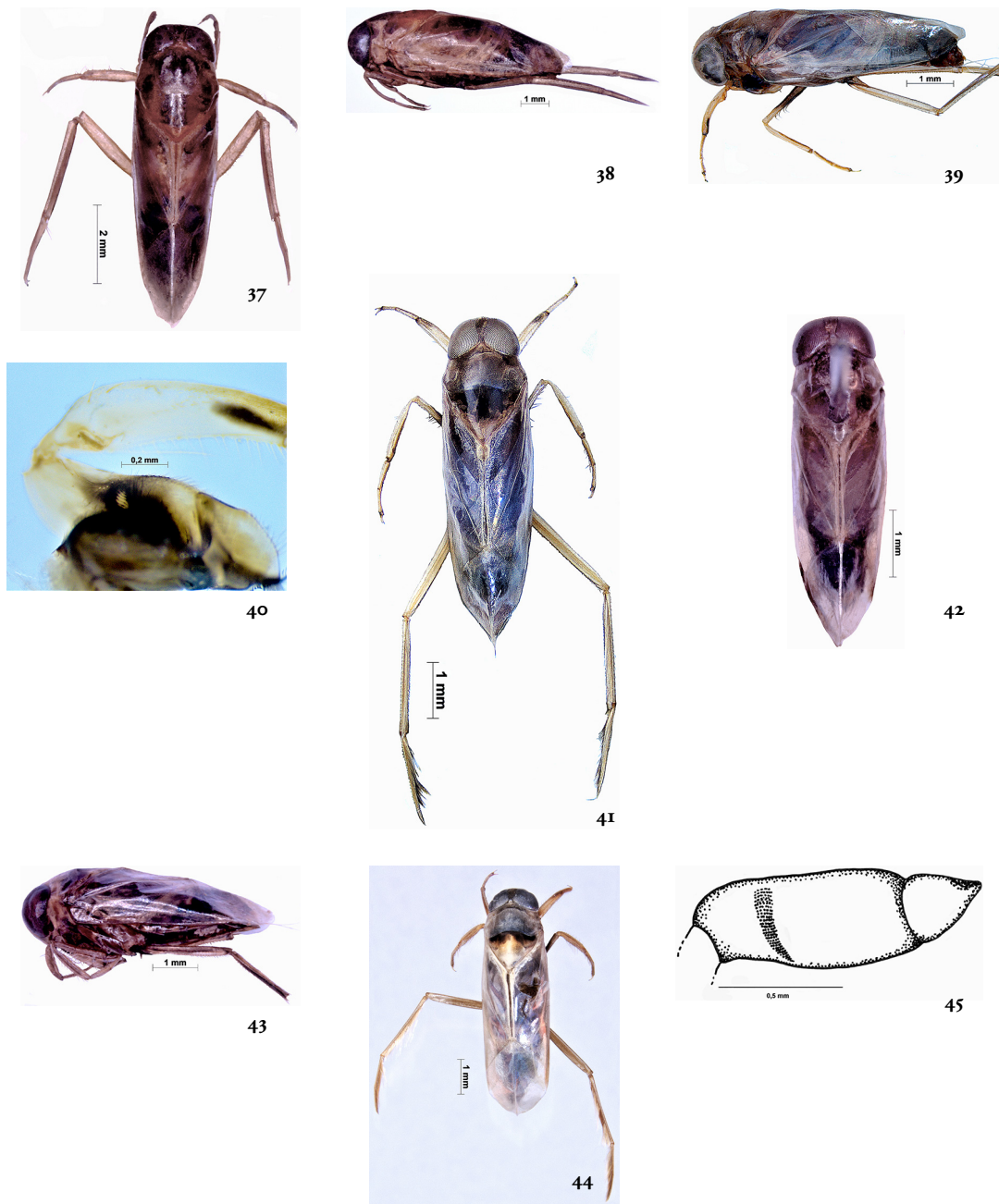


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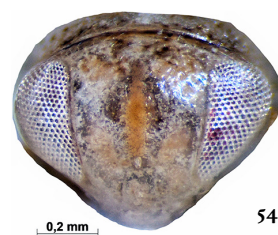
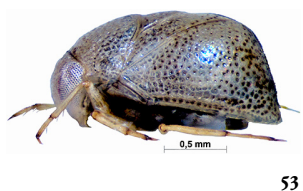
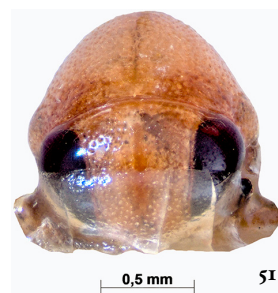
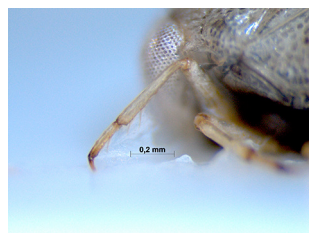


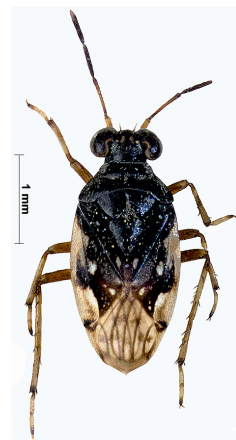
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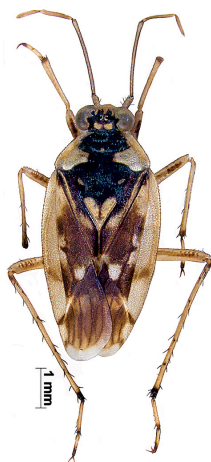
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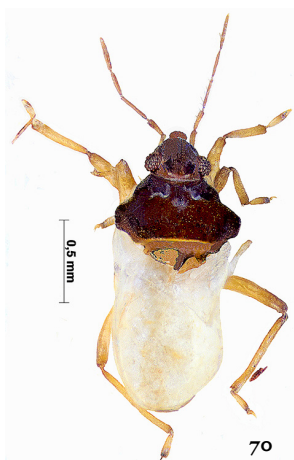
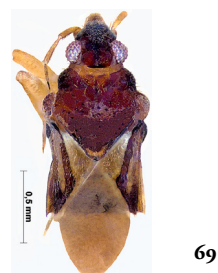
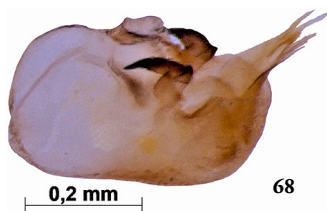
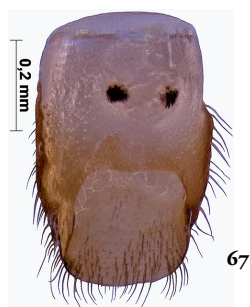


