

New records of marine molluscs from Saba, Caribbean Netherlands

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KEYWORDS

Bivalvia, Cephalopoda, Gastropoda, Scaphopoda, iNaturalist, nudibranchs.

ABSTRACT

Repeated scuba diving visits to Saba, Caribbean Netherlands, from 2011 to 2020 allowed us to add 51 species of marine molluscs to the island's species checklist, in an attempt to get closer to having a full list of all the species that live around the island. The new records include 40 gastropods (over half of which are sea slugs), seven bivalves, one scaphopod and three cephalopods. The records of the following species represent large increments in their geographic distributions: *Anetarca piutaensis* (Ortea, Caballer & Espinosa, 2003), *Coryphellina hamanni* (Gosliner, 1994), *Cyphoma cassidyae* Lorenz, 2020, *Tenellia* cf. *luciae* (Valdés, Medrano & Bhave, 2016), *Elysia cornigera* Nuttall, 1990, *Felimare acriba* (Ev. Marcus & Er. Marcus, 1967), *Lomanotus phiops* Er. Marcus, 1957, *Okenia picoensis* Paz-Sedano, Ortigosa & Pola, 2017, *Polycera* sp. 2 *sensu* Valdés et al. (2006), *Thuridilla malaquita* Ortea & Buske, 2014. The introduced nudibranch *Doriprismatica sedna* (Ev. Marcus & Er. Marcus, 1967) was also recorded; its presence on Saba in 2014 (and on St. Eustatius in 2015) is indicative of a rapid expansion in the Caribbean. All records are backed by photographs which were taken, in situ, by T.M. Zahner, and which have been uploaded to the online platform iNaturalist. This has the advantage of simultaneously making the information available to researchers and to the broader public.

INTRODUCTION

The Dutch Caribbean island of Saba, approximately 13 km² in area, originated in the late Pleistocene from volcanic activity (Westerman & Kiel, 1967; Robool & Smith, 2004). Saba is one of the Lesser Antilles. It is situated in the Eastern Caribbean marine ecoregion, within the northern part of the inner arc of the Leeward Islands chain (17°38'N, 63°15'W). The island consists largely of a stratovolcano, which currently rises steeply from the sea, with coastal cliffs and almost no beaches. More detailed information on the island's geography can be found in Hewitt (2013). Circa 5.5 km to the southwest of Saba is the northern edge of a large submerged atoll. Known as Saba Bank, this is a very different habitat, being rich in coralline sands, whereas Saba is composed of igneous rocks. Deep water separates Saba from Saba Bank.

Although it is a small island, Saba has a diverse molluscan fauna. Prior to this paper, 95 shallow-water marine species were known, including two species from the Saba Bank (Hewitt, 2013, 2017). There are 23 known terrestrial and fresh-water mollusc species on Saba (Van Leeuwen et al., 2015).

The marine mollusc fauna of Saba has only been superficially investigated, with records mostly based on haphazard sightings. This was in part due to the difficult terrain of the island's coast, and sparse access to the sea from the land (Hewitt, 2013). Nonetheless, from an initial count of 17

species a decade ago (Rosenberg, 2009), the number had already been increased nearly six-fold (Hewitt, 2017).

The list of the island's marine fauna is a work in progress. Until now the checklist largely featured intertidal macro-molluscs, plus some initial records of subtidal species, but it was very sparse in shell-less species and micromolluscs (Hewitt, 2017). In the present article, we list 51 new records of marine mollusc species from Saba, the result of repeated visits to the island in recent years, during which a large number of underwater photographs were taken, and made available to the community via the online global natural history platform iNaturalist.

METHODS

The new records compiled herein were assembled primarily from observations of live animals made by one of us (scuba diver T.M.Z.). His dive trips to Saba, which lasted 7 to 10 days, took place in March and August 2011, August 2013, March and August 2014, March and June 2016, March 2017, March 2018, January, March and August 2019, and January 2020. Dives were undertaken two or three times each day, for 5 to 7 days during each trip. Searching for nudibranchs and other marine organisms was carried out both on and near coral reefs, primarily at depths of 12 to 18 m. No specimens were collected, alive or dead (a government-issued permit would be required for that), but all observations were accompanied by photographic records of the animals or shells in situ. Records of all T.M.Z.'s observations, with photos and accompanying data, are available on the iNaturalist website (Zahner, 2020).

Species identification was conducted using specialized literature and published photographs of type and voucher material (see below); in some cases, the aid of other experts was sought (see Table 1 and Acknowledgements). The systematic arrangement used in the list follows Bouchet et al. (2010, 2017) and the World Register of Marine Species (WoRMS Editorial Board, 2020). A list of the newly reported species is presented below, with additional comments where pertinent. We have given priority for figuring the Heterobranchia herein, which are mostly shell-less and represent the majority of new records. Nevertheless, all the observations from this work have photographic evidence that has been uploaded to the website iNaturalist. Thus, identifications of species not figured here can be checked online, using the iNaturalist observation numbers shown in Table 1.

RESULTS

Overall, 51 species were newly recorded from Saba (Table 1), representing an increase of circa 55% in Saba's marine molluscan species checklist. The new findings consist of

40 gastropods (55% of which are sea slugs), seven bivalves, one scaphopod and three cephalopods. Some of these new occurrences represent meaningful extensions of the known geographical range of the species, and are discussed in more detail below. Others, however, are simply new records of widespread species that would have been expected to be found on Saba eventually. No species can simply be assumed to be ubiquitous however, so even these records are useful.

