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Revision of the Indo-Pacific species of the genus *Leucosyrinx* Dall, 1889 (Neogastropoda: Conoidea: Pseudomelatomidae)

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Abstract. The genus *Leucosyrinx* Dall, 1889 is one of the highly diverse genera of the family Pseudomelatomidae, distributed across the Atlantic and Pacific Oceans. It remains poorly defined based on conchological characters. The last revision of the genus was published by Powell (1969; *Indo-Pacific Mollusca* 2 (10): 207–415), in which many species were erroneously included, while others belonging to *Leucosyrinx* were attributed to different genera. For the first time, we have revised the Indo-Pacific species of the genus within the framework of integrative taxonomy, utilizing molecular-grade material accumulated in the Muséum national d'Histoire naturelle, France. Molecular phylogenetic analysis revealed the existence of 62 secondary species hypotheses (SSHs) in our material, with 12 of them corresponding to already named species. The remaining 50 SSHs represent new species, of which 24 are described here, while 26 remain unnamed due to insufficient material. We refined the morphological characteristics of *Leucosyrinx* based on shell analysis of sequenced species from the genus, as well as from similar genera, particularly *Comitas*, *Sibogasyrinx*, and *Comispira* (the latter two belonging to Cochlespiridae). This allowed us to assign 18 previously named species to *Leucosyrinx*, and conditionally attribute four more, bringing the total number of species in the Indo-Pacific to 84, of which 58 are named. Numerous cases of cryptic species, which are nearly indistinguishable morphologically, were recorded within *Leucosyrinx*. The genus is confined to the upper bathyal zone, ranging from 195 to 1634 m in depth, with most occurrences between 500 and 1000 m. The highest species richness (30 species) was recorded in Papua New Guinea and the Solomon Islands, though this is likely due to more intensive sampling of the upper bathyal zone in these regions compared to other areas of the Indo-Pacific.

Keywords. Deep-water Conoidea, *cox1*, integrative taxonomy, new species, cryptic species, radular morphology.

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Introduction

The superfamily Conoidea Fleming, 1822 is the most prolific group within Neogastropoda Wenz, 1938, currently encompassing about 5400 recent species classified into 375 genera (MolluscaBase 2024). This accounts for approximately 36% of the total diversity within Neogastropoda. All species of Conoidea are predatory, with most utilizing a sophisticated mechanism for prey envenomation. This involves use of venom, which is produced in a specialized gland and injected into the prey's body through a marginal tooth detached from the radular membrane and held at the tip of the proboscis (Taylor *et al*. 1993).

The group's exceptional diversity, combined with commonplace homoplasy of shell characters have earned Conoidea the reputation of "taxonomic nightmare" (Bouchet *et al*. 2011). Recent advances in molecular phylogenetic methods, particularly the application of exon-capture-based approaches to comprehensive datasets (Abdelkrim *et al*. 2018a; Zaharias *et al*. 2024) have produced a robust phylogenetic hypothesis for Conoidea. The current taxonomic structure of the superfamily includes 18 families, of which 16 were previously considered within a single family Turridae H. Adams & A. Adams, 1853 (1838).

Despite progress at the family level, use of molecular data at the genus and species levels within Conoidea remains limited. Notable examples include the generic revision of Turridae (Kantor *et al*. 2024; Zaharias *et al*. 2024) and concomitant partial revisions of some individual genera such as *Gemmuloborsonia* Shuto, 1969 (Turridae – Puillandre *et al*. 2010); *Lophiotoma* Casey, 1904 (Turridae – Puillandre *et al*. 2017); *Xenuroturris* Iredale, 1929 (Turridae – Abdelkrim *et al*. 2018b); and *Sibogasyrinx* Powell, 1969 (Cochlespiridae – Kantor & Puillandre 2021).

