

Sinum haliotoideum (Linnaeus, 1758): historic and modern records from the Red Sea, with a discussion of its convoluted taxonomic history (Gastropoda, Naticidae)

LEO J. VAN GEMERT

Couwenhoven 5519, 3703 EV Zeist, The Netherlands; leo.van.gemert@planet.nl [corresponding author]

THOMAS HUELSKEN

Berghofer Heide 104, 44805 Bochum, Germany; t.huelsken@gmail.com

MARY LYN RUSMORE-VILLAUME

3006 NE 16th Ave, Portland, Oregon, 97212, USA; egyptredseashells@gmail.com

MICHAEL HOLLMANN

Stockumer Heide 44, 58454 Witten, Germany; michael.hollmann@rub.de



GEMERT, L.J. VAN, HUELSKEN, T., RUSMORE-VILLAUME, M.L. & HOLLMANN, M., 2019. *Sinum haliotoideum* (Linnaeus, 1758): historic and modern records from the Red Sea, with a discussion of its convoluted taxonomic history (Gastropoda, Naticidae). – *Basteria* 83 (1-3): 3-12. Leiden.
Published 6 April 2019

Specimens of *Sinum haliotoideum* (Linnaeus, 1758) were recently collected in the Red Sea area, confirming an old report from the mid-1800s. The occurrence in the Red Sea is supported by records, both earlier and recent, from neighbouring localities in the northern Indian Ocean. Thus, the northern Indian Ocean, including the Red Sea, has to be included in the geographical range of this species. Differences in opinion concerning conspecificity of *Sinum haliotoideum* with other species of *Sinum* described from the Indo-Pacific are discussed. *S. planulatum* (Récluz in Chenu, 1843) = *S. planatum* (Récluz in Chenu, 1843), *S. planum* (Philippi, 1844), *S. gualterianum* (Récluz, 1851), and *S. weberi* (Bartsch, 1918) are all junior synonyms of *S. haliotoideum* (Linnaeus, 1758). *S. fuscum* (Röding, 1798), *S. sinuatum* (Récluz, 1851), *S. lacteum* (Récluz, 1851), *Ectosinum pauloconvexum* Iredale, 1931, and *S. diauges* Kilburn, 1974 are distinct from *S. haliotoideum*. The status of *S. indicum* (Gray, 1828) remains uncertain as the type material is probably lost.

Key words: Gastropoda, Naticidae, *Sinum haliotoideum*, Red Sea, distribution, taxonomy.

INTRODUCTION

This study was triggered by the discovery of two damaged shells of a *Sinum* species on Egyptian beaches of the Red Sea by the first author. This finding led to a comprehensive search for records of *Sinum* species from the Red Sea in other private collections, in museums, institutions and in the literature. Included in this search was the adjacent northern part of the Indian Ocean. To support our assignment of the collected specimens to *Sinum haliotoideum* (Linnaeus, 1758) we revisited the descriptions and, wherever possible, examined the type specimens of all *Sinum* species previously synonymized with *Sinum haliotoideum* or reported from the vicinity of the Red Sea.

MATERIALS AND METHODS

Definitions. — The views of the figured *Sinum* shells are defined following Huelsken et al. (2008). Apical view = view from the top: with the apex pointing upwards, looking down on the apex. Umbilical view = view from the bottom: with the apex pointing downwards, looking at the inner lip, basal lip, and outer lip. Apertural view = view from the side: with the apex pointing upwards while looking into the aperture.

Shell dimensions. — Measurements of shell dimensions of *Sinum* species differ in the literature. We use the following terms to specify the measurements. Larger diameter = with the shell positioned on a flat surface with the apex pointing upwards (see, for example, Fig. 2c), the distance from the left border to the right border. Lesser diameter

= with the shell positioned on a flat surface with the apex pointing upwards (see, for example, Fig. 2c), the distance from the upper border to the lower border. Maximal diameter = the largest measurement obtainable on the specimen (without a specified, fixed position during measurement). Height = with the apex pointing upwards and the basal lip downwards, as in the apertural view (see above and Fig. 2b, for example), the distance between apex and basal lip. Width = with the apex pointing upwards and the basal lip downwards, as in the apertural view (see above and Fig. 2b, for example), the distance between the left and the right border of the shell.

Acronyms of institutions and repositories. — AMS - Australian Museum Sydney, Sydney, Australia; van Gemert collection - collection Leo van Gemert, Zeist, The Netherlands; MHNG - Muséum d'Histoire Naturelle, Geneva, Switzerland; Rusmore-Villaume collection - collection Mary Lyn Rusmore-Villaume, Portland, Oregon, USA; NHMUK - Natural History Museum, London, United Kingdom; NMSA - Natal Museum, Pietermaritzburg, South Africa; RMNH - formerly Rijksmuseum van Natuurlijke Historie, now Naturalis Biodiversity Center, Leiden, The Netherlands; USNM - United States National Museum, Smithsonian Institution, Washington, USA; ZMUU - Zoological Museum, Uppsala University, Uppsala, Sweden.

RESULTS

Records of *Sinum* species in the Red Sea

Over the past two decades, three shells of a *Sinum* species were collected by the first and third author on Egyptian beaches of the Red Sea. The locations where these *Sinum* specimens were found are shown in Fig. 1. One slightly damaged shell (Fig. 2; 26 mm, van Gemert collection) in the Bay of Safaga in November 2003; one conspecific badly damaged shell (> 20 mm; van Gemert collection) in March 2005 in Lahami Bay, approximately 120 km south of Marsa Alam; and another conspecific damaged shell (15 mm; Rusmore-Villaume collection) in May 2010 just south of Wadi Gimaal, approximately 60 km south of Marsa Alam. When trying to identify this species, it became apparent that no *Sinum* species had been reported from the Red Sea in the recent literature (Dekker & Orlin, 2000; Heiman & Mienis, 2004; Rusmore-Villaume, 2008; Verbinen & Wils, 2008). More than a hundred years ago, however, “*Sigaretus planulatus* Recluz” [*sic*] = *Sinum planatum* (Récluz in Chenu, 1843) had been reported from the Red Sea by Horst & Schepman (1908: 384). This specimen (Fig. 3) had been collected by the Dutch consul Ruysenaers in the mid-1800s in Egypt (Gijzen, 1938: 113). It should be noted here that not all the material allegedly coming from the Red Sea in the Ruysenaers collection is actually from that area. Mienis (1992)