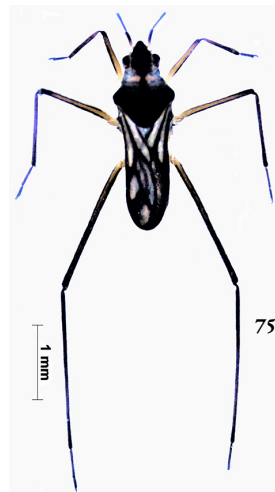
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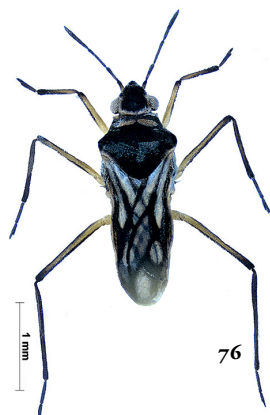
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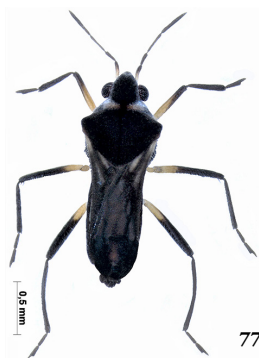
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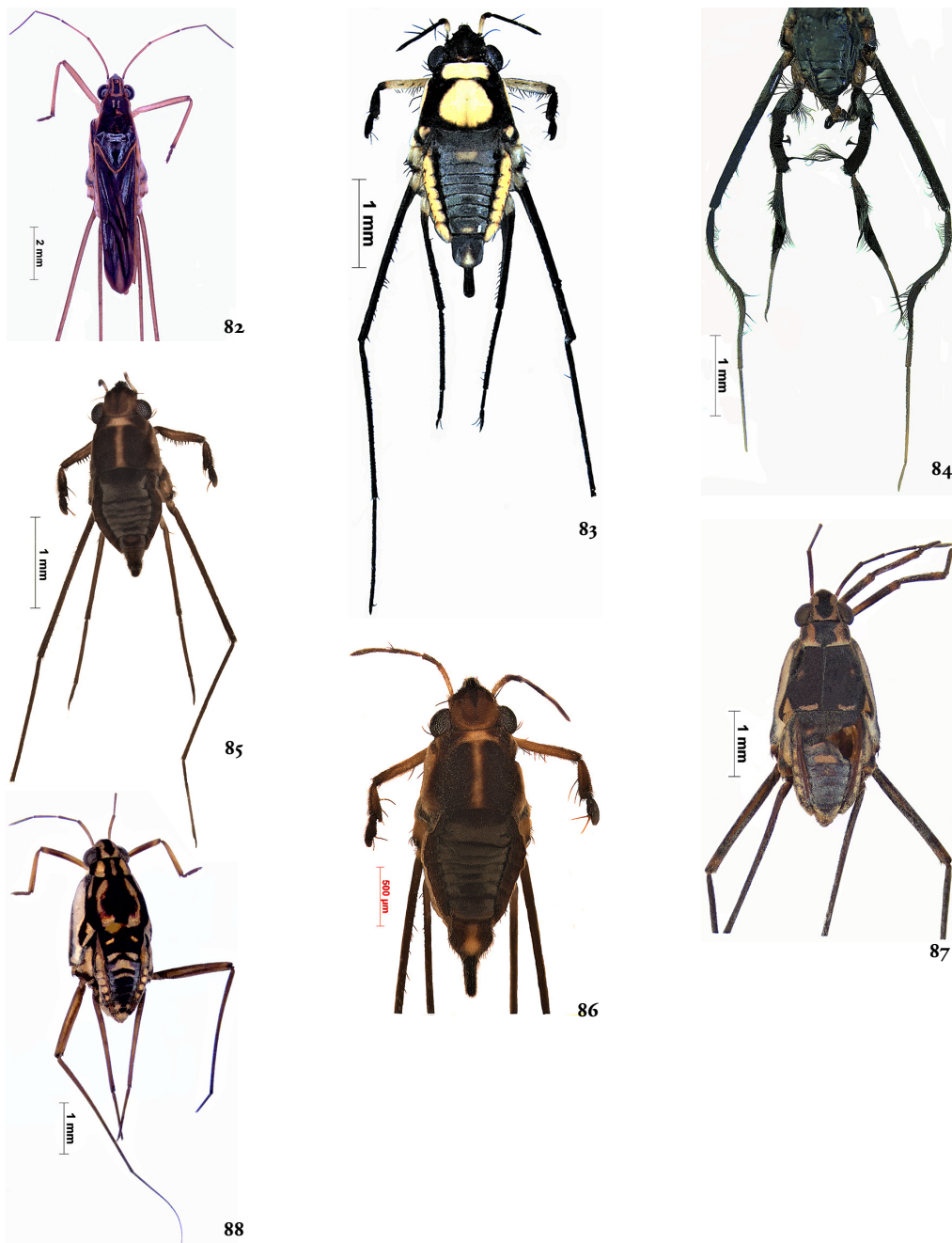


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RESULTS

A checklist of the Gerromorpha, Leptopodomorpha and Nepomorpha of the Dutch Caribbean is presented. For each of the islands, Aruba, Bonaire, Curaçao, Sint Eustatius, Sint Maarten and Saba, the occurrence is indicated. Locality information is provided for species new to an island or the Dutch Caribbean as a whole. In the general distribution Mexico is included in Central America. Aruba, Bonaire and Curaçao are jointly referred to as ABC Islands.

