

# ON THE IDENTITY OF *STROMBUS CONIFORMIS* SOWERBY II, 1842 (GASTROPODA, STROMBIDAE), WITH ADDITIONAL NOTES ON ITS DISTRIBUTION

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**Abstract** Based on shell characters, *Strombus* (*Conomurex*) *coniformis* Sowerby II, 1842 can be distinguished from *S. (C.) decorus* (Röding, 1798). The distribution range of both forms is partly overlapping, without intermediates being known. Therefore both have to be considered valid species. As the type specimens of *S. (C.) coniformis* are considered lost, a neotype for this species is designated. *S. (C.) decorus masirensis* Moolenbeek & Dekker, 1993 is a junior objective synonym of *S. (C.) coniformis*. *Conomurex* is considered a genus, rather than a subgenus of *Strombus*. New locality data for *Conomurex coniformis* are provided, forming a range extension for this species from Iran southwards to Eastern Africa.

**Key words** *Strombidae*, *Conomurex*, neotype, range extension, Indian Ocean.

## INTRODUCTION

The genus *Conomurex* P. Fischer, 1884 (type species *Strombus luhuanus* Linnaeus, 1758), here considered to be a genus in the family Strombidae, is characterised by an overall conical shape, absence of spiral sculpture, a sharp edged outer lip which barely flares, and a columella which is hardly or not thickened by a callus. Moolenbeek & Dekker (1993) have discussed some of the species allocated to *Conomurex* (as a subgenus of *Strombus*). Summarised, their conclusions were: 1) *Strombus persicus* Swainson, 1821 is a species rather than a subspecies; 2) *S. fasciatus* Born, 1778 should be allocated to *Conomurex*; 3) the description of a new subspecies, viz. *S. decorus masirensis*.

In their paper, Moolenbeek & Dekker (1993: fig. 15) also illustrated a shell that they identified as *S. (C.) decorus* forma *coniformis*, thereby following the opinion of Abbott (1960: 138). They did not, however, refer to Sowerby's (1842) original description and figures.

During the 1990's and early 2000's some *Conomurex* specimens from further south on the Arabian peninsula (mainland of Yemen and Socotra) and localities along the East African coast (Somalia, Brava (= Baraawe), Kisimajo and Bagiuni islands (both close to the border with Kenya); Zanzibar; Madagascar, Mahajanga and Tulear) were found, which fitted the description of *S. (C.) d. masirensis*. These new, more southern, localities for this taxon as well as the unclear status of *S. decorus* f. *coniformis* urged us to re-evaluate the status of the

taxon described by Moolenbeek & Dekker, as well as that of *Strombus coniformis* Sowerby II.

We also examined a number of specimens of *S. decorus* to verify the differences between this species and *C. decorus* forma *coniformis* sensu Abbott (1960) and Moolenbeek & Dekker (1993). From the observations made, it appears that in the eastern part of the Indian Ocean the form of *S. decorus* with plicae and/or knobs on the shoulder of the teleoconch whorls is absent.

Based on conchological characters, it has been advocated to consider the strombid taxa employed as subgenera by Abbott (1960) as full genera (Kronenberg & Vermeij, 2002 and references therein). More recently, this approach was confirmed by Simone (2005) based on anatomical data, and Latiolais (2003) and Latiolais *et al.* (2006) based on molecular data. Simone, Latiolais and Latiolais *et al.* conclude that *Strombus* sensu Abbott is paraphyletic, and based on the cladograms presented by Latiolais and Latiolais *et al.*, the name *Strombus* should only be employed to denote a group of species within a clade that is now restricted to the (sub)tropical Americas and to West Africa; in the latter this clade is represented by *S. latus* (see Kronenberg & Vermeij, 2002). This species is now allocated to *Persististrombus* Kronenberg & Lee, 2007

Fossil representatives of this clade are known from the Miocene in Europe. This is discussed by Kronenberg & Lee (2007) and will be further discussed by Harzhauser & Kronenberg (2008; in prep.). *Conomurex* is considered here to be a monophyletic group of Indo-Pacific strombs,

closely related to *Gibberulus fide* Latiolais *et al.* (2006).