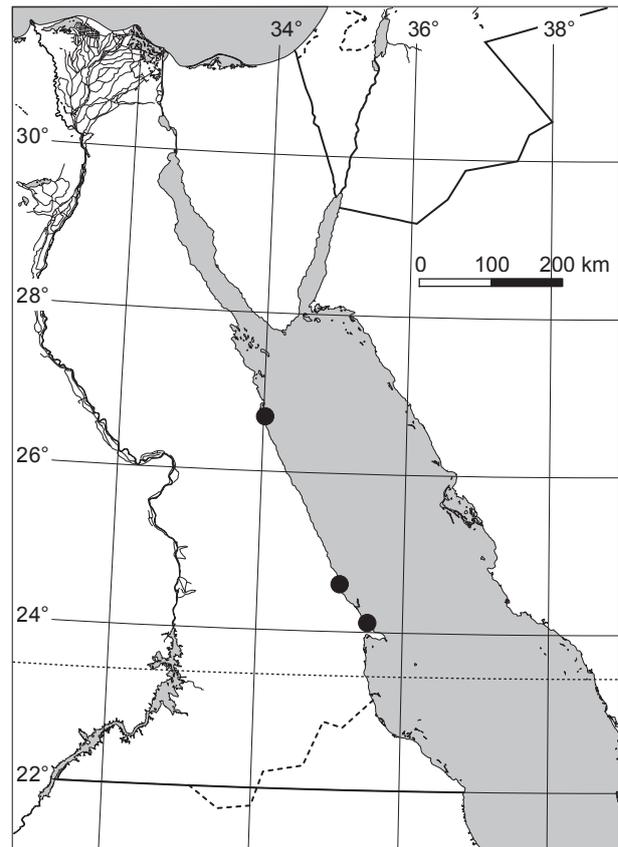


Fig. 1. Locations in the northern half of the Red Sea where shells of *Sinum haliotoideum* have recently been found.

showed that the species *Natica rodatzii* Schepman, 1901 [non *Natica rodatzii* Philippi, 1850 *ex* Dunker, MS], described as a new species from the Ruysenaers Red Sea collection and figured in van der Bijl et al. (2010: 79, figs 189-190), is a junior synonym of the amphi-Atlantic species *Polinices lacteus* (Guilding, 1834), demonstrating that locality data of the Ruysenaers Red Sea collection are not always reliable. Another concern regarding Red Sea locality data derives from human-induced redistribution of shells. Already in 1874, Jickeli (page 18) warned against shells sold to tourists in Suez that were apparently imported from eastern Asian countries and falsely labelled by vendors as from “*M. rubrum*” [= Red Sea]. Along the same lines, a recent publication (Vanleke & Fraussen, 2017) highlighted the problem of beach contamination by tourist shells, providing several examples from localities outside the Red Sea area.

In our case, regarding the recently found specimens of *Sinum*, it is highly unlikely that they originated from bags of shells (i.e. imported into Egypt for the tourist trade, bought by visitors in Red Sea resort towns and hypothetically discarded on the beach). This is because, as far as we know, there are no such shops in Safaga. Furthermore, the

other two locations are quite remote from tourist destinations. In addition, the small size, fragility and its rather dull white colour make the shells of *S. haliotoideum* rather unattractive for the tourist trade.

Records of *Sinum* species in neighbouring parts of the northern Indian Ocean

According to Kilburn (1976: 875), *Sinum planatum* (Récluz in Chenu, 1843) = *S. haliotoideum* (Linnaeus, 1758) can be found from Japan to Queensland and from Mozambique to Natal. Kabat (1990: 7) states the geographical range as the central and western portions of the tropical Indo-Pacific. Neither author mentions the Red Sea, nor, more generally, the northern part of the Indian Ocean. In recent years several records of *Sinum* species were published from the northern Indian Ocean, but none from the Red Sea. Jarrett (2000: 42, fig. 172) reported *Sinum planulatum* (Récluz [sic]) from the Seychelles; Kilburn (1976: 874) designated Mahé, Seychelles as the type locality of *S. planatum*; Bosch et al. (1995: 88, fig. 329) reported *S. haliotoideum* from all regions of eastern Arabia. Other reports concern Kenya (Fowler, 2016: 28, pl. 14 fig. 5), Pakistan (Tirmizi & Kazmi, 1995: fig. 1), Sri Lanka (Kirtisinghe, 1978: 58, pl. 31 fig. 1 as *Sinum planulatus* [sic] (Récluz)) and India (Subba Rao, 2003: 192, pl. 38 figs 5, 16, pl. 39 figs 9-10; Apte, 2014: 83, pl. 11 fig. 7). However, the specimen pictured by Kirtisinghe is certainly not *S. planulatum* (= *S. haliotoideum*), but rather *S. javanicum* (Gray in Griffith & Pidgeon, 1834), and the specimen pictured by Apte as *S. haliotoideum* is also not correctly identified and probably represents *S. incisum* (Reeve, 1864). This latter species is described (Reeve, 1864) as a flatly depressed shell with numerous spiral ridges, fitting well the picture of Apte, 2014, while clearly separating it from *S. haliotoideum* which lacks any macroscopic spiral ribs.

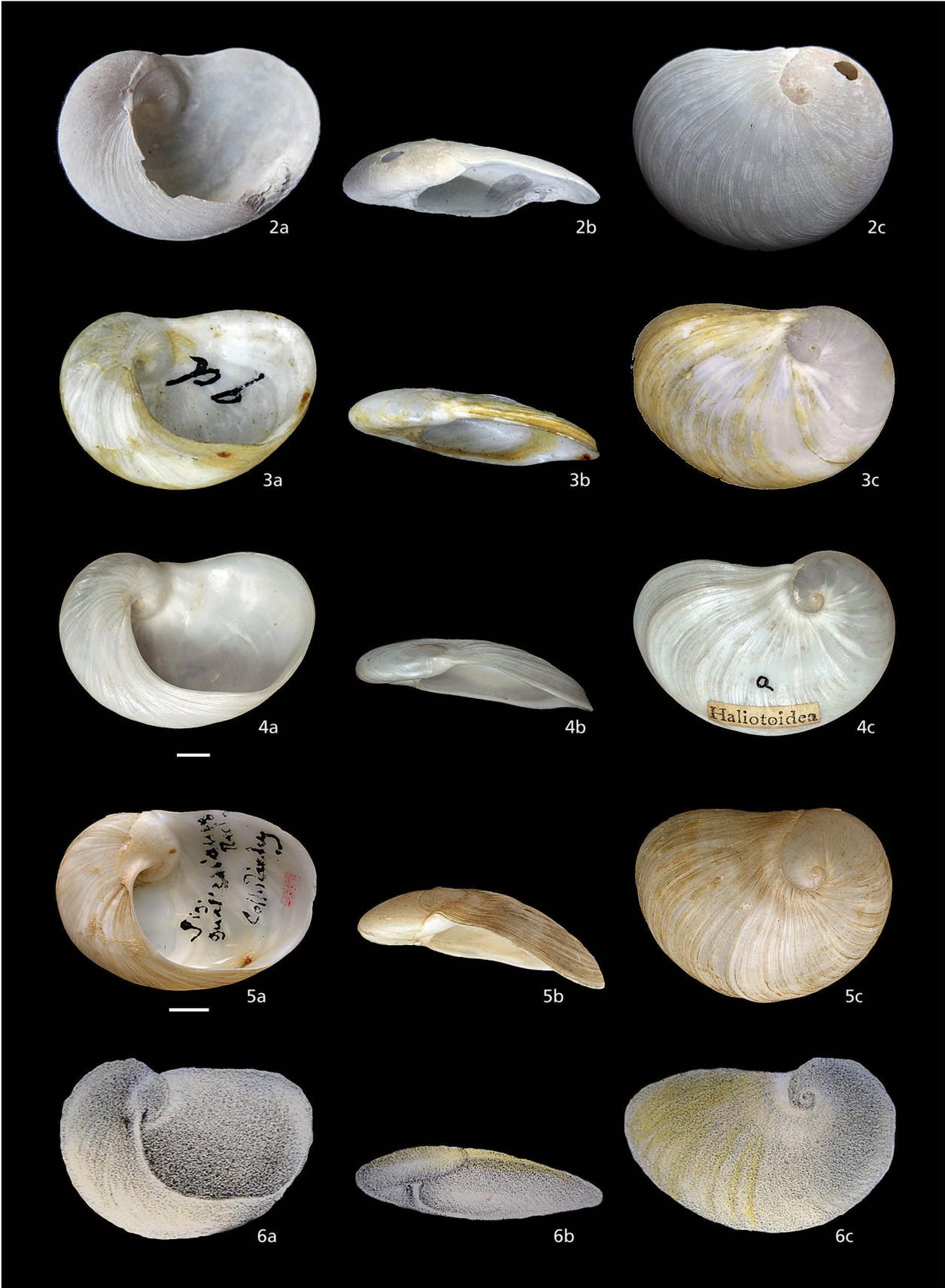
The *Sinum* record closest to the Red Sea was published by E.A. Smith in 1891. He reported *Sigaretus planulatus* Récluz from Aden, collected intertidally or in shallow water (Smith, 1891: 414).