A few animals could not be confidently identified to species level due to complicating factors: diagnostic details being obscured by unfavorable angles of the photographs or low resolution of fine structures; individuals being juvenile; or by specific diagnosis requiring further anatomical or molecular data. These more obscure animals were either identified to genus level or, in two cases, two possible species were listed (Table 1).

DISCUSSION

Among the new records from Saba, there are some species that call for further commentary, and these are addressed below. The order of presentation follows Table 1. We also offer comparisons of the faunal composition of Saba with that of the island of St. Eustatius (ca. 30 km SE of Saba) and Bonaire (ca. 800 km SW of Saba), both also part of the Caribbean Netherlands, as well as with the faunas of Aruba, Curaçao and St. Maarten, which are constituent countries of the Kingdom of the Netherlands. While these islands are not all in close vicinity and thus some comparisons might have restricted biogeographical value, a complete checklist considering political geography is often useful for end users of taxonomic information, especially in nature conservation.

St. Eustatius was recently surveyed by the Statia Marine Biodiversity Expedition 2015, and the molluscan fauna was reported by Hewitt & van Leeuwen (2017), with more recent additions by van Leeuwen (2020). Records from the other islands were drawn from the Dutch Caribbean Species Register (Naturalis Biodiversity Center, 2017).

Shelled gastropods: Although the majority of new observations are of shell-less gastropods, there are also new records of shelled species (Table 1). These mostly include species (e.g., *Lithopoma tectum*, the cowries, and *Micromelo undatus*) that are widespread in the Caribbean (e.g., Bratcher & Cernohorsky, 1983; Valdés et al., 2006; Massemin et al., 2009; Rosenberg et al., 2009; Miloslavich et al., 2010) and thus, they were expected eventually to be found on Saba. Most of these shelled species are not represented on the plates, although photographs are available on iNaturalist (Table 1).

All the species of shelled gastropods listed here have also been previously reported from St. Eustatius (Table 1; Hewitt

Table 1. List of newly reported species from Saba, systematically arranged, with date of observation, identifiers (indicated by their initials), figure number, and iNaturalist observation number. An asterisk (*) indicates that the species had already been reported from Saba (Hewitt, 2013, 2017), but the record came from the present expeditions. The presence of the species in the islands of the Dutch Caribbean and the Kingdom of the Netherlands is also indicated for comparison. Abbreviations: AD, Anne DuPont; BEP, Bernard E. Picton; CMC, Carlo M. Cunha; DCC, Daniel C. Cavallari; HJ, Heather Judkins; JJP, Jan Johan ter Poorten; LW, Leslie Wilk; MV, Michael Vecchione; PJK, Patrick J. Krug; RBS, Rodrigo B. Salvador; SJH, Susan J. Hewitt; TMZ, Terence M. Zahner. The iNaturalist observation number needs to be added to the end of the following command <https://www.inaturalist.org/observations/> to become a functioning URL for accessing each observation on the iNaturalist website.

Species	Date	Identifier(s)	Fig(s)	iNaturalist #	Aruba	Bonaire	Curaçao	St. Eustatius	St. Maarten
GASTROPODA: VETIGASTROPODA									
Superfamily Fissurelloidea									
Family Fissurellidae									
<i>Diodora variegata</i> (G.B. Sowerby II, 1862)	25-Aug-2019	SJH	—	34983863		x		x	
Superfamily Trochoidea									
Family Turbinidae									
<i>Lithopoma tectum</i> (Lightfoot, 1786)	15-Mar-2016	RBS, SJH	—	20315553	x		x	x	x
GASTROPODA: CAENOGASTROPODA									
Superfamily Cypraeoidea									
Family Cypraeidae									
<i>Luria cinerea</i> (Gmelin, 1791)*	25-May-2016	RBS, SJH	—	20315564	x	x	x	x	x
<i>Naria acicularis</i> (Gmelin, 1791)	19-Mar-2019	SJH	—	27344714	x	x	x	x	x
Family Ovulidae									
<i>Cyphoma cassidyae</i> Lorenz, 2020	16-Mar-2017	RBS, SJH	26	19988204		x	x		
Superfamily Stromboidea									
Family Strombidae									
<i>Macrostrombus costatus</i> (Gmelin, 1791)	5-Jan-2020	DCC, SJH	—	38348487	x	x	x	x	x
Superfamily Epitonioidae									
Family Epitoniidae									
<i>Opalia crenata</i> (Linnaeus, 1758)	15-Mar-2019	SJH	—	26973234			x		x
Superfamily Tonnoidea									
Family Tonnidae									
<i>Tonna pennata</i> (Mörch, 1853)	17-Mar-2019	RBS, SJH	—	27251051	x	x	x	x	x
GASTROPODA: NEOGASTROPODA									
Neogastropoda incertae sedis									
Family Marginellidae									
<i>Volvarina</i> sp.	15-Mar-2019	SJH	27	26973239	x	x	x	x	x
Superfamily Buccinoidea									
Family Pisaniidae									
<i>Engina turbinella</i> (Kiener, 1836)	3-Jan-2020	SJH	—	37230629	x	x	x	x	x
Superfamily Muricoidea									
Family Muricidae									
<i>Phyllonotus pomum</i> (Gmelin, 1791)	27-Aug-2013	SJH	—	20336383	x		x	x	x
Superfamily Olivoidea									
Family Olividae									
<i>Olivella nivea</i> (Gmelin, 1791) or <i>O. floralia</i> (Duclos, 1844)	27-Aug-2013	CMC, SJH	—	20336382	x	x	x		x
<i>Oliva reticularis</i> Lamarck, 1811*	16-Mar-2019	SJH	—	27040335	x	x	x	x	x
Superfamily Mitroidea									
Family Mitridae									
<i>Neotiara nodulosa</i> (Gmelin, 1791)	15-Mar-2019, 26-Aug-2019	SJH	—	26972925, 35024817	x	x	x	x	x
Superfamily Conoidea									
Family Conidae									
<i>Conus daucus</i> Hwass in Bruguière, 1792	16-Mar-2019	DCC, SJH	—	27040338	x	x	x	x	x