#### ABBREVIATIONS

GB	Gianluigi Bini, Città di Castello, Italy, private collection
GCK	Gijs C. Kronenberg, Eindhoven, The Netherlands, private collection
HD	Henk Dekker, Winkel, The Netherlands, private collection
JW	Joop Wiersma, Kerkrade, The Netherlands, private collection
MF	Maurizio Forli, Prato, Italy, private collection
MNHN	Museum National d'Histoire Naturelle, Paris, France
RMNH	Nationaal Natuurhistorisch Museum, Leiden, The Netherlands
spec./specs	(in material examined) specimen(s)
VL	Virgilio Liverani, Faenza, Italy, private collection
unreg.	unregistered
ZMA	Zoölogisch Museum, Amsterdam, The Netherlands

#### SYSTEMATICS

Family STROMBIDAE Rafinesque, 1815

Genus *Conomurex* P. Fischer, 1884

Type species *Strombus luhuanus* Linnaeus, 1758 by monotypy

*Conomurex decorus* (Röding, 1798)  
(Figs 1-8, 13)

*Lambis decora* Röding, 1798: 62, sp. 777 [referring to Chemnitz, 1788: pl. 157 figs 1499 and 1500]

For principal synonyms (except *Strombus coniformis*) see Abbott (1960). Records of *Conomurex decorus* can be found in literature, but we do not include a full list, since Abbott synonymised *C. coniformis* with *C. decorus*, which was followed by subsequent authors, and therefore makes their true identity questionable, except when specimens are illustrated. Good illustrations of this species can be found in Walls (1980: 142 top

figs); Kronenberg & Berkhout (1984: pl. 8 fig 9); Moolenbeek & Dekker (1993: figs 14, 15); DeTurck *et al.* (1999: pl. 112 figs 1-5, pl. 113 figs 1-5, pl. 114 fig. 1); Heiman *et al.* (2007: figs 2, 4).

*Type material* Chemnitz (1788: figs 1499 and 1500) illustrated two views of one specimen (here reproduced Figs 1, 2). Röding (1798) referred to Chemnitz's illustrations for his new species, this figured specimen should be considered a syntype of *Lambis decora*. To unequivocally clarify the identity of this species, and distinguish it from *Strombus coniformis* Sowerby, 1842 (see further below) we designate the specimen figured by Chemnitz as lectotype of *Lambis decora* Röding, 1798. The present whereabouts of this specimen are unknown; it might be in Copenhagen, or still in the Chemnitz collection, now in St. Petersburg (Martynov, 2002). The type locality is Mauritius (designated by Abbott, 1960).

*Brief diagnosis* Species of Strombidae with conical shape, low spire, distinct stromboid notch and posterior notch. Outer lip hardly flaring, thin, unglazed. Columellar callus very thin. Colour very variable, white background with irregular narrow or broad mottling, nettings or zigzag streaks, whether or not set in a pattern of more or less distinct spiral bands. Adcolumellar side of outer lip white, deeper within the aperture pink to orange red, base of columella white.

*Conomurex decorus* is a well-known Indian Ocean species, and can only be confused with *C. persicus* (Swainson, 1821) and *C. coniformis*. For differences from *C. persicus* see Moolenbeek & Dekker (1993), although it should be noted that the differences in the radula as noted by Moolenbeek & Dekker should be regarded with some reservations, as Mutlu (2004) clearly demonstrated sexual dimorphism in the radula of *C. persicus*. For differences with *C. coniformis* see further below.

*Material examined* **Unknown:** ex Jousseume, 1916, MNHN unreg., 1 (knobbed form, in sample with 1 *C. coniformis*); ZMA unreg., 3 specs; ex Hoogeveen, RMNH unreg., 1 spec. "**Indian Ocean**", ex Reinwardt, RMNH unreg., 6 specs (2 juvenile, 1 knobby form). "**East Africa**", 1962, RMNH unreg. 1 spec. **South Africa:** Port Elizabeth, Schoenmakerskop, at low tide in rock pool, GCK 3698, 1 spec.. **Mozambique:** ex coll. Jan Berkhout, GCK 5696, 1 spec.; VL 900-01, 3