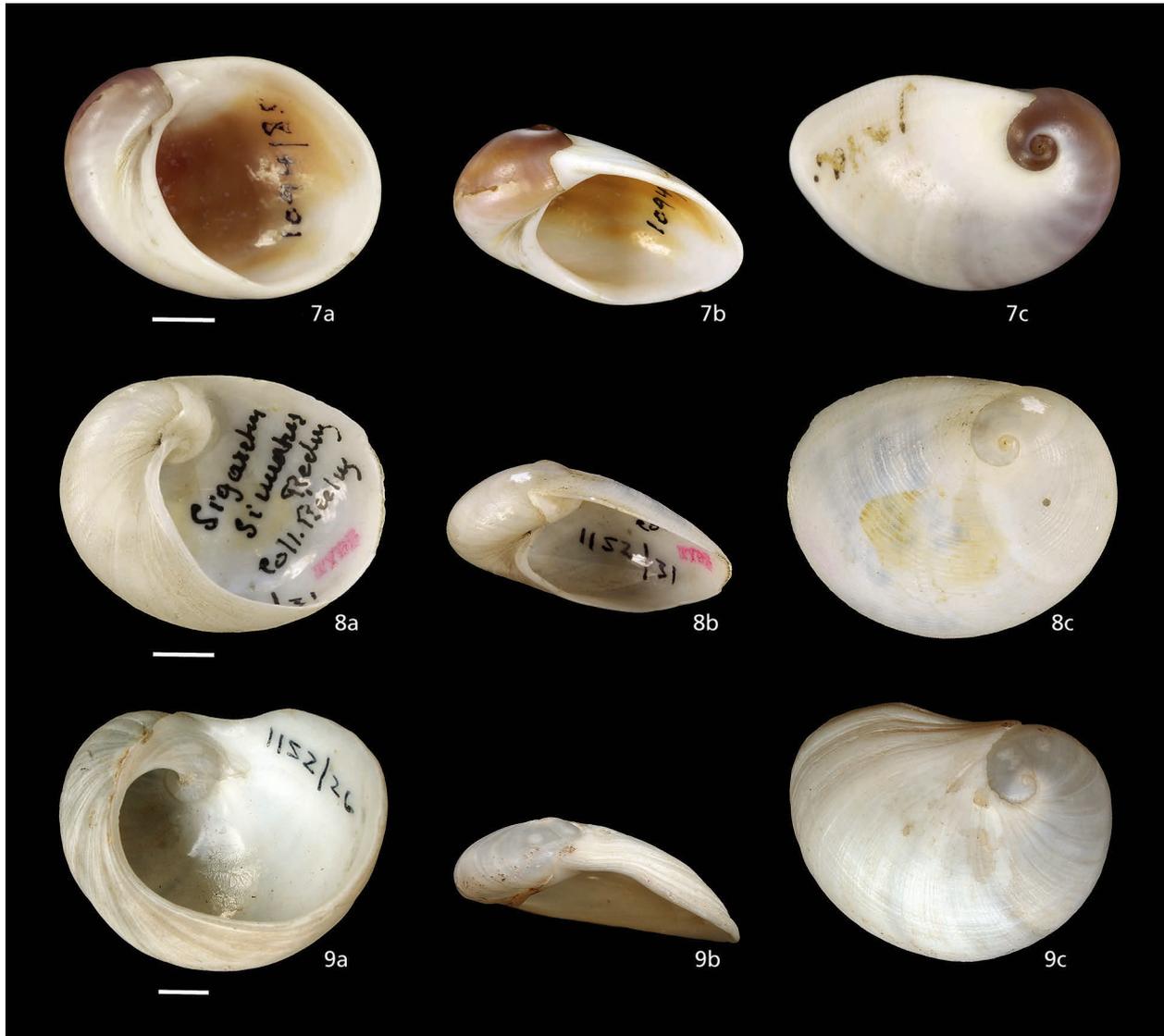
Discussion of the synonymy of *Sinum haliotoideum* (Linnaeus, 1758)

Kabat (1990: 6) synonymized *Sigaretus planatus* and its variant spelling *Sigaretus planulatus* with *Sinum haliotoideum* (Linnaeus, 1758). The lectotype of the latter (selected by Kabat, 1990) is shown in Fig. 4. More synonyms and records are given by Kabat (1990), including most of the ones already applied by Kilburn (1976), with the notable exception of *Ectosinum pauloconvexum* Iredale, 1931, which Kabat, disagreeing with Kilburn, considered to be conspecific with *Sinum zonale* (Quoy & Gaimard, 1832) and not a synonym of *S. haliotoideum* (see discussion below). The complex taxonomic history of *Sinum planatum* has been discussed in great detail by Kilburn (1976: 874). Kilburn es-

tablished that the name *planatum* has to be accepted over the alternative spelling *planulatum* as Iredale in 1924, by inadvertently acting as the First Revisor, fixed the name *Sinum planatum* when he picked *planatum* over *planulatum* based on a perceived date priority (Iredale, 1924: 254-255). Iredale argued that the specific name *planatum* had been introduced on page 1 of Récluz' monograph, published May 11, 1843, while *planulatum* had been introduced on page 21, which had been published on June 5, 1844. However, as Kilburn (1976: 874) pointed out, the name *planulatum* had also been used on plate 3 of this monograph, which had been published together with page 1 on May 11, 1843; thus, priority of *planatum* over *planulatum* is reduced to a mere page priority. Interestingly, Iredale noted that both names were used interchangeably in the original description by Récluz (Récluz in Chenu, 1843). The largest of the seven syntypes of *Sigaretus planatus*, housed in the Muséum d'Histoire Naturelle, Geneva, Switzerland (MHNG-MOLL 20831, formerly 1152/30; 13.5 × 33.7 mm) is shown in Fig. 5. It should be noted that those seven syntypes had all been labeled directly on the shell as "*Sig. gualterianus* Récluz" by a MHNG collection manager. *Sigaretus gualterianus* Récluz, 1851 = *S. gualterianum* (Récluz, 1851) was introduced in the synonymy of *S. planatum* (Récluz in Chenu, 1843) and *S. planum* (Philippi, 1844). Thus, it is a junior synonym of *S. planatum* (Récluz in Chenu, 1843), as noted in Récluz, 1851: 185 and Kabat et al., 1997: 20, but according to ICZN (1999: Article 11.6) is considered an unavailable name.