Infraorder Gerromorpha

Family Mesoveliidae

Mesovelia amoena Uhler, 1894

(fig. 63-65)

Bonaire, Curaçao, Sint Eustatius (Cobben 1960a). A widespread species, ranging from the USA through Central America and the Antilles to southeastern Brazil (Nieser & Lane de Melo 1997). Due to its small size and cryptic habits probably often overlooked. Male specimens are extremely rare.

Mesovelia mulsanti White, 1879

(fig. 66-68)

Aruba, Bonaire, Curaçao, Sint Maarten (Cobben 1960a). A widespread species, occurring from southern Canada through Central America and the Antilles to northern Argentina. *Mesovelia mulsanti* usually is over 3 mm long, whereas *M. amoena* is under 2.5 mm. In addition, the middle femur of *M. mulsanti* posteriorly bears a row of small spines, which is lacking in *M. amoena* (fig. 65, 66).

Family Hebridae

Hebrus Curtis, 1833

Hebrus concinnus and *H. consolidus* prefer low wet grassy meadows, bordering various bodies of

water. Cobben, who especially looked for them, could only find one of each (Drake & Cobben 1960). These specimens are the damaged specimens in figure 69-71. *Hebrus elimatus* lives on salty mud flats at the foot of halophilous plants, sometimes in large numbers, making it much easier to collect. We refer to Drake & Cobben (1960) for identification.

Hebrus concinnus Uhler, 1894

(fig. 69)

Curaçao (Drake & Cobben 1960). Distributed from southeastern Canada, eastern and southern USA to Panama and the West Indies, also recorded from Peru (Polhemus & Chapman 1979).

Hebrus consolidus Uhler, 1894

(fig. 70, 71)

Curaçao (Drake & Cobben 1960). Distributed from eastern USA to Central America and the West Indies.

Hebrus elimatus Drake & Cobben, 1960

(fig. 72)

Aruba, Bonaire, Curaçao (Drake & Cobben 1960). This species is only known from the ABC islands.

Merragata hebroides White, 1877

(fig. 73, 74)

Aruba, Bonaire, Curaçao (Drake & Cobben 1960). Distributed all over the Americas except Chile (Prado 2008). It also occurs on Hawaii and the Canary Islands (Drake & Cobben 1960). In *Hebrus* the distal antennal segment is incised, so it seems that there are five antennal segments. In addition, the two distal segments are long and thin. *Merragata* has four short antennal segments

of equal width (fig. 71, 73). *Merragata hebroides* is variable in colour (fig. 73, 74).

Family Veliidae

Microvelia longipes Uhler, 1894

(fig. 75, 76)

Aruba, Bonaire, Curaçao, Sint Eustacius, Sint Maarten (Cobben 1960a). Found in the West Indies and South America, not recorded from Chile (Prado 2008). Males can be recognised by their long hind legs (fig. 75), in females the hind femur reaches or just surpasses the apex of the abdomen. In both sexes of *M. pulchella* the hind femur does not reach the apex of the abdomen.

Microvelia pulchella Westwood, 1834

(fig. 77-79)

Aruba, Bonaire, Curaçao, Sint Maarten, Saba. Also found on the satellite islands Klein Bonaire and Klein Curaçao (Cobben 1960a). Distributed from southern Canada through Central America and the West Indies to South America, not recorded from Chile (Prado 2008). Males can be recognised by the curved hind tibia (fig. 77), the apterous females have a characteristic oval body shape (fig. 79), see also under *M. longipes*.

Rhagovelia plumbea Uhler, 1894

(fig. 80-81)

Aruba, Bonaire, Curaçao (Cobben 1960a). Known from Florida through the West Indies and the eastern coast of Central America to Venezuela. This species occurs on brackish waters and also on the sea at quiet places near the shore. Carpenter (1898a) described *Trochopus marinus* from Jamaica, which he shortly afterwards synonymised with *Trochopus plumbeus* (Uhler, 1894) (Carpenter 1898b). *Trochopus* species are recognised by the middle and hind tarsi having two segments only.

Also, the fore tarsi often have two segments. Other *Rhagovelia* species have three segmented tarsi. Polhemus (1997) states that the name *Trochopus* should be abandoned, based on cladistic analysis. As it is still practical to have a name by which to refer to the marine *Rhagovelia*, which form a monophyletic unit, Polhemus (1997) proposes to refer to these as the *salina*-group within the *angustipes*-complex.

Family Gerridae

Limnogonus franciscanus Stål, 1859

(fig. 82)

Sint Eustacius Hotel at Zeelandia Beach, 17.5078, -62.9818, 16.X.2015, 2 ♂ (RMNH.5015380, 5015425), 1 ♀ (RMNH.5015381), K. Beentjes, col. RMNH.

Aruba, Bonaire, Curaçao, Sint Maarten (Cobben 1960a), Sint Eustacius (present paper). Found in the southern USA, Central America, West Indies and South America. New record for Sint Eustacius. The species was already known from Aruba, Bonaire, Curacao and Sint Maarten. This is a widespread species found in the southern parts of the USA, Central America and South America and it is common on the Antilles and in Central America (Cobben 1960a).

Rheumatobates imitator Uhler, 1894

(fig. 83, 84)

Bonaire Kralendijk, 12.1480 -68.2736, 27.XII.2022, 1 apterous ♀, 1 macropterous ♂, 2 younger larvae, V.J. Kalkman, col. RMNH.

New record for the Dutch Caribbean. Bonaire (present paper). Widespread in the Antilles, also recorded from Venezuela and quite common in Trinidad (Nieser & Alkins-Koo 1991). *Rheumatobates* are small bugs with a length of 1.6-3.0 mm. The last abdominal segment of the female is long and subcylindrical. Most males have modified

hindlegs and often also modified midlegs (fig. 84). Males of *R. imitator* can be distinguished from species with similar modified hindlegs by their strongly sinuate middle tibia (fig. 84).

Rheumatobates spec.

(fig. 85, 86)

Bonaire Lac, Awa lodo di Bacuna, 15.VIII.1967, 2 ♂, 2 ♀, 2 apterous larvae, P. Wagenaar Hummelinck, col. RMNH.