specs (knobby form); VL 900-19, 4 specs; Ilha Magaruque, on sand at low spring tide, ix 1971, ex C.A. v.d. Peijl, RMNH unreg., 3 specs; District Inhambane, Ilha Santa Carolina, offshore between Inhassoro and Chuambo, leg. M. de Lanoy Meijer – de Geer, RMNH unreg., 6 specs; (as Portuguese East Africa), ex J. Mulder, RMNH unreg., 10 specs; (as Portuguese East Africa), “Porto Amelia”, ex Mulder, RMNH unreg., 4; Nacala Bay, JW 03.540c(2), 1 spec.; Nacala Bay, JW 03.540c(3), 1 spec.; Maputo Bay, Ihaca Isl., JW 03.540(6), 1 spec.; Maputo Bay, Ihaca Isl., JW 03.540(7), 1 spec.; Bazaruta Isl., JW 03.540(1), 1 spec.; **Tanzania:** Zanzibar, x 1926, leg. G. Van Roon, RMNH unreg., 1 spec.; Zanzibar, Uroa, leg. H.H. Kool, 1994, ZMA unreg., 1; Zanzibar, E side Uroa, near Tamarind Beach Hotel, coral bank at low tide, leg. H.H. Kool, 29 ix 1994 – 11 x 1994, RMNH unreg., 1 spec.; Zanzibar, Uroa, leg. H.H. Kool, 1995, ZMA unreg., 2 specs; Zanzibar, N point Nungwi, at low tide, leg. H.H. Kool, ix 1995, RMNH unreg., 1 spec.; Zanzibar, viii.1999, leg. V. Liverani, GCK 5998, 4 specs; Zanzibar, Bweju, ix.1997, beached, GCK 5822, 1 spec.; Zanzibar, Ras Nungwi, at low tide xii 2000 VL 900-14, 30 specs (some knobby form); Zanzibar, Kiwengwa beach, ix 2002, by snorkelling, VL 900-15, 12 specs (some knobby form); Zanzibar, Jambiani, 1998, HD 547, 6 specs; Zanzibar, Uroa, 1995, HD 1482, 2 specs. **Kenya:** no further data JW 03.540(8), 4 specs; Mombasa, GCK 438, 1 spec.; Mombasa, in shallow water, 1986, GCK 906, 1 spec.; near Mombasa in shallow water, 1986, ex Jan Berkhout, GCK 5691, 1 spec.; Mombasa, leg. P.F. Fontei, ZMA unreg., 2 specs; Ukunda, leg. S. Hillaar, 1956, ZMA unreg., 1 spec.; Diana Beach, leg. T. Bruins, 1973, ZMA unreg., 2 specs; Diana Beach, leg. R.G. Moolenbeek, 1981, ZMA unreg., 2 specs; **Seychelles:** St. Anne Island, ex coll. N. Koekoek, 1990, ZMA unreg., 1 spec.; NIOP-E, Tyro Seychelles 1992/1993, Sta. 758 St. Joseph atoll, N rim 5°24'S 53°20'E, reef flat 27 xii 1992 RMNH unreg., 1 subadult; NIOP-E, Tyro Seychelles 1992/1993, Sta. 780 Poivre atoll, W rim 5°46'S 53°18'E, reef slope at 10m 1 i 1993 RMNH unreg., 1 spec.. **Somalia:** Brava, 1984, by snorkelling, VL 900-06, 1 spec.; Merca, beached, GB 11578, 1 spec.. **Madagascar:** no further data JW 03.540(9), 3 specs; Nosy Be isl., VL 900-13, 2 specs; Mahajanga bay, beached, GB 459, 2 specs; Tulear, at 1m on rocky bottom covered with algae, ex Jan Berkhout, GCK 5695, 1 spec. (knobby form); Tulear, from