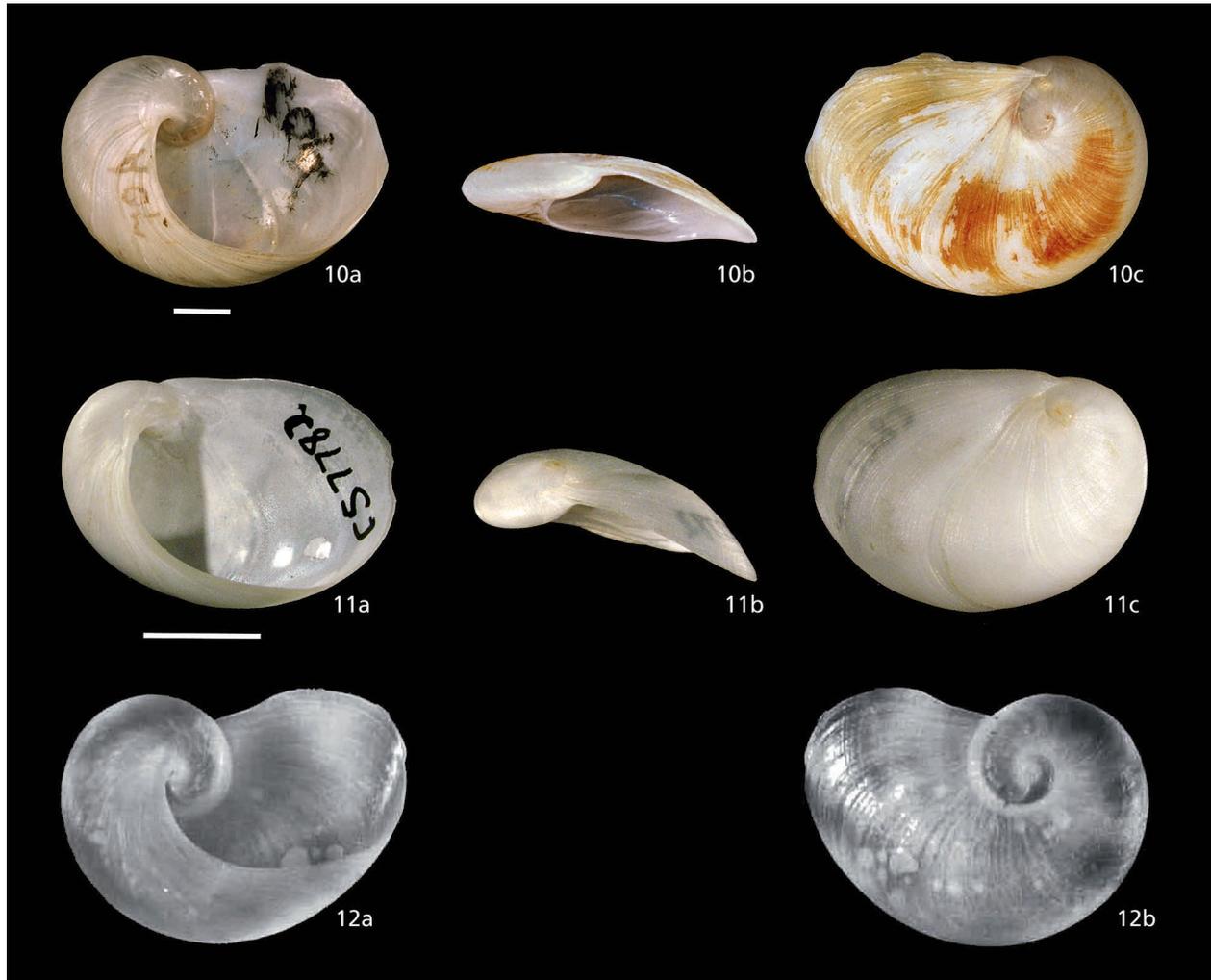
Kilburn (1976) also synonymized *Sigaretus planus* Philippi, 1844 with *Sinum planatum* (= *Sinum haliotoideum*), probably prompted by the same action taken by Weinkauff in his monograph on the genus *Sigaretus* (Weinkauff, 1883: 15). Indeed, the drawing of *Sigaretus planus* (Philippi, 1842-1845: pl. vi.3 [1] fig. 7; the unnumbered figures below fig. 7 are the figs 8 and 9, respectively), reproduced here (Fig. 6), shows a strong resemblance to *Sinum haliotoideum*. However, the statement by Philippi (1842-1845: 146) in his original description of *Sigaretus planus*: "Die Skulptur ist wie bei *S. laevigatus*" (= "the sculpture is just like that of *S. laevigatum*") appears to contradict this synonymy, as *Sinum laevigatum* (Lamarck, 1822) is a species strongly sculptured with easily recognizable concentric ribs, and not a smooth shell with only microscopic wavy concentric threads as is typical of *Sinum planatum* = *Sinum haliotoideum*. This apparent contradiction, however, can be resolved by considering the fact that the holotype of *Sinum laevigatum* (Lamarck, 1822), which was figured by Delessert (1841: pl. 33 fig. 1) and Récluz in Chenu (1843: 6, pl. 2 figs 8-12) prior to Philippi's description of *S. planus*, is an extremely worn shell which, as already noted by Kilburn (1976: 880), does not show the concentric ribs typical for the species but looks almost polished. To illustrate this, we picture the holotype of *Sigaretus laevigatus* Lamarck, 1822 from Java stored in the Lamarck collec-





< **Figs 2-6.** *Sinum haliotoideum* (Linnaeus, 1758). **2a-c**, Egypt, Bay of Safaga, November 2003, van Gemert collection, 26 mm larger diameter (leg. and photography: Leo van Gemert). **3a-c**, Red Sea, 7.1 mm height, 24.2 mm larger diameter × 17.0 mm lesser diameter, RMNH.MOL.190578, ex Ruysenaers collection, (photography: Jeroen Goud, RMNH). **4a-c**, Lectotype of *Helix haliotoidea* Linnaeus, 1758: ZMUU (no. 382), locality unknown, 5 mm height × 25.5 mm lesser diameter × 38.2 mm larger diameter (photography: Erica Meljon, ZMUU). **5a-c**, Seychelles, Mahé, largest of seven syntypes of *Sigaretus planatus* Récluz in Chenu, 1843, 13.5 mm height × 33.7 mm width, 34.0 mm maximal diameter, MHNG-MOLL 20831 (formerly 1152/30), (photography: Thomas Huelsken). **6a-c**, Type figure of *Sigaretus planus* Philippi, 1844, locality unknown, dimensions approximately 7 mm height × 14 mm lesser diameter × 24 mm larger diameter (taken from Philippi, 1842-1845: pl. VI.3, *Sigaretus* 1, fig. 7) (photography: Leo van Gemert). For all Figs: **a** = umbilical view; **b** = apertural view; **c** = apical view. Scale bars = 5 mm.