New for the Dutch Caribbean. Bonaire (present paper). With the key of Hungerford (1954) this species leads to *R. minutus* Hungerford, 1936, but males of that species lack spines on the front femur, which are clearly present in the present species (fig. 85). The male of *R. urabaensis* Molano et al., 2017 from the Caribbean mangrove of Colombia has modified antennae and forelegs. Other relevant *Rheumatobates* species, e.g. *R. peculiaris* Polhemus & Spangler, 1989 and *R. plumipes* Castro-Vargas & Morales-Castaño, 2011, have modified hind legs (Molano et al. 2017). So this species is apparently undescribed and will be described in a forthcoming publication. Awa is a corruption of ‘aqua’ and ‘awa lodo’ means muddy water. Bacuna is an estate on the northeastern edge of the Lac near the present Mangrove Center. This species has probably been collected in the mangrove of the Lac. Since 1967 this location has been altered considerably mainly due to the construction of a dam and it is unclear if the species is still present. Collectors should be aware that at first sight *Rheumatobates* adults look like small larvae of larger Gerridae.

***Trepobates taylori* Kirkaldy, 1899**

(fig. 87, 88)

Aruba, Bonaire, Curaçao (Cobben 1960a), Sint Maarten (Kittle 1977). Found in the USA (Texas), Central America, West Indies and the northwest of South America (Kittle 1977). The male can be

distinguished from other *Trepobates* by the distally constricted fore femur (Kittle 1977).

Infraorder Leptopodomorpha

Family Saldidae

Due to their agility Saldidae are difficult to collect with a net suited for aquatic collecting. They are best collected by carefully inspecting the collecting site and sucking them up with an exhaustor or putting a glass tube over them. For identification we refer to the richly illustrated papers of Cobben (1960b) and Polhemus (1985).

***Micracanthia drakei* Cobben, 1960**

(fig. 56)

Aruba, Bonaire, Curaçao (Cobben 1960b). Occurs on the ABC islands and in Central America (Polhemus 1985). *Micracanthia drakei* is very similar to *M. humilis*. However, *M. drakei* has silvery hairs on the clavus whereas these hairs in *M. humilis* are gold-coloured (Cobben 1960b).

***Micracanthia humilis* Say, 1832**

(fig. 57)

Curaçao, Sint Eustatius, Sint Maarten (Cobben 1960b). Widespread species ranging from southern Canada through all states of the USA, Central America and the West Indies to Brazil (Polhemus 1985). Similar to *M. drakei* see above.

***Micracanthia husseyi* Drake & Chapman, 1952**

(fig. 58)

Sint Maarten (Cobben 1960b). Found in the USA (southern states and New Jersey), Mexico, Guatemala and Saint Martin (Polhemus 1985). The male from Saint Martin in figure 58 looks quite different from the other *Micracanthia*. However, that is because this specimen is submacropterous,

whereas the others are macropterous. Polhemus (1985) states that the specimens he has seen from Central America are all macropterous. *Micracanthia husseyi* can be recognised by the third antennal segment being as long as or slightly longer than the second segment. In the other *Micracanthia* the third antennal segment is shorter than the second.

Pentacora signoreti signoreti

Guérin-Ménéville, 1857

(fig. 59)

Sint Maarten (Cobben 1960b). Found along the Atlantic Coast, from southeastern Canada to Veracruz in Mexico including the northern Antilles. Along the Pacific Coast from Costa Rica northwards to southern California. The subspecies *P. signoreti yucatanae* Hodgden, 1949 seems to be restricted to Yucatán. In Canada and the USA. *Pentacora s. signoreti* is common on salty substrates in the interior but in Central America it has only been found at the coast (Polhemus 1985). *Pentacora sphaelata* is distinctly smaller, see below.

***Pentacora sphaelata* Uhler, 1877**

(fig. 60)

Aruba, Bonaire, Curaçao, Sint Maarten (Cobben 1960b). Distributed along the Atlantic Coast from Newfoundland to Mexico, including the West Indies, Pacific Coast from Panama to southern California. In addition, it occurs on the Galapagos Islands and the western mediterranean region of the Old World (Polhemus 1985). *Pentacora sphaelata* is distinctly smaller than *P. s. signoreti*, 3.9-5.1 mm and 6.5-7.4 mm, respectively (Cobben 1960b).

***Saldula dentulata* Hodgden, 1949**

(fig. 61)

Bonaire, Curaçao (Cobben 1960b). Recorded from Costa Rica, Panama, Ecuador, Peru, Curaçao, Bonaire, Grenada and Brazil (Polhemus 1985). This species is similar to *S. lomata*. Both have a white spot at the caudal tip of the clavus. In *S. lomata* this spot is long, elongate and thin whereas in *S. dentulata* it is shorter and broader (fig. 61, 62).

***Saldula lomata* Polhemus, 1985**

(fig. 62)

Sint Maarten (Cobben 1960b). Recorded from the southeastern USA, Mexico, Guatemala,



Figure 89. Wechi lake, Curaçao.
Photo Mathijn Speelman.



Figuur 90-91. Salina St. Marie, Curaçao. Photos Mathijn Speelman.

Honduras and the Antilles (Polhemus 1985). Cobben (1960b) studied specimens from Alaska, Newfoundland and Saint Martin. These specimens are now in RMNH. He concluded that they belong to the *palustris*-complex but stated that this complex is much more intricate in the New World than in the Old World. As he had only a few specimens from one location at his disposal he could not distinguish the Sint Maarten specimens from northern ones and provisionally identified them as *S. 'palustris'*. Polhemus (1985) had more material from many localities available and was able to describe and differentiate this species.

Infraorder Nepomorpha Family Belostomatidae

Belostoma minusculum Uhler, 1884 (fig. 1-5)

Bonaire Sewage treatment plant, pool overgrown with grasses, 12.1580 -68.2565, alt. 12 m, 8.XII.2021, 1 ♀, V.J. Kalkman & O. Vorst, col. NCTN.

Curaçao Christoffel NP Pos Shimaron, 12.3434 -69.1224, alt. 69 m., 29.XI.2021, 1 ♂, 1 ♀, leg. H. Smit, col. NCTN (♂), RMNH (♀).