Species	Date	Identifier(s)	Fig(s)	iNaturalist #	Aruba	Bonaire	Curaçao	St. Eustatius	St. Maarten
Family Drilliidae									
<i>Decoradrillia pulchella</i> (Reeve, 1845)	26-Aug-2019	SJH	—	35024790	x		x	x	x
Family Terebridae									
<i>Hastula hastata</i> (Gmelin, 1791)	15-Mar-2016	RBS, SJH	—	20315550	x	x	x	x	x
<i>Terebra glossema</i> Schwengel, 1942	15-Mar-2016, 24-Aug-2019, 5-Jan-2020	DCC, SJH	—	20315551, 34968895, 38348485	x		x		
GASTROPODA: HETEROBRANCHIA									
Superfamily Haminoeidea									
Family Haminoeidae									
<i>Atys caribaeus</i> (d'Orbigny, 1841)	17-Mar-2019, 27-Aug-2019	BEP, SJH, RBS	1	27271126, 35035455	x			x	x
Superfamily Acteonoidea									
Family Aplustridae									
<i>Micromelo undatus</i> (Bruguère, 1792)	31-Aug-2011	AD, SJH	2	19994368	x	x	x		x
Superfamily Polyceroidea									
Family Polyceridae									
<i>Polycera</i> sp. 2 <i>sensu</i> Valdés et al. (2006)	7-Jan-2019	AD, BEP	3	19783020					
Superfamily Chromodoridoidea									
Family Chromodorididae									
<i>Doriprismatica sedna</i> (Ev. Marcus & Er. Marcus, 1967)	6-Jan-2019	AD, BEP, SJH	4	19783756					x
<i>Felimida binza</i> (Ev. Marcus & Er. Marcus, 1963)	13-Aug-2011	AD, SJH	5	20032356			x	x	
<i>Felimare acriba</i> (Ev. Marcus & Er. Marcus, 1967)	31-Aug-2014	AD	6	20021416					x
<i>Felimare ruthae</i> (Ev. Marcus & Hughes, 1974)	19-Aug-2011	AD, BEP	7	20032382	x				
Superfamily Onchidoridoidea									
Family Goniodorididae									
<i>Okenia picoensis</i> Paz-Sedano, Ortigosa & Pola, 2017	14-Mar-2018, 20-Mar-2019	AD, RBS, SJH	8	19919061, 27332553					
Superfamily Dendronotoidea									
Family Scyllaeidae									
<i>Scyllaea pelagica</i> Linnaeus, 1758	16-Aug-2011	AD, SJH	9	20032361		x			
Superfamily Flabellinoidea									
Family Flabellinidae									
<i>Coryphellina hamanni</i> (Gosliner, 1994)	15-Mar-2011	AD, BEP	10	20023468					
<i>Flabellina dushia</i> (Ev. Marcus & Er. Marcus, 1963)	16-Mar-2016, 20-Mar-2016, 04-Jan-2020	SJH	11, 12	20309576, 27332853, 38346767				x	
<i>Flabellina engeli</i> (Ev. Marcus & Er. Marcus, 1968)	16-Mar-2011, 14-Mar-2016	AD, LW	13	20023589, 20309294				x	
Superfamily Fionoidea									
Family Lomanotidae									
<i>Lomanotus phiops</i> Er. Marcus, 1957	13-Mar-2017	BEP, CMC, LW	14	20328468					
Superfamily Aeolidioidea									
Family Aeolidiidae									
<i>Berghia creutzbergi</i> Er. Marcus & Ev. Marcus, 1970	16-Mar-2016, 18-Mar-2016	AD, CMC	15	20315556, 20315557			x	x	
<i>Bulbaeolidia oasis</i> Caballer & Ortea, 2015	09-Mar-2018	AD	16	19899704					
Family Facelinidae									
<i>Anetarca piutaensis</i> (Ortea, Caballer & Espinosa, 2003)	12-Mar-2017	AD, BEP	17	19980699					
<i>Nanuca sebastiani</i> Er. Marcus, 1957	18-Mar-2014	AD, BEP	18	20020802		x	x		
<i>Tenellia</i> cf. <i>luciae</i> (Valdés, Medrano & Bhave, 2016)	13-Mar-2016, 13-Mar-2017	BEP, LW, TMZ	19	20309799, 19980854			x		