Figs 7-9. Type specimens of *Sinum* species. **7a-c**, *Sigaretus laevigatus* Lamarck, 1822, holotype, MHNG-MOLL 51382 (formerly 1094/85), Java, 18.5 height × 25.9 mm width, 26.7 mm maximal diameter (photography: Michael Hollmann). **8a-c**, *Sigaretus sinuatus* Récluz, 1851, holotype, MHNG-MOLL 20832 (formerly 1152/31), locality unknown, 16.3 mm height × 28.2 mm width, 28.4 mm maximal diameter (photography: Michael Hollmann). **9a-c**, *Sigaretus lacteus* Récluz, 1851, holotype, MHNG-MOLL 20827 (formerly 1152/26), locality unknown, 17.1 mm height × 31.7 mm width, 22.3 mm maximal diameter (photography: Thomas Huelsken). For all Figs: **a** = umbilical view; **b** = apertural view; **c** = apical view. Scale bars = 5 mm.



Figs 10-12. Type specimens of *Sinum* species. **10a-c**, *Sinum haliotoideum* (Linnaeus, 1758). Holotype of *Sigaretus weberi* Bartsch, 1918 holotype, USNM 219050, Palawan, Philippines, 7.1 mm height, 18.6 mm lesser diameter, 27.6 mm larger diameter, according to the original description (photography: Michael Hollmann). **11a-c**, *Ectosinum pauloconvexum* Iredale, 1931, Australia, Sydney, holotype, AMS C57782, 8.6 mm height \times 13.4 mm width, 14.4 mm maximal diameter, (photography: Thomas Huelsken). **12a-b**, *Sinum diauges* Kilburn, 1974, Mozambique, Bazaruto Archipelago, sandbank between Magaruque Island (21°59'S 35°25'E) and Mucoque (21°59'S 35°20'E), holotype, NMSA G1453/T1785, 17.8 mm lesser diameter \times 24.7 mm larger diameter (photo taken from Kilburn, 1974). For Figs 10, 11: **a** = umbilical view; **b** = apertural view; **c** = apical view, for Fig. 12: **a** = umbilical view, **b** = apical view. Scale bars = 5 mm.

tion at the MHNG (MHNG-MOLL 51382, old number 1094/85, 18.5 \times 25.9 mm, Fig. 7). Thus, while Philippi's comparison of the sculpture of his *Sigaretus planus* to the worn holotype of *Sigaretus laevigatus* (Lamarck, 1822) is correct, this comparison is not valid for well-preserved specimens of *S. laevigatus*. We thus conclude that *Sinum planum* (Philippi, 1844) is indeed another junior synonym of *S. haliotoideum* (Linnaeus, 1758).

In 1828 John Edward Gray described a *Sinum* species from India, *Cryptostoma indica*, which he stated to closely resemble *S. haliotoideum*. He writes "*Cryptostoma Indica*, *n.* which differs from *C. haliotoidea* in being a little more convex and solid, and in the edge of the columella being concave and polished" (Gray, 1828). Unfortunately, this species was never figured, and the whereabouts of the holotype, which in the original description was stated to be held at the "Mus. General Hardwicke", are unknown. The Hardwicke collection is in the NHMUK. Despite a thorough search by the curators and by one of us (MH) the type material of *Cryptostoma indica* Gray, 1828 has not been found there and should be considered as probably lost.

A second record of a *Sinum* species from the Red Sea was given by Récluz (1851: 189, pl. 6 figs 12-14) when he described his new species *Sigaretus sinuatus* (non *Sigaretus sinuatus* Swainson, 1837, nomen nudum). Récluz considered this new species to be distinct from *Sigaretus haliotoideus*. However, Weinkauff (1883) stated in his monograph that *Sigaretus sinuatus* resembles *Sigaretus planulatus* the most, thus in effect relating it to *S. haliotoideum*. The holotype of *Sigaretus sinuatus*, kept at the MHNG (MHNG-MOLL 20832, former number 1152/31, 16.3 × 28.2 mm), has no locality data on the museum label (Kabat et al., 1997: 23), which is not in agreement with the original description by Récluz, which states “La mer Rouge” as the habitat. We examined the holotype (Fig. 8) and conclude that *S. sinuatus* is by no means conspecific with *S. haliotoideum*. An obvious major difference is that the former species is ribbed while the latter is, as mentioned before, smooth with only microscopic wavy concentric threads.

Sigaretus lacteus Récluz, 1851 is another species that clearly resembles *S. haliotoideum* (Linnaeus, 1758). Kilburn (1976: 874) synonymized the two species, but with a question mark. The holotype of *Sigaretus lacteus* Récluz, 1851 (Fig. 9) kept at the MHNG (MHNG-MOLL 20827, formerly 1152/26, 17.1 × 31.7 mm) shows a substantially higher-spined shell with a more convex outline when viewed from the side (= apertural view; Fig. 9b) compared to *S. haliotoideum* (Figs 2b, 3b, 4b, 5b, 6b). It also has a much more concave inner lip when viewed from the bottom (= umbilical view; Fig. 9a) compared to *S. haliotoideum* (Figs 2a, 3a, 4a, 5a, 6a), and we regard it as a different species. Another species morphologically close to *S. haliotoideum* is *Sinum* (*Ectosinum*) *diauges* Kilburn, 1974. The type specimen illustrated in Kilburn (1974, figs 10a-b), described from Bazaruto Bay area, Mozambique, is very similar to *S. planatum* (= *S. haliotoideum*). According to Kilburn (1974: 200; 1976: 874) the diagnostic differences are the number of protoconch whorls, the size of the spire whorls, and the sutures. We follow Kilburn in considering *S. diauges* (Fig. 12) to be not conspecific with *S. haliotoideum*.

We also figure another *Sinum* species synonymous with *S. haliotoideum*: *Sigaretus weberi* Bartsch, 1918 from Alfonso XIII, Palawan Island, Philippines, the holotype of which is kept at the US National Museum, Smithsonian Institution, Washington (USNM 219050, 27.6 mm; Fig. 10). No differentiating features were given in the original description, and Kilburn (1976), Kabat (1990) and Habe (1992) all previously synonymized *Sigaretus weberi* with *S. haliotoideum*.

A more formal synonymy of *Sinum haliotoideum* (Linnaeus, 1758) that includes also the misspellings found in the literature is provided below. It combines information from Kabat (1990: 6-9) and Kilburn (1976: 874-876) and that of our studies of the type material of taxa previously suggested or potentially synonymous with *S. haliotoideum*.