shell market, 1985, ex M. Bloecher, ZMA unreg., 2 specs; Tulear VL 900-10, 8 specs; Itafy, beach vendors, 1985, ex M. Bloecher, ZMA unreg., 2 specs; Itafy lagoon, 1985, leg. M. Bloecher, ZMA unreg., 1 juv., 1 subadult, 3 adult; Ifaty Lagoon, at 3 m on sand, 1987, GCK 990, 1 spec.; Ifaty, leg. Bozzetti, VL 900-09, 6 specs; Anakao, 1985, by snorkelling, VL 900-11, 18 specs (some knobby form); Fort Dauphin, JW 03.540(1), 1 spec. **Comores Isl:** Majotte, VL 900-24, 6 specs; **Europa Isl.:** in lagoon in shallow water, GCK 2562, 1 spec.. **Réunion:** St. Gilles, dived at night at 35m on algae, GCK 3068, 1 spec.; Cap la Houssaye, dived at 10m on algae, GCK 3069, 1 spec.; Cap la Houssaye, at 12m on sand, 1987, ex coll. Jan Berkhout, GCK 5690, 1 spec.; Cap la Houssaye, at 11m on sand, 1988, ex coll. Jan Berkhout, GCK 5690, 2 specs. **Mauritius:** ex coll. Frank, 1897, RMNH unreg., 2 specs; ex coll. C.A. v.d. Peijl, RMNH unreg., 2 specs; leg. W. Gyngell, ex coll. J. Mulder, RMNH unreg., 1 spec.; don. P.L. van Pel, ZMA unreg., 1 spec; ex coll. M.M. Schepman, ZMA unreg., 1 spec.; ex coll. L. de Priester, ZMA unreg., 1 spec.; Ile Marianne, leg. W. Regter & B. Gras, 2002, ZMA unreg., 1 spec.; ex coll. Schepman, ZMA unreg., 3 specs; ex coll. Ph. Dautzenberg, ex coll. L. de Priester, 1934, ZMA unreg., 1 spec; idem, 4 specs; ex coll. G. Lieftinck, 1940, ZMA unreg., 1 spec.; Ile Plate, GCK 101, 1 spec.; Le Morne, ex. Jan Berkhout, GCK 5694, 1 juvenile; Trou, near shipwreck, leg Jan Paul Buys, 16.viii.1996, GCK unnumbered, 1 spec.. **Rodriguez:** Birds islet, 1983 by snorkelling, VL 900-03, 1 spec.. **Chagos Isls:** Diego Garcia, VL 900-07, 2 specs. **Oman:** Persian Gulf (doubtful), ex coll. Jan Berkhout, GCK 5688, 1 spec.. **Maldives:** VL 900-02, 2 specs. **India:** SW coast, don. E. Wils, 1977, ZMA unreg., 1 spec.. **Sri Lanka:** Trincomalee, China Bay, leg. P.L. van Pel, 1981, ZMA unreg., 2 specs; Trincomalee, 1988, ex coll. Jan Berkhout, GCK 5692, 1 spec.; Trincomalee, 1988, GCK 1398, 1 spec.; Trincomalee, 1990, in weedy sand, leg. Kalika K. Perera, don. Richard J. Kelly, GCK 5132, 1 spec.. **Thailand,** Andaman Sea: Phuket area, local shops, VL 900-16, 8 specs; Koh Pee-Pee, by fisherman VL 900-17, 6 specs; Krabi province, Koh Lipe, beached, VL 900-18, 1 spec.; Racha Island, 1995, HD 11809, 1 spec.; Phuket, ex coll. S. Martin, 1990, ZMA unreg., 1 spec.; Phuket, Rawai beach, 1995, HD 11810, 16 specs; Phuket, Maiton Isl., JW 03.540(2), 1 spec.; Phuket, near Rawai, JW 03.540(4), 1 spec.; Phuket, near Rawai, JW 03.540(5), 1 spec.;



**Figs 1-8, 13** *Conomurex decorus* (Röding, 1798). **9-12, 14-18.** *Conomurex coniformis* (Sowerby II, 1842). **1-2** Original figures of *Lambis decora* Röding from Chemnitz, 1788, Conchylien Cabinet: pl. 157 figs 1499-1500. **3-4** Madagascar, Tuléar, Anakao, 57 mm, VL 900-09. **5-7,13** Madagascar, Tuléar, Anakao, 54 mm, VL 900-10. **8** Juvenile, Tanzania, Zanzibar, Nungwi, beached, 40 mm, VL 900-15. **9-10** Original figures of *Strombus coniformis* from Sowerby, Thesaurus Conchyliorum: pl. 7 figs 55,61. **11-12** Jemen, Socotra, 32 mm, VL 905-05. **14-17** Somalia, Cape Guardafui, shallow water, 49 mm, VL 905-04. **18** Juvenile, Somalia, Brava, shallow water among seagrass, 37 mm, VL 905-03.

**Malaysia**, west coast: Pulau Pangkor, 1971, ex coll. Jan Berkhout, GCK 5689, 1 spec.; **Indonesia**: ZMA unreg., 1 spec.; Sumatera, Sabang, leg. C.H.J. van Benthem, 1920, ZMA unreg., 4 specs.

*Conomurex coniformis* (Sowerby II, 1842)  
(Figs 9-12, 14-18)

*Strombus coniformis* Sowerby II, 1842: 29, pl. 7 figs 55, 61

*Strombus coniformis* Kiener, 1843: 36, pl. 19 fig. 2

*Strombus coniformis* [in part] Tryon, 1885: 122 (as synonym of *S. decorus*), pl. 8 fig 90 (a copy of Sowerby's fig. 55)

? *Strombus cylindricus* Swainson & *S. mauritiana* Lamarck Shopland, 1896: 225

? *Strombus mauritanus* var. *coniformis* Melvill & Standen, 1901: 381

? *Strombus cylindricus* Swainson & *S. mauritanus* Lamarck Shopland, 1902: 175

*Strombus coniformis* [in part] Abbott, 1960: 138 (listed in synonymy of *S. decorus* as knobbed form)

*Strombus coniformis* [in part] Walls, 1980: 188 (in synonymy index as synonym of *S. decorus*)

*Strombus conformis* [sic; in part] Kronenberg & Berkhout, 1984: 295 (as synonym of *S. decorus*)