Certain genera are particularly challenging due to the rarity of described species, which are mostly confined to deep waters and often represented by only a few specimens. The vast majority, if not all, of the species in these genera are described based on shell characteristics alone, and their taxonomy has remained largely unchanged for over half a century, dating back to the time when shell characteristics were the only reliable means of species delimitation and description. This has led to the acceptance of paraphyletic, often loosely defined genera. A notable example includes the genera *Leucosyrinx* Dall, 1889 and *Comitas* Finlay, 1926 (both from the family Pseudomelatomidae). These predominantly Pacific genera (with a few species of *Leucosyrinx* found in the Atlantic, including, notably, the type species, *L. verrillii* (Dall, 1881)) were revised by Powell (1969) in his seminal work on Pacific turrids. According to Powell and subsequent updates reflected in MolluscaBase (2024), *Leucosyrinx* and *Comitas* include 29 and 52 accepted recent species, respectively. Powell primarily assigned species to one genus or the other based on shell characteristics, often without much discussion. His generic assignments were generally followed by subsequent authors, with few exceptions. For example, Sysoev (1996) reassigned *Comitas claviforma* Kosuge, 1992 to *Leucosyrinx* without an explicit reference to specific morphological features deemed to differentiate the genera.

Further taxonomic advancements included the transfer of several species of *Leucosyrinx* from Antarctic and subantarctic waters to the genus *Antarctospira* Kantor, Harasewych & Puillandre, 2016 (family Borsoniidae), based on radular characters (Kantor *et al*. 2016). The first molecular data on these species were published by Puillandre *et al*. (2011) and later expanded by Kantor *et al.* (2018). The latter work confirmed the amphioceanic distribution of *Leucosyrinx* and the congenerity between the Atlantic type species, *L. verrillii*, and Pacific species that can be morphologically attributed to *Leucosyrinx*. The

recent study of Sánchez *et al.* (2024) corroborated these results, and demonstrated that Atlantic and Indo-Pacific species of *Leucosyrinx* form reciprocally monophyletic sister groups. This result allows a separate taxonomic treatment of the Atlantic and Indo-Pacific species, making it overall more feasible, as consolidating representative material of this generally rarely sampled group requires a considerable effort.

Oceanographic expeditions of the Muséum national d'Histoire naturelle, Paris, conducted in the last two decades in various regions of the Pacific and Indian Oceans generated vast amounts of deep-water Conoidea material suitable for DNA sequencing. Preliminary analysis of the DNA barcoding data revealed that the MOTUs referable to *Leucosyrinx* by far outnumber the number of currently described species. This result suggests that a majority of Indo-Pacific species of *Leucosyrinx* remains undescribed. Therefore, the goal of this publication is to conduct a taxonomic revision of Indo-Pacific *Leucosyrinx* within the framework of integrative taxonomy.

Material and methods

Sampling

Samples were collected during several expeditions of the MNHN (https://expeditions.mnhn.fr/): NanHai 2014 and ZhongSha 2015 in the South China Sea, AURORA 2007 and PANGLAO 2005 in the Philippines, SALOMON 2 and SALOMONBOA 3 in the Solomon Is., BIOPAPUA, KAVIENG 2014, MADEEP and PAPUA NIUGINI in Papua New Guinea, BOA1 and SANTO 2006 in Vanuatu, CONCALIS, KANADEEP, KANACONO, and TERRASSES in New Caledonia, EBISCO in the Chesterfield Is., TARASOC in French Polynesia, MIRIKY in Madagascar, ATIMO VATAE in Mozambique and Madagascar, Walters Shoal in southern Indian Ocean. Full details on the stations of these expeditions are available at the above-mentioned website. Specimens processed before 2012 were anaesthetized using an isotonic solution of $MgCl_2$ before fixation in 96% ethanol. Specimens processed after 2012 were microwaved and fixed in 96% ethanol (Galindo *et al*. 2014). The samples are recorded in the BOLD database and the sequences have been deposited in GenBank (Supp. file 3).

DNA sequencing

DNA was extracted using the epMotion 5075 robot (Eppendorf), following the manufacturer's recommendations. The barcode fragment (658 bp) of the mitochondrial *cox1* gene was amplified using the universal primers LCO1490/HCO2198 (Folmer *et al*. 1994). Polymerase chain reactions (PCRs) were performed using a previously well-established protocol (Puillandre *et al*. 2017). The PCR products were purified and sequenced by the Eurofins sequencing facility.