Family Naticidae Guilding, 1834
Subfamily Sininae Woodring, 1928
Genus *Sinum* Röding, 1798

Type species: *Helix haliotoidea* Linnaeus, 1758; by subsequent designation of Dall, 1915: 109.

***Sinum haliotoideum* (Linnaeus, 1758)**

Helix haliotoidea Linnaeus, 1758: 775, no. 621. Lectotype figured, Fig. 4.

Helix haliotoidea — Gmelin, 1791: 3663-3664; misspelling.

Sigaretus haliotoideus — Bosc, 1801: 255; misspelling.

Sigaretus haliotoideus — Lamarck, 1822: 208.

Cryptostoma haliotoideum — Gray in King, 1827: 491.

? *Cryptostoma indica* Gray, 1828: 4. not figured. Type material probably lost.

Sigaretus planatus Récluz, 1843: 1, 6. Syntype figured, Fig. 5.

Sigaretus planulatus Récluz, 1843: pl. 3, fig. 4. A variant spelling of *Sigaretus planatus*.

Sigaretus gualterianus Récluz, 1843: 185, introduced in the synonymy of *Sigaretus planatus* Récluz, 1843, and thus an unavailable name (ICZN 1999, Article 11.6).

Sigaretus planus Philippi, 1844: 146, pl. 1 fig. 7. Figured type, Fig. 6.

Helix haliotidea — Hanley, 1855: 390-391, 541, pl. 4 fig. 7; misspelling.

Sigaretus weberi Bartsch, 1918: 187; figured in Habe, 1992: 296, 299, fig. 5. Holotype figured, Fig. 10.

Sinum planulatum — Robson, 1923: 268, text-fig. of external anatomy.

Sinum (*Ectosinum*) *planatum* — Kilburn, 1974: 201, figs 10c-d (radula), 11b-c (protoconch).

Sinum planatum (Récluz, 1843) — Kilburn, 1976: 874-876, figs 23-24.

Taxa that we exclude from the synonymy of *Sinum haliotoideum*

The following taxa and citations are excluded by us from the synonymy of *Sinum haliotoideum*:

Sinum fuscum Röding, 1798: 14, not figured. Contra Torigoe & Inaba, 2011: 59-60.

Helix haliotoidea — Dillwyn, 1817: 973; probably in Lamellariidae, fide Kabat (1990: 6).

Sigaretus laevigatus Lamarck, 1822: 208, no. 3, not figured. Holotype figured, see our Fig. 7.

Sigaretus haliotoideus — Brown, 1827: pl. 44 figs 1-2; Fleming, 1828: 360; Brown, 1844: 23, pl. 2 figs 1-2; in Lamellariidae, fide Kabat (1990: 8).

Sigaretus haliotidea — Philippi, 1844: 144, pl. 1 fig. 6; is *Sinum philippi* (Weinkauff, 1883), fide Kabat (1990: 8) = *Sinum bifasciatum* (Récluz, 1851).

Sigaretus sinuatus Récluz, 1851: 189–190, pl. 6, figs 12–14.

Holotype figured, see our Fig. 8.

Sigaretus lacteus Récluz, 1851: 186–187, pl. 6 figs 1–2. Holotype figured, see our Fig. 9.

Sigaretus haliotoideus — Reeve, 1864: pl. 1 figs 4a–b; is *Sinum concavum* (Lamarck, 1822), fide Kabat (1990: 8).

Ectosinum pauloconvexum Iredale, 1931: 216, pl. 23 fig.16.

Holotype figured, see our Fig. 11. Contra Kilburn, 1976: 874 and Torigoe & Inaba, 2011: 65; we believe this to be a junior synonym of *Sinum zonale* (Quoy & Gaimard, 1832).

Sinum diauges Kilburn, 1974: 200, figs 10a–b, 11a–c. Holotype figured, see our Fig. 12.

Comments on differences in opinion between authors

Torigoe & Inaba (2011) consider *S. haliotoideum* and *S. planulatum* to be different species. They even place these two species into different subgenera, *Sinum* s.s. and *Ectosinum*, respectively. The latter genus was erected by Iredale in 1931 with *Ectosinum pauloconvexum* Iredale, 1931 as the type species. Torigoe & Inaba (2011) synonymized *Ectosinum pauloconvexum* with *S. planulatum* (= *S. planatum*). However, Kabat (1990: 6) considered *S. pauloconvexum* to be different from *S. haliotoideum* (= *S. planatum* = *S. planulatum*). After comparing the holotype of *E. pauloconvexum* (Fig. 11), which is stored in the Australian Museum in Sydney (AMS, C57782) to the pre-Linnaean figure by Gualtieri (1742) that Kilburn adopted as the type figure of *S. planatum* (Kilburn, 1976: 875, fig. 23) as well as to the figure of one of the syntypes of *S. planatus* (see Fig. 5) and to the photograph (Fig. 4) of the lectotype of *S. haliotoideum* figured in Kabat (1990: 7, fig. 1), we accept the view of Kabat (1990), despite the contrasting conclusion of Kilburn (1976: 874–875). The protoconch of the holotype of *S. pauloconvexum* is quite large and comprises only $\frac{3}{4}$ of a whorl, a feature also found in *Sinum zonale* (Quoy & Gaimard, 1832), while the protoconch of *S. planatum* = *S. haliotoideum* is rather small but comprises 2.0–2.25 whorls. Apparently, Torigoe & Inaba (2011) were not aware of the publication by Kabat (1990) on the species of Naticidae described by Linnaeus, as it is not listed in their references. Thus, it is not surprising that Torigoe & Inaba (2011: 59–60) repeated the earlier, incorrect view that *S. haliotoideum* is a strongly sculptured, ribbed species living in the Western Atlantic and the Mediterranean Sea and not the smooth-shelled Indo-Pacific species it actually is. According to Rueda & Gofas (1999), the correct name for the West African and Mediterranean *Sinum* is *S. bifasciatum* (Récluz, 1851), which takes precedence over the junior synonym *Sinum philippii* (Weinkauff, 1883) that is still used in many publications on the Mediterranean fauna. As a consequence of their misinterpretation of *S. haliotoideum* (Linnaeus, 1758), Torigoe & Inaba (2011) also misinterpreted *Sinum fuscum* Röding, 1798 as synonymous

with *S. haliotoideum*. *S. fuscum* Röding, 1798 represents a different species, as the figures in the pre-Linnaean literature cited by Röding all show specimens with a densely ribbed sculpture.