*Strombus decorus* Wranik & Saad, 1992: 60

*Strombus decorus masirensis* Moolenbeek & Dekker, 1993: 6-7, 9 figs 9-13

*Strombus decorus masirensis* Samaie, 1997: 107-108, colour photo

*Strombus decorus* Wranik, 1998: 179

*Strombus decorus masirensis* De Turck et al., 1999: 53, pl. 114 figs 2-4 (not pl. 114 fig. 1 = *C. decorus* knobbed form)

*Strombus decorus* Wranik, 2004: pl. 204 fig. c

*Conomurex decorus masirensis* Heiman et al., 2007: figs 5, 6

Not "form *coniformis*" Heiman et al. 2007: table 1, figs 24, 25 = *Conomurex persicus*

*Type material* Syntypes of *Strombus coniformis* are considered lost (see below), Sowerby (1842) did not indicate a locality for *Strombus coniformis*. Holotype of *Strombus (Conomurex) decorus masirensis* is ZMA Moll. 3.92.029, the type locality is Oman, Masirah Island (Moolenbeek & Dekker 1993).

Sowerby's original description (1842: 29) reads (translated): "Shell cone-shaped, smooth, palely yellowish-brown, brown bands interrupted

encircled, strongly angled; extremely short spire; whorls plicate at shoulder; narrowed aperture, external lip barely expanded, with small sinus.". This description could refer to a number of species of *Conomurex*. Some confusion may arise as Sowerby, in the additional remarks (in English), wrote down the phrase: "(...) absence of the posterior sinus (...)", which contradicts the "small sinus" in the description.

Sowerby (1842: pl. 7 figs 55, 61) illustrated two specimens from the collections of F.J. Stainforth and of T. Norris. These figured shells are to be considered syntypes of *Strombus coniformis*. Both collections were sold at auctions, the first about 1850, the second in 1873 (Dance, 1986: 166, 169). None of these syntypes are present in the Natural History Museum, London (Kathie Way, pers. comm. to GCK, Feb. 2003), nor in the National Museum of Wales, Cardiff; National Museum of Scotland, Edinburgh; nor the museums of Manchester or Leeds (Harriet Wood, pers. comm. to GCK, Feb.-March 2003) and are presumed lost. No type locality was given by Sowerby (1842: 29).

Sowerby's (1842) illustrations are here reproduced (Figs 9, 10). Figure 9, (Sowerby's fig. 55) shows a dorsal view, Fig. 10 (his fig. 61) shows an apertural view. Both specimens show (markedly less conspicuous in fig. 55) the so-called strombid notch. The presence or absence of a posterior sinus cannot be established in fig. 55, while in fig. 61 there is no posterior sinus visible, but an adapical extension of the outer lip, forming a gutter-like posterior canal against the spire, is present.

It is evident that Sowerby distinguished *S. coniformis* from *S. decorus* (as *S. cylindricus* Swainson) since he mentions this latter species (Sowerby, 1842: 29) and illustrates it on the same plate (pl. 7 figs 50, 57, 59). The specimen illustrated on pl. 7 fig. 50 is particularly interesting, as it represents a white specimen of the knobbed form of *Conomurex decorus*, see also further below.

Kiener (1843) considered *S. coniformis* a species different from *S. decorus*, judging from his comment (1843: 36) "... des caractères distinctifs, nous pensons qu'elle doit être conservée."

Moolenbeek & Dekker (1993) made an extensive description of *S. decorus masirensis*, based especially on the holotype of that spe-

character	<i>C. persicus</i>	<i>C. decorus</i>	<i>C. coniformis</i>
shoulder knobs on last whorl	absent	sometimes present	always present
posterior sinus	deep	deep	shallow
adapical lip extension	absent	absent	present
columellar callus	thin to moderately thick	very thin	very thin
colour columellar callus	white	pattern of outer shell shining through, base white	pattern of outer shell shining through, base orange
colour aperture	white to pale pink	white border, pink to orange red inside	rosy border, white inside