Species delimitation

The *cox1* sequences were aligned manually (no gaps were inferred). The Assemble Species by Automatic Partitioning (ASAP; Puillandre *et al*. 2021) method was used to propose primary species hypotheses (PSH), using the web version (https://bioinfo.mnhn.fr/abi/public/asap/) with default parameters. ASAP screens all the genetic distances calculated among all pairs of sequences, from the lowest to the highest, and merges sequences into 'groups' that are successively further merged until all sequences form a single group. At each merging step, the partition is evaluated and given a score. At the end of the analyses, the 10 partitions with the lowest scores are provided (the lower the ASAP-score, the better the partition).

The robustness of the PSHs proposed by ASAP was then evaluated by checking whether they correspond to highly supported clades, whether they are conchologically and anatomically diagnosable, and whether they are geographically and/or bathymetrically isolated, and in so doing they were converted into secondary species hypotheses (SSH), following the methodology described in Puillandre *et al*. (2012).

We attempted to identify a DNA-based diagnoses for all proposed SSH, by running MOLD (Fedosov *et al*. 2022) with default parameters on the *Leucosyrinx cox1* alignment.

Phylogenetic analysis

Phylogenetic trees were reconstructed using the *cox1* alignment containing the *Leucosyrinx* sequences, plus two sequences of other Pseudomelatomidae Morrison, 1966 used as outgroups (*Antiplanes sanctiioannis* and *Crassispira scala*) (Supp. file 3). Maximum Likelihood (ML) and Bayesian Approach (BA) were used to infer phylogenetic trees. ML was performed using the IQ-Tree webserver (http://iqtree.cibiv.univie.ac.at/) (Trifinopoulos *et al*. 2016), and robustness of the tree was estimated using ultrafast bootstrapping (1000 replicates) (Minh *et al*. 2013). Bayesian Approach (BA) was performed using MrBayes ver. 3.2. (Ronquist *et al.* 2012), as implemented on the Cipres Science Gateway (MrBayes ver. 3.2.2 on XSEDE; http://www.phylo.org/portal2), with two parallel analyses consisting each of 4 Markov chains for 10 000 000 generations with 2 swaps at each generation, a sampling frequency of one tree each 5000 generations, a chain temperature of 0.02 and the parameters of the substitution model estimated during the analysis. A substitution model with six substitution categories, a gamma-distributed rate variation across sites approximated in four discrete categories and a proportion of invariable sites was used for each codon position independently. Convergence of each analysis was evaluated using Tracer ver. 1.4.1 (Rambaut & Drummond 2014) by checking that ESS values all exceeded 200, and a consensus tree was reconstructed after removing trees from the burn-in phase (first 25% of the trees).

Morphological studies

The number of whorls of the protoconchs were counted according to Bouchet & Kantor (2004). The foregut anatomy was examined by dissections. Radulae were prepared by standard methods (Kantor & Puillandre 2012) and examined by scanning electron microscopy (TeScan TS5130MM) at the Institute of Ecology and Evolution of the Russian Academy of Sciences (IEE RAS).

Abbreviations

AL = aperture length
dd = dead collected specimen
I. = island
Is. = islands
lv = live collected specimen
OD = original designation
PSH = primary species hypothesis
SL = shell length
SSH = secondary species hypothesis
stn = station
SW = shell width
TL = marginal tooth length

Repositories

AMS = Australian Museum, Sydney, Australia
ANSP = Academy of Natural Sciences of Drexel University, Philadelphia, PA, USA
IEE RAS = A.N. Severtsov Institute of Ecology and Evolution, Russian Academy of Sciences, Moscow, Russian Federation
MMM = Museo Malacologico Piceno, Cupra Marittima, Italy
MNHN = Muséum national d'Histoire naturelle, Paris, France
MNZ = Museum of New Zealand Te Papa Tongarewa, Wellington, New Zealand