Species	Date	Identifier(s)	Fig(s)	iNaturalist #	Aruba	Bonaire	Curacao	St. Eustatius	St. Maarten
Superfamily Philinoidea									
Family Aglajidae									
<i>Camachoaglaja berolina</i> (Er. Marcus & Ev. Marcus, 1970)	17-Mar-2016	BEB, TMZ	20	20315554					
<i>Navanax gemmatus</i> (Mörch, 1863)	10-Mar-2018	AD, RBS	21	19914534			x		
Superfamily Plakobranchoidea									
Family Plakobranchoidea									
<i>Elysia cornigera</i> Nuttall, 1990	4-Jan-2020	PJK, RBS	22	38346765					
<i>Elysia papillosa</i> Verrill, 1901	8-Jan-2019	AD	23	19795743			x		
<i>Thuridilla malaquita</i> Ortea & Buske, 2014	2-Jan-2020	TMZ	24	38108405					
BIVALVIA: PTERIOMORPHA									
Superfamily Arcoidea									
Family Arcidae									
<i>Acar</i> sp.	18-Mar-2019	SJH	—	27344713	x		x	x	x
<i>Barbatia domingensis</i> (Lamarck, 1819)	16-Mar-2019	SJH	28	27040341	x		x	x	x
Superfamily Ostreoidae									
Family Ostreidae									
<i>Dendostrea frons</i> (Linnaeus, 1758)*	31-Aug-2013	DCC, SJH	—	20336388			x	x	x
Superfamily Pectinoidea									
Family Pectinidae									
<i>Aequipecten muscosus</i> (W. Wood, 1828)	7-Jan-2020	SJH	—	38495681			x		x
<i>Antillipecten antillarum</i> (Récluz, 1853)	2-Jan-2020	SJH	—	38108402	x	x	x	x	x
<i>Caribachlamys pellucens</i> (Linnaeus, 1758)	23-Aug-2019	SJH	—	34897027	x	x	x	x	x
Superfamily Limoidea									
Family Limidae									
<i>Ctenoides scaber</i> (Born, 1778) or <i>C. mitis</i> (Lamarck, 1807)*	18-Mar-2014	DCC, RBS, SJH	—	20334470			x	x	x
<i>Lima caribaea</i> d'Orbigny, 1853	25-Aug-2019	SJH	—	34983861	x			x	x
BIVALVIA: HETERODONTA									
Superfamily Cardioidea									
Family Cardiidae									
<i>Dalocardia muricata</i> (Linnaeus, 1758)	24-Aug-19	SJH	—	34968876			x		x
<i>Laevicardium serratum</i> (Linnaeus, 1758)	17-Mar-19	JJP, SJH	—	27225169				x	
<i>Papyridea semisulcata</i> (Gray, 1825)	25-Aug-19	SJH	—	34983849			x	x	x
Superfamily Tellinoidea									
Family Tellinidae									
<i>Tampaella mera</i> (Say, 1838)	25-Aug-19	SJH	—	34983847		x	x		
Superfamily Veneroidea									
Family Veneridae									
<i>Lirophora paphia</i> (Linnaeus, 1767)	16-Mar-19	SJH	—	27040335	x		x	x	x
SCAPHOPODA									
Family Dentaliidae									
<i>Graptacme eborea</i> (Conrad, 1846)	24-Aug-19	SJH	—	34968899					
CEPHALOPODA									
Superfamily Octopodoidea									
Family Octopodidae									
<i>Octopus briareus</i> Robson, 1929	21-Mar-14	HJ, MV, TMZ	—	20021044			x		
<i>Octopus hummellincki</i> Adam, 1936	16-Mar-19	HJ, MV, TMZ	—	27040658		x	x		
<i>Octopus americanus</i> Monfort, 1802 or <i>O. insularis</i> Leite & Haimovici in Leite et al., 2008	28-Aug-2013, 29-Aug-2013	HJ, MV, TMZ	—	19995197, 19995198					

& van Leeuwen, 2017), with the following exceptions: *Opalia crenata*, *Terebra glossema*, and *Olivella* sp. These two species and genus, however, are known from the ABC islands (Aruba, Bonaire and Curaçao) in the Dutch Caribbean (de Jong & Coomans, 1988).

Another interesting find are three distinct taxa previously assigned to the ovulid species *Cyphoma gibbosum* (Linnaeus, 1758), which was until recently considered polymorphic in mantle pattern and coloration (Reijnen & van der Meij, 2017; Lorenz, 2020). Off of Saba, T.M.Z. has photographed typical *C. gibbosum* (iNaturalist observation #27251301) and its previous synonym *C. signatum* Pilsbry & McGinty, 1939 (#20018533), both widely distributed in the Caribbean. T.M.Z. also observed what has been until recently called the “black morph” of *C. gibbosum* (Reijnen & van der Meij, 2017), but which has just been described as a new species, *C. cassidyae* (Lorenz, 2020). In the type description, the author said this new species was “so far known from Martinique, Curaçao and Bonaire (Lorenz, 2020). In addition, in 2017, T.M.Z. photographed *C. cassidyae* off the island of Little Cayman, Cayman Islands (Fig. 25; #20280923). Hewitt & Van Leeuwen (2017: pl. 3, fig. 8) also figured one individual of that species from St. Eustatius, and listed another individual from a different locality on the same island. Together, these records from St. Eustatius, Saba, and Little Cayman expand the known range of *C. cassidyae* to the north and to the west.