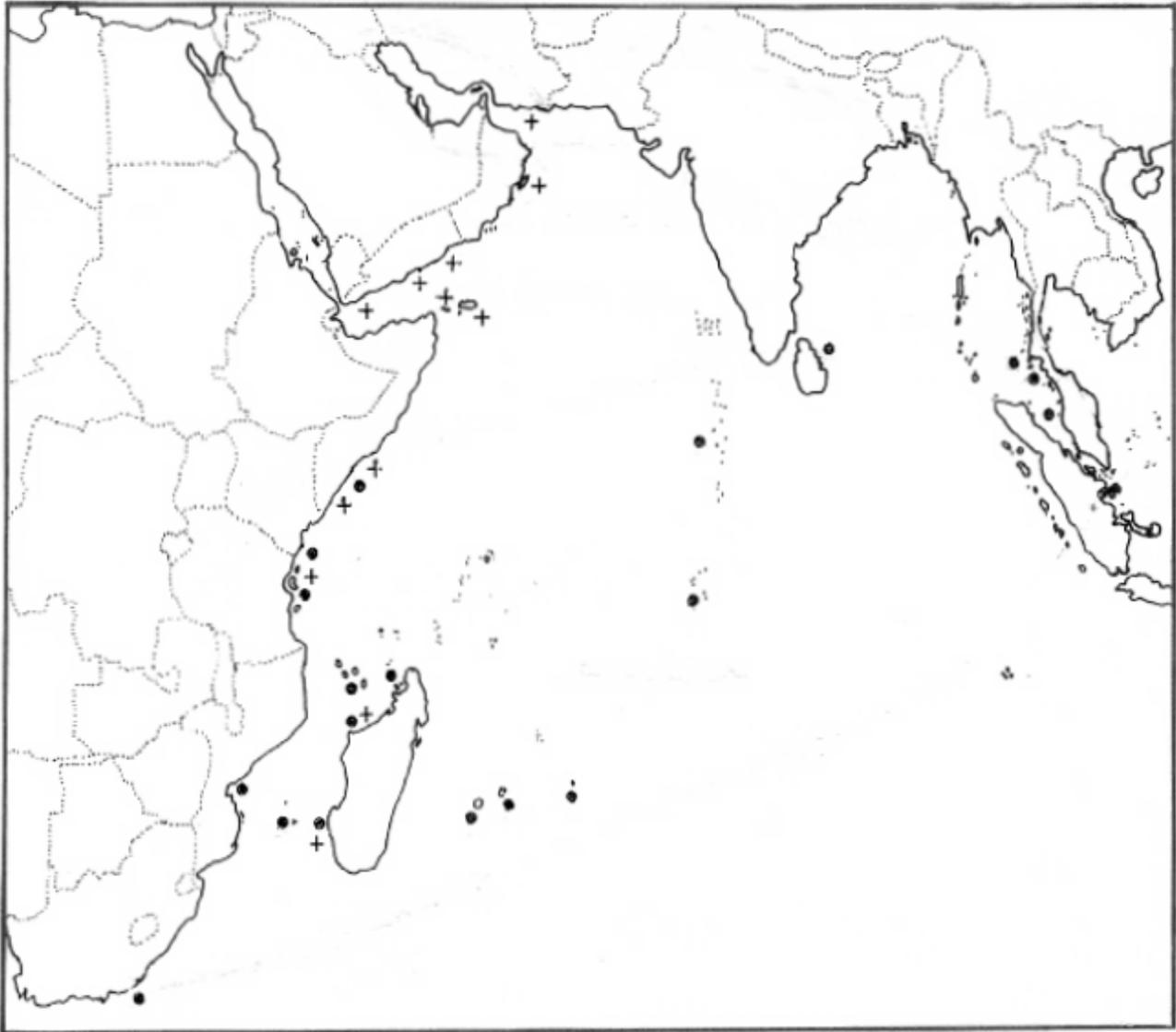
**Table 1** Differences in shell characters between *Conomurex persicus*, *C. decorus* and *C. coniformis*

cies. Sowerby's fig. 61 shows a specimen that accommodates the differences as mentioned by Moolenbeek & Dekker (1993: 7), viz. it shows the tongue-like flap (forming the gutter-like posterior canal), and a reddish colour on the columella.

Comparison of the figures of Sowerby (1842) with the description by Moolenbeek & Dekker (1993) and comparison of the material available have convinced us that these two taxa are synonymous. *Strombus decorus masirensis* is a junior synonym of *S. coniformis*. The holotype of *S. decorus masirensis* shows a strong resemblance in colour pattern to one of Sowerby's (1842: pl. 7 fig. 55) figured specimens. To establish the identity of *S. coniformis* unequivocally, we hereby designate the holotype of *Strombus decorus masirensis* as neotype of *Strombus coniformis*. Besides the holotype and 36 paratypes present in ZMA and the paratype present in HD (Moolenbeek & Dekker, 1993) of *Strombus decorus masirensis*, we studied the following material of *Conomurex coniformis*:

*Material examined* **Unknown:** ex Jousseume, 1916, MNHN unreg., 1 spec. (in sample with 1 *C. decorus* knobbed form). **Oman:** Mirbat, Jazirat Hino, leg. R.G. Moolenbeek & P.L. van Pel, 1996, ZMA unreg., 2 specs; Masirah, leg. J. Bryan, 1998, ZMA unreg., 14 specs; Masirah, leg. D.T. Bosch, 1992, ZMA unreg., 7 specs; Masirah, Ras Radum, leg. M. Day, 1997, ZMA unreg., 1 spec.; Masirah, 2 km S of Haql, leg. R.G. Moolenbeek & P.L. van Pel, 1995, ZMA unreg., 4 specs; Masirah, behind RAF station, leg. R.G. Moolenbeek & P.L. van Pel,

1997, ZMA unreg., 1 spec.; Masirah, Ras ad Dan, leg. R.G. Moolenbeek & P.L. van Pel, 1995, ZMA unreg., 1 spec.; Masirah, E coast, leg. M. Day, 1995, ZMA unreg., 2 specs; Masirah, BERS station, leg. R.G. Moolenbeek & P.L. van Pel, ZMA unreg., 3 specs; Masirah JW 03.542(1), 1 spec.; Gulf of Oman, SE Arabia, 1983 GCK 706, 2 specs; Gulf of Oman, SE Arabia, GCK 779, 1 spec.; Masirah Isl., ex Jan Berkhout, GCK 5697, 1 spec.. **Yemen:** 120 km W of Mukallah, leg. C.A. Wagenvoort, 1993, ZMA inreg., 1 spec.; al-Mahrah, Ra's Darjah, W. side of cape. 15°27'31"N-051°48'35"E, beached, HD 9314, 1 spec.; al-Mahrah, Tabut, 5 km S of village, 15°54'37"N-052°09'49"E, beached, HD 9313, 1 spec.; al-Mahrah, Musayna'ah, 12 km E of village, 15°05'32"N-050°48'43"E, beached, HD 9315, 1 spec.; Aden area, HD 8825, 3 specs; Socotra Island, coll. Petruccioli, Rome, 3 specs; Socotra Island, ex Petruccioli, coll. Pirazzini, Lugo, Italy, 1 spec.; Socotra Island, leg. Lavranos, 1967, MNHN unreg., 15 specs; Socotra, Abd el Kuri isl., legit Lavranos, 1967, MNHN, unreg., 6 specs. **Somalia:** near Mugdiisho (Mogadiscio) JW 03.542(2), 1 spec.; near Mugdiisho JW 03.542(3), 1 spec.; near Mugdiisho JW 03.542(4), 2 specs; Brava, 1984, by snorkelling VL 905-03, 1 juvenile; Somalia?, from Somali fishermen, deep water?, VL 905-04, 14 specs; from Somali fishermen, shallow water, VL 905-05, 1 spec.; HD 8921, 2 specs; Kisimaio, collected in sand at 12 m. depth, HD 8881, 2 specs; Bagiuni islands, beach, 1970, MF unreg., 1 spec.. **Tanzania:** Zanzibar, Ras Nungwi, 1998, VL 905-01, 1 spec.; Kiwengwa beach, Bravo Club hotel, by snorkelling, ix.2002,



**Fig 19** Map of the Indian Ocean with the distribution of *Conomurex* species. + = *C. coniformis*, • = *C. decorus*. Note the exclusive presence of *C. coniformis* along southern Arabia.

VL 905-02, 1 spec.. **Madagascar:** Mahajanga bay, beached, GB 459, 1 spec.; Anakao (Tulear), live in shallow water, GB unreg., 1 spec..

#### DISCUSSION

*Conomurex coniformis* was synonymised with *Conomurex decorus* (within the genus *Strombus*) by Abbott (1960), in spite of some outstanding characters of *C. coniformis* shown by the original illustrations, which distinguish this species from *C. decorus*.

*Conomurex decorus masirensis* was differenti-

ated by Moolenbeek & Dekker (1993: 7) from *C. decorus* by two constant characters, viz. the presence of the outer lip posterior extension, the "tongue-like flap" as Moolenbeek & Dekker called it, which is absent in *C. decorus*, and the colouring of the columella, red to orange in *C. masirensis* (Figs 10, 12, 16-18), but no statement was made about the colouring of the columella in *C. decorus*. The columella of *C. decorus* is always white (Figs 2, 4, 6-8). The holotype of *C. d. masirensis* (Moolenbeek & Dekker, 1993: 5 fig. 2), when viewed from the apex, clearly shows a posterior sinus. This posterior sinus is often much less distinct in other specimens, and is generally

(although not always) deeper and u-shaped in *C. decorus* (Figs 13, 14). As already mentioned by Moolenbeek & Dekker (1993: 7), shoulder knobs, especially on the last half of the body whorl, are present in *C. coniformis*, but may also be present in specimens of *C. decorus*, and this feature is therefore of little use in distinguishing both species (Figs 5-7, 13). To the differences mentioned above we may add that the colouring of the aperture is reversed in the two species: in *C. decorus* it is pinkish/red deep within, with a white border, while in fresh and adult *C. coniformis* it is white inside with light pink-orange towards the rim of the outer lip. This difference is even present in juvenile specimens (Figs 8, 18). Differences we observed are summarised in Table 1.