NATURALIS	=	Naturalis Biodiversity Center, Leiden, the Netherlands
NHMUK	=	Natural History Museum, London, UK
NMNS	=	National Museum of Natural Science, Taichung, Taiwan
SAM	=	Iziko South African Museum, Cape Town, South African Republic
USNM	=	National Museum of Natural History, Smithsonian Institution, Washington DC, USA
WAM	=	Western Australian Museum, Perth, Australia
ZMA	=	former Zoological Museum of Amsterdam, now part of Naturalis Biodiversity Center
ZMB	=	Humbold University, Zoological Museum, Berlin, Germany
ZMMU	=	Zoological Museum of Moscow State University, Russian Federation
ZSI	=	Zoological Survey of India, Kolkata, India

Results

Phylogenetic analysis

ASAP partitions

The best ASAP partition (Supp. file 1) includes 62 PSHs. For clarity the PSHs are named with an available name or a new species name (see Taxonomy section). When no name was available and when the PSH has not been described as a new species (see Taxonomy section), the PSHs have been numbered from sp. 1 to sp. 26. The best partition combines *L. zucconi* sp. nov. and *L. farhatorum* sp. nov. in a single PSH. The second-best ASAP partition includes 68 PSHs, splitting *L. urbanae* sp. nov., *L. modicae* sp. nov., *Leucosyrinx* sp. 18 and *Leucosyrinx* sp. 21, and *L. farhatorum* into two PSHs each. The third best ASAP partition includes 66 PSHs, combining the two PSHs recognized within *L. farhatorum* in the second-best partition into a single PSH and the two PSHs recognized within *Leucosyrinx* sp. 18 in the second-best partition into a single PSH. Given the high ASAP-score (and thus the low probability) of the subsequent partitions, they will not be discussed further.

From PSHs to SSHs

The ML and BA phylogenetic trees were nearly identical in topology and congruent in support of the terminal taxa (PSHs). For clarity and brevity, we only discuss below the tree obtained with BA.

The Bayesian phylogenetic tree obtained with the *cox1* is shown in Fig. 1, with SSH represented by multiple specimens collapsed (for the complete tree see Supp. file 1). In most cases, the PSHs with multiple specimens found in the first-best partition of ASAP are monophyletic with maximum support, except in four cases: *L. margaritae* (E.A. Smith, 1904) (monophyletic with a Posterior Probability PP = 0.87), *L. farhatorum* sp. nov.+*L. zucconi* sp. nov. (paraphyletic), *L. modicae* sp. nov. (monophyletic with a PP = 0.95), and one of the two PSHs within *L. breviplicata* (E.A. Smith, 1899) (paraphyletic). When a PSH is split in the second- or third-best partitions, the resulting PSHs, when represented by multiple specimens, are either non-monophyletic (within *L. farhatorum*) or monophyletic, but not supported (within *L. urbanae* sp. nov. and *L. modicae*). In addition, morphological, geographical and/or bathymetrical homogeneity within PSHs split in the second- or third-best partitions led us to turn the PSHs proposed in the first-best partition into SSHs, with four exceptions: (i) the PSH *L. farhatorum* + *L. zucconi* found in the first-best partition is turned into two SSHs (*L. farhatorum* and *L. zucconi*), each corresponding to a highly supported clade (PP = 0.99 and 1, respectively), not sister to one another, with marked conchological differences, (ii) the PSH *Leucosyrinx* sp. 11 + *L. bernardeti* sp. nov. is turned into two SSHs (*Leucosyrinx* sp. 11 and *L. bernardeti*), never found separated in the three best partitions (although found separated in the 8th and 9th best partitions), but each representing a highly supported clade (PP = 1 in both cases), with marked conchological differences; (iii) the two PSHs recognized within *L. breviplicata* are considered as a single SSH, given the non-monophyly of one of the two PSHs

and the notable conchololological homogeneity among the specimens of the two PSHs, and (iv) the two PSHs recognized within *L. nodulocordata* sp. nov. are considered as a single SSH, given the strong conhological similarity between the two specimens (more details are provided in the Taxonomy section).

Fig. 1. Bayesian phylogenetic tree obtained with the *cox1* dataset. Posterior probabilities (> 0.80) are shown for each node. The SSH containing several specimens are collapsed for saving space, the number in brackets indicates the number of specimens in the corresponding collapsed clade.