Shell-less and reduced-shell gastropods: Prior to this paper, out of the 93 marine mollusc species already recorded from Saba, only one shell-less gastropod had been observed: *Felimare kempfi* (Ev. Marcus, 1971) (as *Mexichromis kempfi* (Ev. Marcus, 1971); Hewitt, 2013, 2017). In 2015, on St. Eustatius, during the three-week, two-dives-a-day Statia expedition, a team of 17 scuba divers and two shore-based investigators succeeded in expanding the marine mollusc species list for the island from 191 to 366 (Hewitt & van Leeuwen, 2017), and out of those additional species, 14 species of shell-less gastropods were found. However, none of the Statia expedition divers were searching specifically for molluscs. In contrast, T.M.Z. is particularly interested in photographing shell-less marine gastropods on Saba and elsewhere. As a result, the list of shell-less (and almost shell-less) species for Saba has been greatly expanded (Table 1), as follows.

Two shells of an *Atys* species were found, and the species is here tentatively identified as *Atys caribaeus*. This species is known from the USA to Brazil (Valdés et al., 2006), so its occurrence would be expected in Saba. Likewise, *Micromelo undatus* is a circumtropical species (Valdés et al., 2006), but until now it had not been reported from either Saba or St. Eustatius.

The individual of *Polycera* Cuvier, 1816 photographed by T.M.Z. can be identified as *Polycera* sp. 2 *sensu* Valdés et al. (2006). To our knowledge, this species remains undescribed;

Valdés et al. (2006) reported its distribution as Florida, Belize and Panama; the present record is a first for the Dutch Caribbean. The only other *Polycera* species known from the region are *P. herthae* Ev. Marcus & Er. Marcus, 1963 and *P. odhneri* Er. Marcus, 1955, both from Curaçao (Naturalis Biodiversity Center, 2017).

Doriprismatica sedna is an Eastern Pacific nudibranch accidentally introduced to the Caribbean Sea, where it has become invasive (Goodheart et al., 2016) and currently seems to be expanding its range. In 2015, *D. sedna* was found on St. Eustatius (Hewitt & van Leeuwen, 2017), a record which at that time represented a range extension of 1,000 km to the Eastern Caribbean. The present report demonstrates that the species had already reached Saba in 2014, with individuals photographed by T.M.Z.

Felimida binza is known to occur from Florida to S.E. Brazil (Padula et al., 2012) and has been previously reported from St. Eustatius (Hewitt & van Leeuwen, 2017). *Felimare acriba*, however, was previously known from Mexico and Venezuela, and from Martinique and Guadeloupe (Gosliner & Johnson, 1999; Lamy & Pointier, 2017); the present record thus extends its range ca. 150 km to the north in the Lesser Antilles. *Felimare ruthae* was already known to range from the Yucatán Peninsula and from the Bahamas to Venezuela (Ortigosa et al., 2015; Gutiérrez et al., 2015), a distribution that includes Saba. Until now the only species in this genus known from Saba was *Felimare kempfi* (Ev. Marcus, 1971), as reported by Hewitt (2013).

A surprising find was *Okenia picoensis*, a recently described species known only from the Azores (Paz-Sedano et al., 2017). If validated, the record would represent a considerable increase in the known range; however, definitive confirmation would require molecular and/or anatomical data. Nevertheless, an amphiatlantic distribution is not uncommon in nudibranchs and for gastropods in general (e.g., *Flabellina dushia*, see below; Rosenberg et al., 2009).

Scyllaea pelagica is circumtropical, being especially abundant in the Caribbean (Rosenberg et al., 2009). Despite that, this is the first record of the species from Saba and only the second from the Kingdom of the Netherlands after Bonaire.

Coryphellina hamanni was previously only known from the Bahamas and the Turks and Caicos (Gosliner, 1994), thus its presence in Saba is a large range extension south-east. *Flabellina dushia* occurs from Florida to Martinique in the Caribbean (that range includes Saba), and also from the Canary to Cape Verde Islands in the eastern Atlantic (Millen & Hamann, 2006). *Flabellina engeli*, in the strict sense, is known from Florida to Venezuela, including both the Caribbean islands and the coastal regions of continental Central and South America (Gutiérrez et al., 2015; Goodheart et al., 2016), so its occurrence in Saba as found by T.M.Z. is not surprising. This range, however, refers only