New for the Dutch Caribbean. Bonaire, Curaçao (present paper). Found in Central America from Costa Rica to Panama ranging southwards to Venezuela (Estévez & Polhemus 2007). This

species belongs to the *B. plebejum*-group of Lauck (1962), modified by Nieser (1975). *Belostoma minusculum* can be recognised by the length of segment I of the rostrum being subequal to segment II (in most other species of this group segment I is distinctly shorter), combined with a prominent prosternal keel and lateral margins of the ventral diverticulum of the phallus not thickened (fig. 5) (Estévez & Polhemus 2007). The only other species of *Belostoma* known from the ABC islands is *B. venezuelae* Lauck, 1962, which is twice the size of *B. minusculum*, 27-32 mm versus 12-14 mm.

Belostomata venezuelae Lauck, 1962 (fig. 6).

Aruba Bubali, trench with *Typha*, 15.IX.1988, 1 ♀, L. Higler, col. NCTN. **Bonaire** Pos Bronswinkel, 20.IX.1967, 1 ♂, 1 ♀, P. Wagenaar Hummelinck, col. NCTN. Pos Bronswinkel, 6.VIII.1975, 1 ♂, 1 ♀, P. Wagenaar Hummelinck, col. NCTN (♂), RMNH (♀). **Curaçao** 'Curaçao', 2 ♂, 3 ♀ W. Mulder, col. RMNH. Hato, 1922, ♂ ♀, 3 ♀, Molengraaff, col. RMNH. Westpoint, rainwater puddle behind dam, 23.V.1967, 2 ♂, P. de Wilde, col. RMNH (1 ♂), NCTN (1 ♂). Tanki di Malpais, upstream of dam, 26.X.1967, 2 ♂, 3 ♀, P. Wagenaar Hummelinck, col. RMNH (2 ♂, 3 ♀), NCTN (1 ♀).

Aruba (Van Halewijn et al. 1992), Bonaire (present

paper), Curaçao (Lauck 1962). First record for Bonaire. Known from the northwestern parts of South America and the ABC Islands.

***Lethocerus annulipes* Herrich-Schaeffer, 1845**
(fig. 7, 8)

Bonaire Kralendijk in swimming pool, 12.12.52 -68.2789, 25.IV.2017, photograph by J. Polanen.

Bonaire (present paper). First record for the Dutch Caribbean. Widely distributed in northern and eastern South America and Lesser Antilles (Perez Goodwyn 2006). The specimen on the photograph is recognisable by the distinct dark stripes on the abdominal venter. This species is recognisable by its length (58-75 mm), combined with the stripes on abdominal venter (fig. 8). There are no suitable habitats for this species, which propagates in fairly large ponds and lakes, on Bonaire so it has probably flown over from Venezuela, where it is common.

***Lethocerus maximus* De Carlo, 1938**
(fig. 9)

Curaçao Willemstad, Schottegat, Nieuwe Haven, 15.V.1970, 1 ♂, H.A. ten Hove, col. NCTN.

Curaçao (present paper). First record for the Dutch Caribbean. Known from northeastern South America (Perez Goodwyn 2006). On Curaçao there are no habitats where this large (9-10 cm) species, which lives in similar habitats as *L. annulipes*, can live, let alone reproduce. Schottegat is connected with the sea, and as far as known *Lethocerus* species are restricted to fresh water for reproduction. It is widespread in Venezuela and as it is a good flyer it has probably flown over from there. This species can be recognised by its size and claws of fore tarsus which are shorter than the tarsomeres combined. In *Lethocerus grandis* (Linnaeus, 1758), the only other species of similar size, the claws of the fore tarsus are

longer than the tarsomeres and this species is apparently restricted to the southeastern coastal area of Brazil (Perez Goodwyn 2006).

Family Corixidae

Corixidae and Micronectidae can be separated from the other neogean Heteroptera by their rostrum which is triangular and unsegmented (fig. 12, 29), whereas in other Heteroptera the rostrum is needle-like and clearly segmented. In Corixidae the pronotum covers the scutellum (fig. 16), whereas in Micronectidae the scutellum is exposed (fig. 11).

***Centrocorisa kollari* Fieber, 1851**
(fig. 16-18)

Aruba, Bonaire, Curaçao (Nieser 1969a). Recorded from Central America and the northern part of South America. There is also an isolated record from Paraguay, southern South America (Hungerford 1948). Females can be recognised by a patch of hairs on the corium which is lacking in *C. nigripennis*. However, this patch is small and difficult to see on a photograph (see Nieser (1969a) for a drawing). Males can be recognised by the pala (fig. 18). In the Dutch Caribbean *C. kollari* and *C. nigripennis* apparently do not overlap.

***Centrocorisa nigripennis* Fabricius, 1803**
(fig. 19, 20)

Sint Maarten (Nieser 1969a). Found in the USA (Texas), Central America, West Indies and Venezuela. Males can be recognised by the pala (fig. 20). See also under *C. kollari*.

***Corisella edulis* Champion, 1901**
(fig. 13-15)

Aruba Bubali bird sanctuary, 18.II.1988, 2 ♂, 3 ♀, L.W.G. Higler, col. NCTN.



Figuur 92. Christoffel lakes, Curaçao. Photo Mathijn Speelman.

Aruba (Van Halewijn et. al. 1992, this paper). This species is indigenous in western Canada and the USA. It is unclear if it has become established on Aruba. These specimens have been published in Van Halewijn et al. (1992), but as this is an internal report of the Institute for Nature Management the record may have gone unnoticed. This species is indigenous in western Canada and the USA (Menke 1979). There are no further records from Aruba and this location is far away from the nearest locations, suggesting that it might have been accidentally introduced. This species can be recognised by its size (6-8 mm) and its, compared with *Centrocorisa*, more slender body shape (fig. 13, 19).

***Ramphocorixa rotundocephala* Hungerford, 1927**
(fig. 21-22)

Aruba, Bonaire (Nieser 1969a). Recorded from the USA (Arizona), Mexico, Greater Antilles, Venezuela and Islands off Venezuela. This is the only species of *Ramphocorixa* recorded from the Dutch Caribbean and can be recognised by its habitus (fig. 21), combined with its length of 5.3-6.0 mm.