CONCLUSIONS

The few and scattered historical records of *Sinum haliotoideum* (Linnaeus, 1758) in the Red Sea, as well as our recent findings, are in line with well-documented records of this species in neighbouring regions of the northern Indian Ocean. Hence, the Red Sea has to be added to the geographical range of that species. *Sinum planatum* (Récluz in Chenu, 1843), the name to be preferred over the widely used synonym *Sinum planulatum* (Récluz in Chenu, 1843), is a senior synonym of *Sinum gualterianum* (Récluz, 1851), *Sinum planum* (Philippi, 1844), and *Sinum weberi* (Bartsch, 1918). All five names in turn are junior synonyms of *Sinum haliotoideum* (Linnaeus, 1758). *Sinum fuscum* (Röding, 1798), *Sinum sinuatum* (Récluz, 1851), *Sinum lacteus* (Récluz, 1851), *Sinum diauges* Kilburn, 1974, and *Ectosinum pauloconvexum* Iredale, 1931, on the other hand, are distinct species not conspecific with *S. haliotoideum*. We are unable to judge the true status of *Sinum indicum* (Gray, 1828), as we could not locate the holotype, which is probably lost.

ACKNOWLEDGEMENTS

We thank Henk Mienis and Alan Kabat for their critical comments as reviewers, Henk Dekker and Hubert Blatterer for their effort to locate specimens of *Sinum* species in the Red Sea in their own collections, and Jeroen Goud of RMNH for permission to publish his pictures of *Sigaretus planulatus* from the Ruysenaers collection. The library of RMNH was so kind to allow us to photograph a plate in Philippi (1842–1845). Jan Johan ter Poorten was very helpful in preparing Fig. 1.

Our sincere thanks go to Erica Mejlon of the ZMUU for taking the photos of the lectotype of *Sinum haliotoideum* (Linnaeus, 1758) and to Jean Mariaux of the MNHG, to Christopher Meyer of the USNM, and to Mandy Reid of the AMS for permission to publish photographs of type specimens held at their respective institutions. Finally, we thank Andreia Salvador and Jon Ablett for hosting one of us (MH) at the NHMUK and for their kind assistance in the search for the type material of *Sinum indicum* (Gray, 1828) in the NHMUK collection.

REFERENCES

- APTE, D., 2014. Sea shells of India: an illustrated guide to common gastropods: i-viii, 1-297. Oxford University Press, Mumbai.
- BARTSCH, P., 1918. New marine mollusks from the Philippine Islands. — Proceedings of the Biological Society of Washington 31: 181-187.
- BIJL, A.N. VAN DER, MOOLENBEEK, R.G. & GOUD, J., 2010. Mattheus Marinus Schepman (1847-1919) and his contributions to malacology. A malacological biography and bibliography: 1-200. Nederlandse Malacologische Vereniging, Leiden.
- BOSC, L.A.G., 1801. Histoire naturelle des coquilles, contenant leur description, les mœurs des animaux qui les habitent et leurs usages. Avec figures dessinées d'après nature. Vol. 3: 1-291. Deterville, Paris.
- BOSCH, D.T., DANCE S.P., MOOLENBEEK, R.G. & OLIVER, P.G., 1995. Seashells of eastern Arabia: 1-296. Motivate Publishing, Dubai.
- BROWN, T., 1827. Illustrations of the conchology of Great Britain and Ireland: 2 pp. (Preface/Errata) + v pp. (Systematic index), plate 1-52 (+ Explanations of the plates: un-numbered pages). Lizars / Highley, Edinburgh / London.
- BROWN, T., 1844. Illustrations of the Recent conchology of Great Britain & Ireland, with the description and localities of all the species, marine, land, and fresh water. 2nd edition: i-xiii, 1-144, pls 1-59. Smith & Elder / MacLachlan & Stewart, London / Edinburgh.
- CHENU, J.-C., 1842-1853. Illustrations conchyliologiques ou description et figures de toutes les coquilles connues vivantes et fossiles, classées suivant le système de LAMARCK, modifié d'après les progrès de la science, et comprenant les genres nouveaux et les espèces récemment découvertes: 4 volumes, pp 358, pls 482. Franck, Paris [Published in 85 livraisons (for collation see SHERBORN & SMITH, 1911, Proceedings of the Malacological Society of London, 9 (4): 264-267)].
- DALL, W.H., 1915. A monograph of the molluscan fauna of the *Orthaulax pugnax* zone of the Oligocene of Tampa, Florida. — Bulletin of the United States National Museum 90: i-xv, 1-173, pls 1-26.
- DEKKER, H. & ORLIN, Z., 2000. Check-list of Red Sea Mollusca. — Spirula 47 (Supplement 1): 1-46.
- DELESSERT, B., 1841. Recueil de coquilles décrites par Lamarck dans son *Histoire Naturelle des Animaux sans Vertèbres* et non encore figurées: 95 un-numbered pages, pls 1-40. Fortin & Masson, Paris.
- DILLWYN, L.W., 1817. A descriptive catalogue of Recent shells, arranged according to the Linnaean method; with particular attention to the synonymy. Volume 1: i-xii, 1-580. J. & A. Arch, London.
- FLEMING, J., 1828. A history of British animals, exhibiting the descriptive characters and systematical arrangement of the genera and species of quadrupeds, birds, reptiles, fishes, mollusca, and radiata of the United Kingdom; including the indigenous, extirpated, and extinct kinds, together with periodical and occasional visitants. 1st edition: i-xxii, 1-565. Bell & Bradfute / Duncan, Edinburgh / London.
- FOWLER, O., 2016. Seashells of the Kenya coast: 1-170. ConchBooks, Harxheim.
- GIJZEN, A., 1938. 's Rijks Museum van Natuurlijke Historie 1820-1915: I-XII, 1-335. — PhD Thesis, Leiden University, The Netherlands.
- GMELIN, J.F., 1791. Caroli a Linné, systema naturae, per regna tria naturae, secundum classes, ordines, genera, species, cum characteribus, differentiis, synonymis, locis. Editio decima tertia, aucta, reformata. Tomus 1 Pars 6: 3021-3910. Lipsiae [Leipzig].
- GRAY, J.E., 1827. Appendix B. Containing a list and description of the subjects of natural history collected during Captain King's survey of the intertropical and Western coasts of Australia. Mollusca. — In: KING, P.P. (ed.), Narrative of a survey of the intertropical and western coasts of Australia, performed between the years 1818 and 1822, with an appendix containing various subjects relating to hydrography and natural history: 474-496. Murray, London.
- GRAY, J.E., 1828. Spicilegia zoologica; or, original figures and short systematic descriptions of new and unfigured animals, part I: 1-8, pls 1-6. Treüttel, Würtz & Wood, London.
- HABE, T., 1992. Illustrations of the Philippine marine gastropods described by Paul Bartsch in 1918. — Venus 50 (4): 296-302.
- HANLEY, S., 1855. Ipsa Linnaei conchyliæ. The shells of Linnaeus determined from his manuscripts and collection: 1-557, pls. 1-5. Williams & Norgate, London.
- HEIMAN, E.L. & MIENIS, H.K., 2004. Shells of East Sinai, an illustrated list: Naticidae. — Triton 9: 11-13.
- HORST, R. & SCHEPMAN, M.M., 1894-1908. Catalogue systématique des mollusques (Gastropodes Prosobranches et Polyplacophères). — Muséum d'Histoire Naturelle des Pays-Bas 13: I-VIII, 1-572 (1894: 1-176; 1899: 177-360; 1908: I-VIII, 361-572).
- HUELSKEN, T., MAREK, C., SCHREIBER, S., SCHMIDT, I., & HOLLMANN, M., 2008. The Naticidae (Mollusca: Gastropoda) of Giglio Island (Tuscany, Italy): Shell characters, live animals, and a molecular analysis of egg masses. — Zootaxa 1770: 1-40.
- INTERNATIONAL COMMISSION ON ZOOLOGICAL NOMENCLATURE, 1999. International Code of Zoological Nomenclature. Fourth edition: I-XXIX, 1-306. The International Trust of Zoological Nomenclature, London.