Based on the constant differences, the sympatric occurrence in a part of the areas of distribution of both taxa, without specimens with intermediate characters, we conclude that these taxa should be separated as distinct species in the genus *Conomurex*.

#### REMARKS

The ranges of both taxa are distinct, but overlap in Eastern Africa (see material examined, and Fig. 19). The finding of *C. decorus* at Brava, Somalia confirms the occurrence of this species in Somalia, which was reported from Merca by Borri et al. (2002: 21).

The Persian Gulf record of *C. decorus* in the GCK-collection (see specimens examined) is doubtful and needs confirmation, as no specimens of *C. decorus* are reported with certainty from that area (Moolenbeek & Dekker, 1993). However, Melvill & Standen (1901) recorded *Strombus mauritanus* var. *coniformis* from the Persian Gulf, which they regard as a nodular form of *S. mauritanus* (= *C. decorus*). The identity of these noded specimens, as well as the typical specimens, should be re-examined.

Samaie (1997) recorded specimens of *C. coniformis* from Ramin, Iran (just east of Cah Bahar), close to the Pakistani border. Mr. Moolenbeek identified these specimens. This record is the most eastern locality we know of.

The Aden record in the HD collection is of shells bought from a local shell shop in Aden. Shopland (1896, 1902) recorded both *Strombus cylindricus* Swainson and *S. mauritanus* Lamarck from Aden; both names are now considered syn-

onyms of *C. decorus* (Abbott, 1960: 138). Although Shopland used two names to denote his samples, it seems likely that Shopland had in fact only specimens of *C. coniformis* before him.

*Conomurex coniformis* is the only species of *Conomurex* recorded from southern Oman and Yemen. The finding of a good number of specimens at Socotra (MNHN and Petruccioli) indicates that viable populations exist there, confirmed by the records of Wranik (2004) and F.G. de Ceuninck van Capelle, Leiden, The Netherlands (pers. comm., HD). The finding of *C. coniformis* in southern Somalia, Zanzibar, and Madagascar, however, is no evidence that viable populations of that species actually live there. But it is at least an indication that larvae can be dispersed by ocean currents in a southward direction (although such dispersal would be opposed by the prevailing East African Coastal Current), and, therefore that *C. coniformis* may establish itself along the East African coast.

The name *Strombus decorus* fa. *conospira* in Moolenbeek & Dekker (1993: caption fig. 15) is an error for *Strombus decorus* fa. *coniformis*. The name *Strombus conospira* Moolenbeek & Dekker, 1993 is not available as it appears as both an infrasub-specific name (ICZN art. 10.2) and without a description or diagnosis (ICZN art. 13).

#### NOTE ADDED IN PROOF

Bandel (2007: 148) described the subgenus *Decoristrombus* (Type species by Original designation *Strombus fasciatus* Born, 1778, endemic to the Red Sea and possibly the adjacent part of the Indian Ocean), differentiating *Decoristrombus* from *Conomurex* only by differences between the two type species, viz. that that "*Strombus fasciatus* resembles *Strombus* (*Conomurex*) *luhuanus* but has the corner of its body whorl ornamented by short ribs or spikes" (Bandel, 2007: 149). Bandel (2007) also allocated *S. decorus* to his new genus, retaining *S. persicus* in *Conomurex*.

In *Conomurex fasciatus* (Born, 1778) the shoulder knobs may vary from distinct, pointed knobs to almost indiscernible (the so called forma *elegans*). As shown in this paper, both *C. decorus* and *C. coniformis* may have distinct shoulder knobs and *C. decorus* may have a completely smooth shoulder. The type species of *Conomurex*, *Strombus luhuanus*, usually has a smooth shoulder on the last whorl, but specimens that have low knobs on the shoulder of the last whorl are known.

As there are no other differences in overall shape, nor in structure of the outer lip, see Kronenberg & Vermeij (2002) for a preliminary discussion on characters of the outer lip, and no biogeographical separation we see no reason to separate *Decoristrombus* from *Conomurex*, and therefore consider *Decoristrombus* a junior synonym of *Conomurex*.

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