***Trichocorixa* Kirkaldy, 1908**

The genus *Trichocorixa* consists of rather small,

often salt tolerant, and at first sight mostly very similar species. Because of their salt tolerance they are the dominant Corixidae in the Caribbean. Males can be recognised by the asymmetrical abdomen, notably the shape of the lobes of the caudal segment (fig. 24, 26, 29). The genus has been revised by Sailer (1948). However, his key is difficult to use. For identification of the *Trichocorixa* of the Dutch Caribbean we refer to Nieser (1969a).

***Trichocorixa orinocoensis* Sailer, 1948**
(fig. 23-24)

Aruba, Bonaire, Curaçao (Nieser 1969a), also recorded from Klein Bonaire and Klein Curaçao. Recorded from northern South America including islands off Venezuela (Nieser 1969, 1975). In most females the synthlipsis is narrower than the width of the posterior margin of an eye and lack the projecting posterolateral angles of the second abdominal segment.

***Trichocorixa reticulata* Guérin-Ménéville, 1857**
(fig. 25-27)

Aruba, Bonaire, Curaçao, Sint Maarten (Nieser 1969a), also recorded from Klein Bonaire and Klein Curaçao. Known from the USA, Central and

South America, Antilles, Galápagos and Hawaii. There is a record from China (Shanghai) from 1929, but as there are no further records from China, this species has apparently not become established there (Sailer 1948). In females the synthlipsis is wider than the posterior margin of an eye.

***Trichocorixa verticalis verticalis* Fieber, 1851**
(fig. 28-30)

Aruba, Bonaire, Curaçao, Sint Maarten (Nieser 1969a), also recorded from Klein Bonaire. Ranging from southeastern Canada, through Central America to northern South America (Surinam), the Antilles and the Bahamas (Nieser 1969a, 1975). Females can be recognised by the projecting posterolateral angles of the second abdominal segment which are usually protruding laterally of the hemielytra (fig. 30).

Family Gelastocoridae

***Nerthra papaceki* Nieser, Chen & Caspers, 2024**
(fig. 31)

Bonaire, Curaçao (Nieser et al. 2024). This species is so far only known from the records in the

original description. The fused hemielytra and the thick covering of silt (fig. 31) suggest a burrowing lifestyle.

Family Micronectidae

***Tenagobia spinifera* Nieser, 1970**
(fig. 10-12)

Bonaire Dam behind Pos Gurubu, 12.1935 -68.2621, alt. 27 m., 5.XII.2021, 1 ♀, H. Smit, col. NCTN. Kralendijk, 12.1560 -68.2636, 21.X.2022, 5 ♂, 3 ♀, B. Aukema, col. NCTN & RMNH. Curaçao Willemstad, Wechi, temporary pond, 12.1547 -68.9754, 27.IX.2022, 2 ♀, M.H.K. Speelman & J.W. Veldboom, col. RMNH.

Bonaire, Curaçao (present paper). New for the Dutch Caribbean. Recorded from Colombia and Venezuela (Nieser 1977). *Tenagobia spinifera* was described from Venezuela and has also been found in the Meta district of Colombia (Roback & Nieser 1974). The species can be recognised by its relatively large size (3.2-3.8 mm), the shape of the right paramere, which is characteristic for the subgenus *Incertagobia* Nieser, 1977. The apically hooked left paramere is characteristic for the species (Nieser 1977: 31, fig. 60-62). Other species of *Incertagobia* have a length of less than 2.9 mm, except for *T. campanula* Nieser, 1977 in which the



Figuur 93-94. Klein Curaçao. Photos Mathijn Speelman.

females are 3.2-3.5 mm long. This latter species is so far only known from its type series from the edge of the Peruvian Amazonas.

Family Naucoridae

Pelocoris poeyi Guérin-Méneville, 1835 (fig. 32)

Aruba, Curaçao (Nieser 1969b). Known from the Antilles and the northern and northeastern coast of South America. This species can tolerate considerable salinity (Nieser 1975). This is the only species of Naucoridae known from the Lesser Antilles.

Family Nepidae

Ranatra zeteki Drake & De Carlo, 1953 (fig. 33, 34)

Curaçao (Nieser 1969b). Distributed from Panama to Venezuela and Curaçao. This species belongs to the *Ranatra annulipes*-group. Males of this group are easily recognised by caudolateral extensions of the abdomen which embrace the apex of the genital operculum (fig. 34). Drake & De Carlo (1953) revised this group of very similar species. This species was collected in two ponds (tankis) at Hato, by P.W. Hummelinck on his first trip to the Antilles in 1936 and has not been seen in the Antilles since (Nieser 1969b).

Family Notonectidae

Buenoa Kirkaldy, 1904

Most species of *Buenoa* are very similar at first sight, notably if they have been killed or stored in ethanol, when their colours have faded to a uniform sordid grey. Consequently, many species cannot be reliably identified from habitus photographs. Moreover, females lack good specific cha-

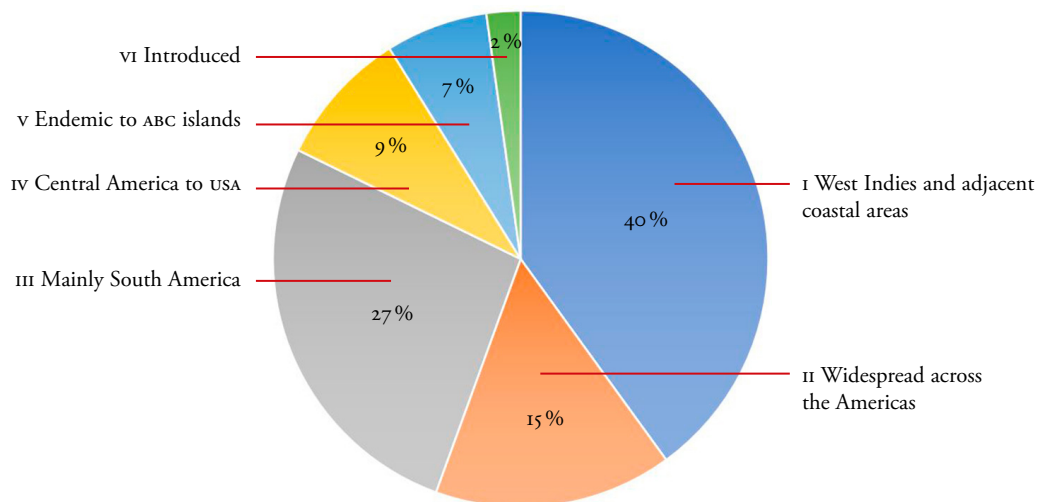
racteristics. Characters used for the identification of males are, apart from size and synthlipsis, the rostral prong, the shape of the stridulatory area on the fore femur (fig. 40, 45) and the stridulatory comb proximal on the fore tibia (fig. 39). This character was used by Truxal but is not used here as it is laborious and superfluous for these Antillean species. See Nieser (1967, 1969c) for identification of the species of the Dutch Caribbean.