- IREDALE, T., 1924. Results from Roy Bell's molluscan collection. — Proceedings of the Linnean Society of New South Wales 49 (3): 179-278, pls xxxiii-xxxvi.
- IREDALE, T., 1931. Australian molluscan notes. No. 1 — Records of the Australian Museum 18 (4): 201-235.
- JARRET, A.G., 2000. Marine shells of the Seychelles: i-xv, 1-149. Carole Green Publishing, Cambridge.
- JICKELI, C.F., 1874. Studien über die Conchylien des Rothen Meeres I. Die Gattung *Mitra* Lam. — Jahrbücher der Deutschen Malakozoologischen Gesellschaft 1 (1): 17-54, pl. 2.
- KABAT, A.R., 1990. Species of Naticidae (Mollusca: Gastropoda) described by Linnaeus in the *Systema Naturae* (1758). — Zoological Journal of the Linnean Society 100 (1): 1-25.
- KABAT, A.R., FINET, Y. & WAY, K., 1997. Catalogue of the Naticidae (Mollusca: Gastropoda) described by C.A. Récluz, including the location of the type specimens. — Apex 12: 15-26.
- KILBURN, R.N., 1974. Taxonomic notes on South African marine Mollusca (3): Gastropoda: Prosobranchia, with descriptions of new taxa of Naticidae, Fascioliariidae, Magilidae, Volutomitridae and Turridae. — Annals of the Natal Museum 22 (1): 187-220.
- KILBURN, R.N., 1976. A revision of the Naticidae of southern Africa and Moçambique (Mollusca). — Annals of the Natal Museum 22 (3): 829-884.
- KIRTISINGHE, P., 1978. Sea shells of Sri Lanka, including forms scattered throughout the Indian and Pacific Oceans: 1-202. Tuttle, Rutland.
- LAMARCK, [J.-B.P.A.] DE, 1822. Histoire naturelle des animaux sans vertèbres, présentant les caractères généraux et particuliers de ces animaux, leur distribution, leurs classes, leurs familles, leurs genres, et la citation des principales espèces qui s'y rapportent; précédée d'une introduction offrant la détermination des caractères essentiels de l'animal, sa distinction du végétal et des autres corps naturels; ensui, l'exposition des principes fondamentaux de la zoologie. Tome 6, 2^{me} partie: 1-232. Lamarck, Paris.
- LINNAEUS, C., 1758. Systema naturae, per regna tria naturae, secundum classes, ordines, genera, species, cum characteribus, differentiis, synonymis, locis. Tomus I. Editio decima, reformata: 1-823. Laurentii Salvii, Holmiae [Stockholm].
- MIENIS, H.K., 1992. On the identity of *Natica rodatzii* Schepman, 1901 (Mollusca, Gastropoda, Naticidae). — Levantina 73 ["1989"]: 11-12.
- PHILIPPI, R.A., 1842-1845. Abbildungen und Beschreibungen neuer oder wenig gekannter Conchylien. Erster Band, I: [2], 1-204, [8], pls 1-48 [part 6, *Sigaretus* Lamk., July 1844, pp. 143-146, pl. VI.3 = *Sigaretus* 1]. Fischer, Cassel.
- RÉCLUZ, [C.A.], in CHENU, J.-C., 1843-1844. G. *Sigaretus*. Sigaret. Lamarck. Livr. 3: pl. 2 (1843); livr. 5: pp 1-4, pls 1, 3 (1843); livr. 8/10: pp. 5-8 (1843); livr. 11: pl. 4 (1843); livr. 16: pp. 9-12 (1843); livr. 22: pp. 13-20 (1844); livr. 25: pp. 21-24 (1844). Franck, Paris [full title of this work given above under CHENU, 1842-1853].
- RÉCLUZ, [C.A.], 1851. Catalogue des espèces du genre sigaret (*Sigaretus*, Lk). — Journal de Conchyliologie 2 (2): 163-191, pl. 6.
- REEVE, L.A., 1864. Monograph of the genus *Sigaretus*. — Conchologia Iconica 15: pls 1-v, 26 species, un-numbered pages.
- ROBSON, G.C., 1923. On the external characters of *Sinum planulatum* (Récl.). — Proceedings of the Malacological Society of London 15 (6): 268-269.
- RÖDING, P.F., 1798. Museum Boltenianum, sive catalogus cimeliorum e tribus regnis naturae quae olim collegerat Joa. Fried. Bolten, M.D.p.d. Pars secunda, continens conchylia sive testacea univalvia, bivalvia & multivalvia: i-viii, 1-199. Trappi, Hamburgi.
- RUEDA, J.L. & GOFAS, S., 1999. *Sinum bifasciatum* (Récluz, 1851) (Gastropoda: Naticidae) confirmed in Mediterranean fauna. — Journal of Conchology 36 (6): 81-82.
- RUSMORE-VILLAUME, M.L., 2008. Seashells of the Egyptian Red Sea. The illustrated handbook: 1-307. The American University in Cairo Press, Cairo / New York.
- SMITH, E.A., 1891. On a collection of marine shells from Aden, with some remarks upon the relationship of the molluscan fauna of the Red Sea and the Mediterranean. — Proceedings of the Zoological Society of London 59 (3): 390-436, pl. XXXIII.
- SUBBA RAO, N.V., 2003. Indian seashells (Part - 1) Polyplacophora and Gastropoda. — Records of the Zoological Survey of India, Occasional Paper no. 192: i-x, 1-416, pls 1-96.
- TIRMIZI, N.M. & KAZMI, Q.B., 1995. *Sinum haliotoideum* (Linnaeus, 1758), a gastropod mollusc new to the marine waters of Pakistan (northern Arabian Sea). — Pakistan Journal of Marine Sciences 4 (1): 67-69.
- TORIGOE, K. & INABA, A., 2011. Revision on the classification of Recent Naticidae. — Bulletin of the Nishinomiya Shell Museum 7: 1-133, pls I-IV, 1-15.
- VANLEKE, C. & FRAUSSEN, K., 2017. Exotic shells in our seas. — Gloria Maris 55 (4): 115-117.
- VERBINNEN, G. & WILS, E., 2008. Red Sea Mollusca. Part 26. Class: Gastropoda. Family: Naticidae. — Gloria Maris 47 (1-2): 30-40.
- WEINKAUFF, H.C., 1883. Die Gattung *Sigaretus*. — Systematisches Conchylien-Cabinet von Martini und Chemnitz 6 (1): 1-50, pls A, 1-10.