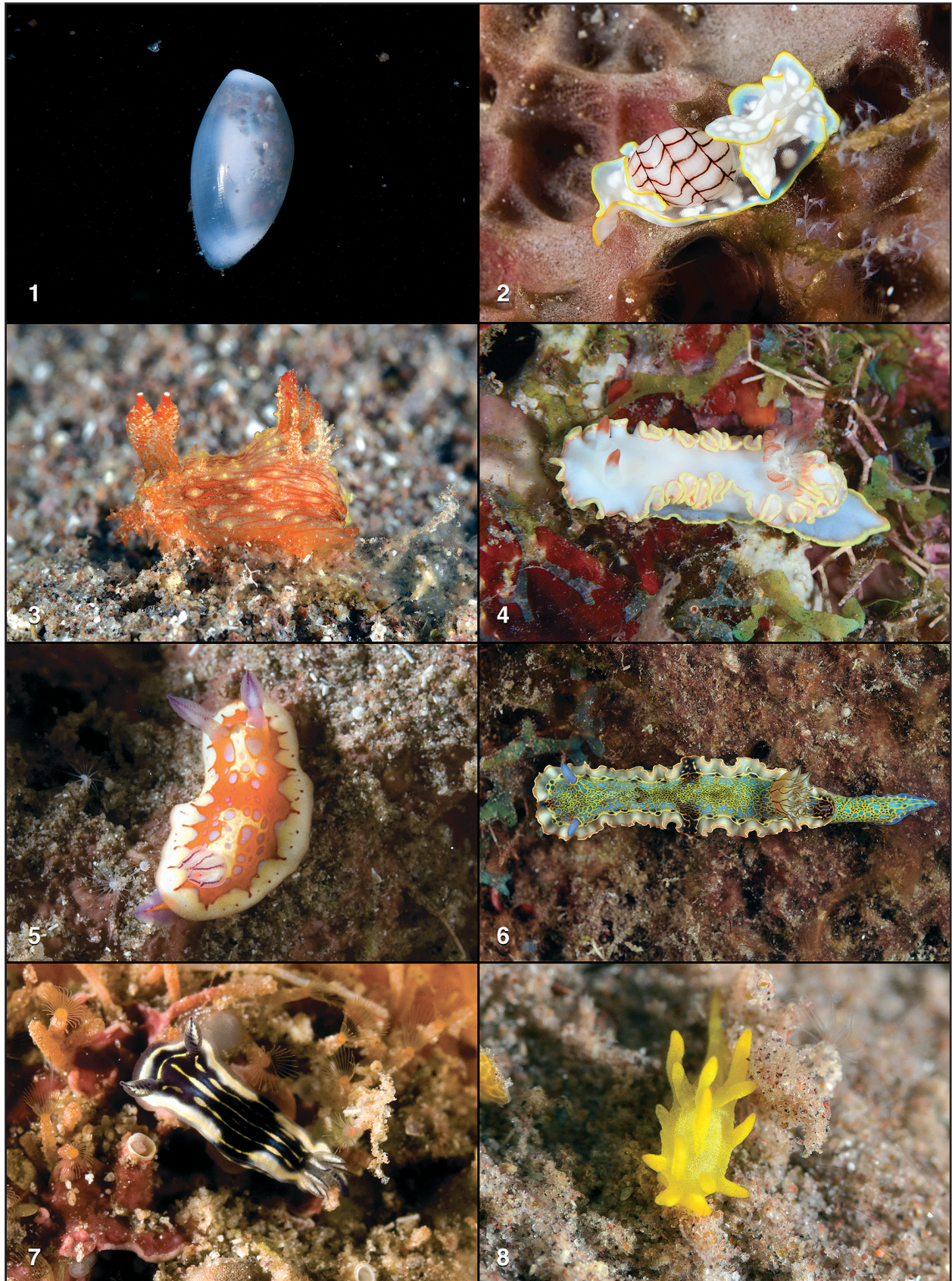


Fig. 1. *Alys caribaeus* (d'Orbigny, 1841). **Fig. 2.** *Micromelo undatus* (Bruguière, 1792). **Fig. 3.** *Polycera* sp. 2 *sensu* Valdés et al. (2006). **Fig. 4.** *Doriprismatica sedna* (Ev. Marcus & Er. Marcus, 1967). **Fig. 5.** *Felimida binza* (Ev. Marcus & Er. Marcus, 1963). **Fig. 6.** *Felimare acriba* (Ev. Marcus & Er. Marcus, 1967). **Fig. 7.** *Felimare ruthae* (Ev. Marcus & Hughes, 1974). **Fig. 8.** *Okenia picoensis* Paz-Sedano, Ortigosa & Pola, 2017.