Buenoa albida Champion, 1901 (fig. 35, 36)

Aruba, Bonaire, Curaçao, Sint Maarten (Nieser 1967). Known from Mexico and the Antilles (Nieser 1967, Henry & Froeschner 1988). Body length 5.8-6.5 mm, synthlipsis approximately half the anterior width of the vertex. Very similar to *B. scimitra*, females are sometimes undistinguishable. In males of *B. scimitra* a well contrasting large scimitar-shaped stridulatory area is present on the femur, which is nearly as long as the width of the femur (45). In *B. albida* the stridulatory area is often poorly contrasting, much smaller and oval.

Buenoa antigone antigone Kirkaldy, 1899 (fig. 37, 38)

Aruba, Bonaire, Curaçao, Sint Maarten (Nieser 1967). Recorded from Mexico, Guatemala, Antilles southwards as far as Argentina (Nieser 1967, 1969c). This is the largest species of *Buenoa* occurring in the Dutch Caribbean with a length of over 7.5 mm, whereas other species are under 7.1 mm, except for occasional females of *B. albida* which reach 7.4 mm.



Figuur 95. General distribution of the waterbugs found on the Dutch Caribbean islands.

***Buenoa gracilis* Truxal, 1953**

(fig. 39-41)

Aruba, Bonaire, Curaçao, Sint Maarten (Nieser 1967). Known from Central America, north-western South America, and the Antilles. Body length 5.4-6.1 mm, synthlipsis narrow, about one fourth the anterior width of the vertex. Males can be recognised immediately by the stridulatory area on the femur which consist of six to nine wide ridges forming a light spot in the center of a dark patch (fig. 40).

***Buenoa platycnemis* Fieber, 1851**

(fig. 42, 43)

Bonaire, Curaçao, Sint Maarten (Nieser 1967). Distributed from Florida and Texas (USA) through Central America and the Antilles to northern South America (Truxal 1953, Nieser 1975). So far, the southernmost records are from Peru and western Brazil (Mato Grosso). This is the smallest species in the Dutch Caribbean, with a length of 4.5-5.5 mm. Synthlipsis slightly less than half the anterior width of vertex. Males can be recognised by the rostral prong which in lateral view protrudes in front of the rostrum (Nieser 1969c).

***Buenoa scimitra* Bare, 1928**

(fig. 44, 45)

Aruba, Bonaire, Curaçao, Sint Maarten (Nieser 1967). Known from the USA, Mexico and Antilles. Body length 5.5-7.5 mm, synthlipsis slightly more than one third the anterior width of vertex. Males can be recognised by the large scimitar-shaped stridulatory area, consisting of about 60 fine ridges on the femur (fig. 45).

***Notonecta indica* Linnaeus, 1771**

(fig. 46)

Curaçao, Sint Maarten (Nieser 1967). Occurs in the USA, Central America, Colombia and the Antilles. This is the only *Notonecta* species recorded in the Dutch Caribbean. Most specimens have a variable transverse blackish band caudal of the claval suture.

Family Ochteridae

Ochterus perbosci Guérin-Ménéville, 1843 (fig. 47, 48)

Curaçao (Cobben 1960b). Ranges from Arizona and Texas (USA) through Central America and the Antilles to Paraguay and southeastern Brazil (Henry & Froeschner 1988, Nieser & Lane de Melo 1997). This species can be recognised by the minute pointed projections at the anterolateral angles of the pronotum (fig. 48).

Family Pleidae

Neoplea punctifer Barber, 1923 (fig. 49-51)

Curaçao (Nieser 1969b). Recorded from Puerto Rico, Hispaniola and Curaçao. The record for Curaçao is based on a single female and needs confirmation. In *Neoplea* species the fore tarsus is three-segmented, with a small basal segment. The specimen from Curaçao has a length of 2.2 mm.

Paraplea puella Barber, 1923 (fig. 51-55)

Aruba Bonaire, Curaçao, Sint Maarten (Nieser 1969b). Ranges from the southern USA, Central America and the Antilles to Venezuela and Surinam. Nieser (1969b, 1975) found only females in several hundreds of specimens. In *Paraplea* species the fore tarsus is two-segmented, with a small basal segment. *Paraplea puella* has a length of 1.5-1.9 mm.

DISCUSSION

We observed that all species of aquatic and semiaquatic bugs occurring in the Dutch Caribbean are capable to fly, except two species, *Rhagovelia plumbea* (Gerromorpha, Veliidae), and *Nerthra papaceki* (Nepomorpha, Gelastocoridae). We

assume that the flying species probably colonised the various islands by flying in from a nearby area where the species is common. *Rhagovelia plumbea* appears to be always apterous. However, this species lives on the sea near the coast, so it could float from island to island. A group of *Nerthra* with fused hemelytra, such as *Nerthra papaceki*, is supposed to disperse by rafting on flotsam, although concrete proof is not available. According to Hedges (2001) and Rodrigues-Silva & Schlupp (2021), this is the most probable method of colonisation in the West Indies for non-flying animals.

Another interesting possibility of dispersal, notably for the West Indies, is transport by hurricanes which has been documented for *Rheumatobates minutus* Hungerford, 1936. Herring (1958) collected both alate and apterous specimens in the Florida Keys (USA) after a severe hurricane in 1947. The specimens were found in a temporary pond filled with rain from the preceding storm. The species did apparently not become established, as it was not found when the site was inspected the following year. He also found *R. clanis* Drake & Harris, 1932, which was found on salt water at Bayport (Florida) after the same hurricane. Both species live in the path of this hurricane. Before 1927 no representative of the Corixidae was seen on Bermuda. Sailer (1948) reports that "L. Olgivie, of the Bermuda Agricultural Station, recorded a swarm of these insects (*Trichorixa verticalis verticalis* (Fieber, 1851) descending into tubs in his backyard following a severe storm. Thereafter he was also able to collect them in pools on the island."

Due to the limited number of species of the waterbugs occurring in the Dutch Caribbean it will be possible to identify many specimens based on the illustrations and information provided in this paper. For some genera it is necessary to consult the more detailed descriptions and illustrations provided by Cobben (1960a, 1960b), Drake & Cobben (1960), Nieser (1967, 1969a, 1969b, 1969c, 1970).

It is noteworthy that in 2022-2023 six entomologists only found about 50 % of formerly reported species while collecting several species new to the island. This seems to indicate that the faunal composition has shifted, possibly as a result of climate change and urbanisation.

In 1956-1957 Cobben spent a total of 15 months specifically collecting Hemiptera, with emphasis on Heteroptera. During this period he spent six months on Curaçao and less than two months on each of the other five islands (Cobben 1960a). This uneven visiting intensity makes a direct comparison of occurrence of species between neighboring islands problematic. Notably the absence of a species on Aruba compared with Curaçao and Bonaire may be artificial. Wagenaar Hummelinck did not focus his fieldwork on Heteroptera and simply scooped up a part of the habitat and put it in preservative fluid instead of chasing specific animals. These samples were later sorted to order level in the laboratory.

Based on the global distribution the species occurring in the Dutch Caribbean can be divided into six groups (fig. 95).

i. Species which occur mainly in the Mexican Gulf comprising the West Indies, the coastal area of the southern USA and Florida, Central America and the northern coastal area of South America are: *Hebrus consolidus*, *Rhagovelia plumbea*, *Limnogonus franciscanus*, *Rheumatobates imitator*, *Trepobates taylora*, *Micracanthia drakei*, *Micracanthia husseyi*, *Saldula lomata*, *Belostoma venezuelae*, *Centrocorisa nigripennis*, *Ramphocorixa rotundoccephala*, *Trichocorixa verticalis verticalis*, *Pelocoris poeyi*, *Buenoa albida*, *Buenoa gracilis*, *Notonecta indica*, *Neoplea punctifer*, *Paraplea puella*. Some of these, e.g. *Trichocorixa verticalis verticalis*, extend their distribution along the Atlantic coast of North America.

ii. Species which occur in most of the Americas, at least from most of the USA to well into Brazil: *Mesovelia amoena*, *M. mulsanti*, *Hebrus concinnus*, *Merragata hebroides*, *Microvelia pulchella*, *Micracantha humilis*, *Trichocorixa reticulata*.

iii. Species which have their main distribution in South America: *Microvelia longipes*, *Saldula dentulata*, *Belostoma minusculum*, *Lethocerus annulipes*, *L. maximus*, *Centrocorisa kollari*, *Trichocorixa orinocoensis*, *Tenagobia spinifera*, *Ranatra zeteki*, *Buenoa antigone antigone*, *Buenoa platycnemis*, *Ochterus perbosci*.

iv. Species which occur in Central America reaching well into the non-coastal areas of the USA: *Micracantha humilis*, *Pentacora signoreti signoreti*, *P. sphaelata*, *Buenoa scimitra*.

v. Species endemic to the ABC islands: *Hebrus elimatus*, *Rheumatobates spec.*, *Nerthra papaceki*.

vi. Introduced: *Corisella edulis*.

Group i, which makes up 41 % (18 species) of the total, contains the species which are really adapted to living in the West Indies. Most of them also occur more or less widespread in Central America. The only one restricted to the islands is the rarely collected *Neoplea punctifer*. In addition, *Rheumatobates imitator* is widespread in the Antilles. The single Venezuelan record is from Guanta, a town on the shores of the Gulf of Mexico in Antezoátegui State, just east of Carácas. However, this record is based on a single female so the identification is uncertain (De Kort-Gommers & Nieser 1969), and the species might actually also be restricted to the Antillean islands.

Group ii, which makes up 16 % (7 species), contains ubiquitous species occurring all over the Americas where suitable habitats are present. They apparently have good powers of dispersion and few specific demands on their habitats.

Group iii, which makes up 27 % (12 species), lives in South America, including northern coastal areas. Most of them occur only on the southernmost islands, so they apparently reached these islands from the northern coast of South America. *Microvelia longipes* is the exception, it is distributed all over the Antilles but apparently does not occur in Central America. *Buenoa antigone antigone*, *B. platycnemis* and *Ochterus perbosci* are widespread over the islands and also in Central America. In view of the geography, entrance in the West Indies through South America is more probable than through Central America.

These three could also have been assigned to group iv, but because of their occurrence deep into South America they have been assigned in group iii. Although *Belostoma minusculum* is widespread in Central America south of Mexico, it also occurs in the coastal area of Venezuela and in Trinidad (Estévez & Polhemus 2007). Therefore, it has been assigned to this group.

Group iv, which makes up 9 % (4 species) has its main distribution from Central America northward and does not occur in South America.

Group v consists of three species (7), % which are only known from their type localities on the ABC islands. Their actual distribution can only be ascertained when more collecting sites become known.

Group vi is formed by *Corisella edulis* (Corixidae) only (constituting 2 % of the total), which lives in western Canada and the USA and is apparently introduced.

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SAMENVATTING

Geïllustreerde naamlijst van de waterwantsen van de Nederlandse Cariben (Heteroptera: Gerrhomorpha, Leptopodomorpha and Nepomorpha)

Deze geïllustreerde naamlijst van waterwantsen uit Caraïbisch Nederland bevat aanwijzingen voor determinatie van de 44 soorten. Zeven soorten worden voor het eerst gemeld voor Caraïbisch Nederland: *Belostoma minusculum*, *Lethocerus annulipes*, *L. maximus*, *Corisella edulis*, *Tenagobia spinifera*, *Rheumatobates imitator* en een onbeschreven *Rheumatobates*-soort. Bovendien wordt *Belostoma venezuelae* voor het eerst gemeld van Bonaire en *Limnogonus franciscanus* van Sint Eustatius. *Saldula* 'palustris' gemeld in Cobben (1960b) is inmiddels beschreven als *Saldula lomata*.

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