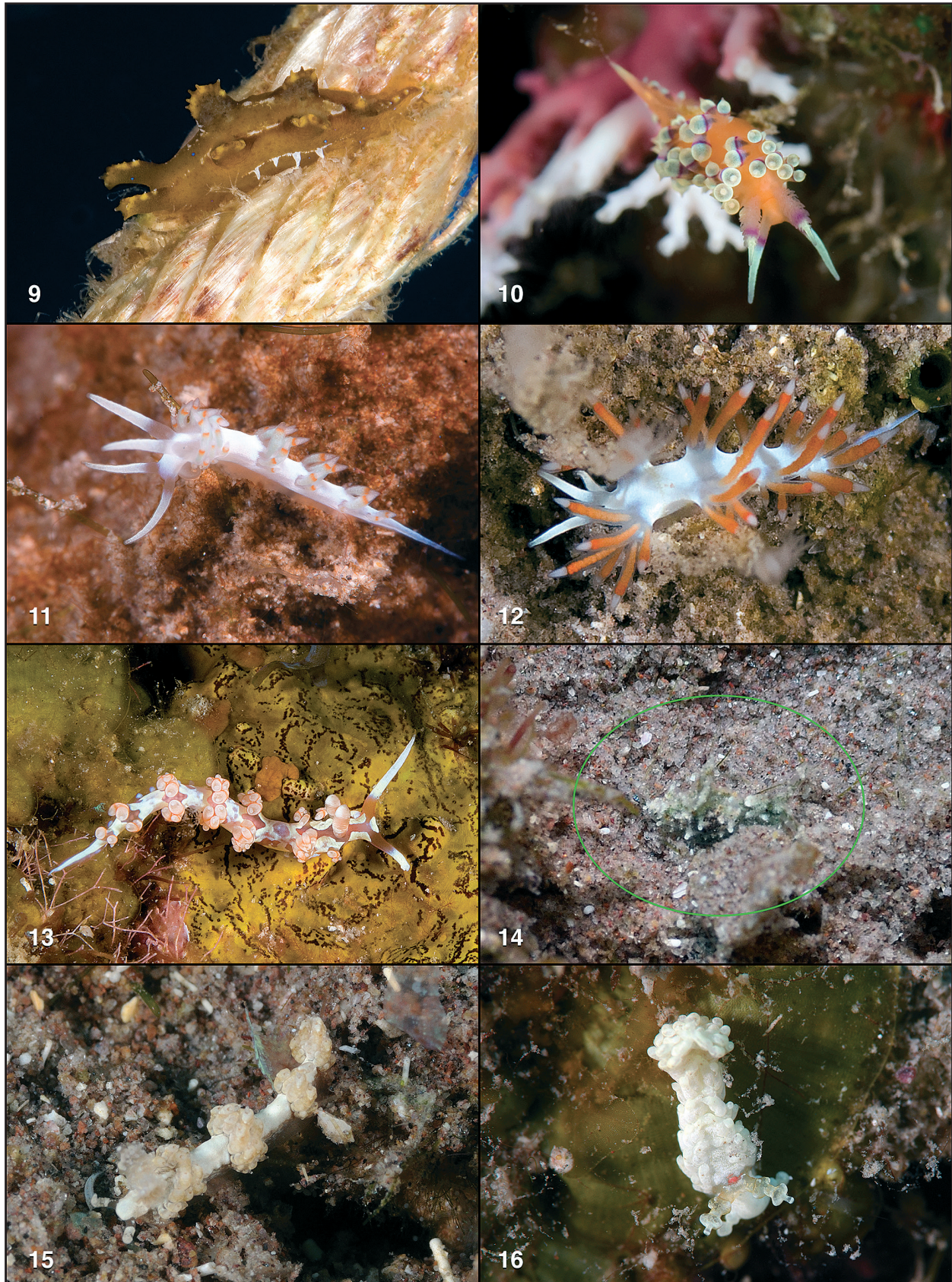


Fig. 9. *Scyllaea pelagica* Linnaeus, 1758. Fig. 10. *Coryphellina hamanni* (Gosliner, 1994). Figs. 11–12. *Flabellina dushia* (Ev. Marcus & Er. Marcus, 1963). Fig. 13. *Flabellina engeli* (Ev. Marcus & Er. Marcus, 1968). Fig. 14. *Lomanotus phiops* Er. Marcus, 1957. Fig. 15. *Berghia creutzbergi* Er. Marcus & Ev. Marcus, 1970. Fig. 16. *Bulbaeolidia oasis* Caballer & Ortea, 2015.

to the nominate subspecies *F. e. engeli*. The subspecies *F. e. lucianae* Dacosta et al., 2007 occurs from northeastern to southern Brazil, being slightly removed geographically from its sister taxon (Dacosta et al., 2007; Padula et al., 2012).

The photograph of the specimen of *Lomanotus* sp. is too blurred to allow a definite identification, but we tentatively classify the specimen as *L. phiops* due to its triangular cerata. This species is known from Honduras to Brazil (Valdés et al., 2006). No species in this genus had been reported from the Dutch Caribbean until now.

Berghia creutzbergi is known from Florida to Brazil (Carmona et al., 2014) and has already been reported from St. Eustatius. *Bulbaeolidia oasis* is known from Mexico (Atlantic coast), Bahamas, Cuba, Guadeloupe, Barbados, and Venezuela to southern Brazil (Carmona et al., 2017), so the present record, despite being new for the Caribbean Netherlands, is within the species' range. The Caribbean and South American representatives of this species were until recently identified as *Bulbaeolidia alba* (Risbec, 1928), a species from the Pacific (Caballer & Ortea, 2015; Carmona et al., 2017).

Anetarca piutaensis is known only from its type locality, Costa Rica (Ortea et al., 2003), so the present record greatly extends its distribution. *Nanuca sebastiani* occurs from Florida to Brazil (Rosenberg et al., 2019) and was previously reported from Bonaire and Curaçao (Table 1).

Tenellia luciae was previously reported from the Caribbean, as *Cuthona caerulea* (Montagu, 1804) (now *Trinchesia caerulea*), Florida and Brazil (Valdés et al., 2006). The present record, however, is possibly the first from the Dutch Caribbean if confirmed. The present specimen is slightly different from typical *T. luciae*, as it lacks the bright orange tips on the rhinophores and oral tentacles and presents a brownish ground color instead of translucent gray (L. Wilk, pers. comm.). This could represent simple intraspecific variation, but it is also possible that the present specimen represents a distinct taxon. As such, we prefer to use open nomenclature for this record: *T. cf. luciae*. Furthermore, it is worth noting that *T. luciae* is a potential synonym of *Cuthona herreraei* Ortea, Moro & Caballer, 2002 from Cape Verde (Ortea et al., 2002; Ortea & Moro, 2018), which may hint at a vast amphiatlantic distribution.

Camachoaglaja berolina has an amphiatlantic distribution (Valdés et al., 2006) and was previously reported from Bonaire and Curaçao. *Navanax gemmatus* is widespread from Florida to southern Brazil, and a remarkable degree of morphological variation is known for the species (Ornelas-Gatdula et al., 2012). In the Dutch Caribbean, this species was previously known only from Curaçao (Marcus & Marcus, 1970).

Elysia cornigera is known from Florida, Bahamas, Cuba and Jamaica (Krug et al., 2011); its range is extended here to Saba. Even though this particular species has not been reported from the Dutch Caribbean, eight other *Elysia* spp. are known from St. Eustatius and/or the ABC islands (Krug

et al., 2016; Hewitt & van Leeuwen, 2017). *Thuridilla malacquita* has likewise never been reported from the Dutch Caribbean. This species is known only from type locality Martinique and from Costa Rica (Camacho et al., 2014; Ortea & Buske, 2014; Ortea & Moro, 2016; Lamy & Pointier, 2017).

Bivalves: The bivalves reported herein, despite being new records to Saba, belong to widespread species already known in other localities of the Dutch Caribbean (Table 1). Nevertheless, some of them warrant further comment.

Barbatia domingensis, known in older literature as *Barbatia cancellaria* (Lamarck, 1819) (Huber, 2015), is distributed from Florida and the Gulf of Mexico through the Caribbean to Venezuela (Miloslavich et al., 2010). Given the nomenclatural confusion surrounding this species, its distribution should be carefully revisited and based on voucher material from museum collections. We also identified from Saba a species representing the morph that in older literature was mistakenly referred to *B. domingensis*; it is uncertain whether there is an available name for this morph and we refer to it simply as *Acar* sp. (Table 1).

The identification of the flame scallop is tentative; it has been recently shown that coloration of soft parts is not enough to distinguish between *Ctenoides scaber* and *C. mitis* (Dougherty & Li, 2017). The most reliable diagnostic feature is the number of radial ribs on the shell (Mikkelsen & Bieler, 2003; Dougherty & Li, 2017), but that information is not presently available in the current case. It is worthwhile to note, however, that *C. scaber* is much more common, being one of the two species most commonly seen (and photographed) by scuba divers (Williams, 1992). Both *C. scaber* and *C. mitis* occur in St. Eustatius, St. Maarten and Curaçao (de Jong & Kristensen, 1968; Hewitt & van Leeuwen, 2017; Lamy & Pointier, 2017) and *C. mitis* is already recorded from Saba (Hewitt, 2017).

Scaphopoda: The single new scaphopod record is *Graptacme eborea*, a widespread species in the West Atlantic, distributed from Florida to Uruguay (Kraeuter, 2009; Souza et al., 2013).

Cephalopods: Hanlon et al. (2010) reported three octopus species from Saba: *Macrotritopus defilippi*, *Amphioctopus burryi* and “*Octopus vulgaris*”. It is very hard to confidently identify octopuses by photograph alone, especially given the plastic morphology of these animals. Even so, we can tentatively identify the individuals in our photographs as *Octopus briareus* and *O. hummellincki*. The former is known from Florida, USA, to northern South America (Ponce-Márquez et al., 2020), while the latter ranges from Florida to southeastern Brazil (Burgess, 1966). Further photographed specimens could either belong to *O. insularis* (known from Mexico to southeastern Brazil; Avendaño et al., 2020) or to the recently-reestablished *O. americanus*, a cryptic species of *O. vulgaris* distributed from northwestern USA to northern Argentina (Avendaño et al., 2020).



Fig. 17. *Anetarca piutaensis* (Ortea, Caballer & Espinosa, 2003). Fig. 18. *Nanuca sebastiani* Er. Marcus, 1957. Fig. 19. *Tenellia* cf. *luciae* (Valdés, Medrano & Bhawe, 2016). Fig. 20. *Camachoaglaja berolina* (Er. Marcus & Ev. Marcus, 1970). Fig. 21. *Navanax gemmatus* (Mörch, 1863). Fig. 22. *Elysia cornigera* Nuttall, 1990. Fig. 23. *Elysia papillosa* Verrill, 1901. Fig. 24. *Thuridilla malaquita* Ortea & Buske, 2014.



Fig. 25. *Cyphoma cassidyae* Lorenz, 2020 (record from off Little Cayman, Cayman Islands). Fig. 26. *Cyphoma cassidyae* Lorenz, 2020. Fig. 27. *Volvarina* sp. Fig. 28. *Acar* sp.

CONCLUSION

The present work increases the species total of Saba from 93 to 144. The addition of 51 species to the faunal list of the island is a significant step towards the long-term goal of having a complete checklist of molluscan species. Of particular importance are the 22 new records of shell-less gastropods, which are typically underrepresented in natural history collections and surveys, but are of particular appeal to nature photographers and scuba enthusiasts. Furthermore, the records of the following species represent large extensions of known range: *Anetarca piutaensis*, *Coryphellina hamanni*, *Tenellia* cf. *luciae*, *Cyphoma cassidyae*, *Elysia cornigera*, *Felimare acriba*, *Lomanotus phiops*, *Okenia picoensis*, *Polycera* sp. 2, *Thuridilla malaquita*.

Finally, this work demonstrates the value of public platforms such as iNaturalist, which encourage citizen scientists and nature enthusiasts to contribute much-needed data. By uploading photographs and associated information, people make their observations available to virtually everyone. Even though voucher specimens are important for safeguarding the future of biodiversity research (Salvador & Cunha, 2020), the easiness of use and accessibility of online photographic

databases such as iNaturalist makes them a powerful tool for biodiversity researchers worldwide. The scientific community, however, has so far been somewhat slow in adopting their use.

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