In total, we thus defined 62 SSHs within our dataset. Two SSHs in the *cox1* dataset, *Leucosyrinx* sp. 6, and *Leucosyrinx* sp. 10 were represented by half-length sequences, and therefore no DNA diagnoses were proposed for them. Among the remaining 60 SSHs, sufficiently robust diagnoses were recovered for 58 SSHs, including all new species described herein. The diagnosis proposed for *L. margaritae* is of borderline robustness (see Fedosov *et al*. 2022, and Manual to the MOLD ver. 1.4.2), and we failed to recover a robust DNA diagnosis for the SSH *Leucosyrinx* sp. 11.

From SSH to named species

The phylogenetic analysis revealed numerous cases of molecularly distinct, but morphologically similar species, however the overall morphological variability of the species of *Leucosyrinx* is very high, both in terms of size, shell outline and sculpture pattern. This resulted in the intraspecific variability often exceeding the interspecific. However, by comparison with type material, we were able to attribute 12 SSHs to available species names. Additionally, 24 SSHs are described as new species, and 26 SSHs are neither linked to an available name nor described as new species, because of the lack of sufficient material.

Taxonomy

Class Gastropoda Cuvier, 1795
Subclass Caenogastropoda Cox, 1960
Order Neogastropoda Wenz, 1938
Superfamily Conoidea Fleming, 1822
Family Pseudomelatomidae Morrison, 1966

Genus ***Leucosyrinx*** Dall, 1889

Pleurotoma (*Leucosyrinx*) Dall, 1889: 75.

Type species

Pleurotoma (*Pleurotomella*) *verrillii* Dall, 1881 (OD).

Diagnosis

Shell small to large, reaching 90 mm in length (*L. bolognai*), narrow to broad fusiform, spire high, siphonal canal distinct, medium-long to long. Shell uniformly colored, from off-white to beige and light brown. Protoconch paucispiral, small, diameter about 1 mm, of 1.5–1.75 rounded whorls. Teleoconch whorls roundly angled at shoulder, at least on upper whorls, with well-defined concave subsutural ramp.

Axial sculpture of usually strong, oblique, axial ribs, present on shoulder and below, not extending to subsutural ramp. Ribs can be reduced just to knobs on shoulder, but can extend to periphery and even shell base. Spiral sculpture from weak to rather strong, of uniform spiral cords, that can be present or absent on subsutural ramp.

Anal sinus moderately deep, subsutural, broadly arcuate, extends across entire subsutural ramp, and confluent with large forward extension of outer lip.

Operculum narrow to medium-broad leaf-shaped, nucleus terminal.

Radular marginal teeth duplex (Fig. 2), narrow to broad lanceolate, rather flat in dorsal view, particularly in anterior part (tooth tip). Major limb pointed, with sharp cutting edges (Fig. 2C – bl), broadest at mid-length and narrowing towards both ends, with rather distinct socket on dorsal surface where accessory

limb embeds. Central formation very weak to completely absent, of indistinct symmetrical folds of the membrane and rarely with very weak central cusp.

Remarks

As confirmed by molecular data, *Leucosyrinx* exhibits significant variability in shell shape, size, and, to a lesser extent, in spiral and axial sculpture. Nonetheless, certain key diagnostic features can be identified. The axial folds, which may be limited to nodules on the shoulder or extend to the shell periphery, are consistently absent on the subsutural ramp. The ramp, including the zone immediately adjacent to the upper suture, is either smooth or exclusively features spiral cords and lacks any other elements. The anal sinus located subsuturally, commences at the upper suture and extends across the entire ramp. Correspondingly, the sinus line in its upper part is prosocline and concave. Below, the sinus is confluent with a notable forward arcuate projection of the outer lip, enhancing the impression of depth in the generally medium-deep sinus.

There are several genera, superficially similar to *Leucosyrinx.* The species treated here as members of *Leucosyrinx* were often confused with genera discussed below, and vice versa some species belonging to those genera were erroneously attributed to *Leucosyrinx.*

Genus ***Antarctospira*** Kantor, Harasewych & Puillandre, 2016 (family Borsoniidae)

Antarctospira Kantor, Harasewych & Puillandre, 2016: 4–5.

Type species

Leucosyrinx badenpowelli Dell, 1990 (OD).

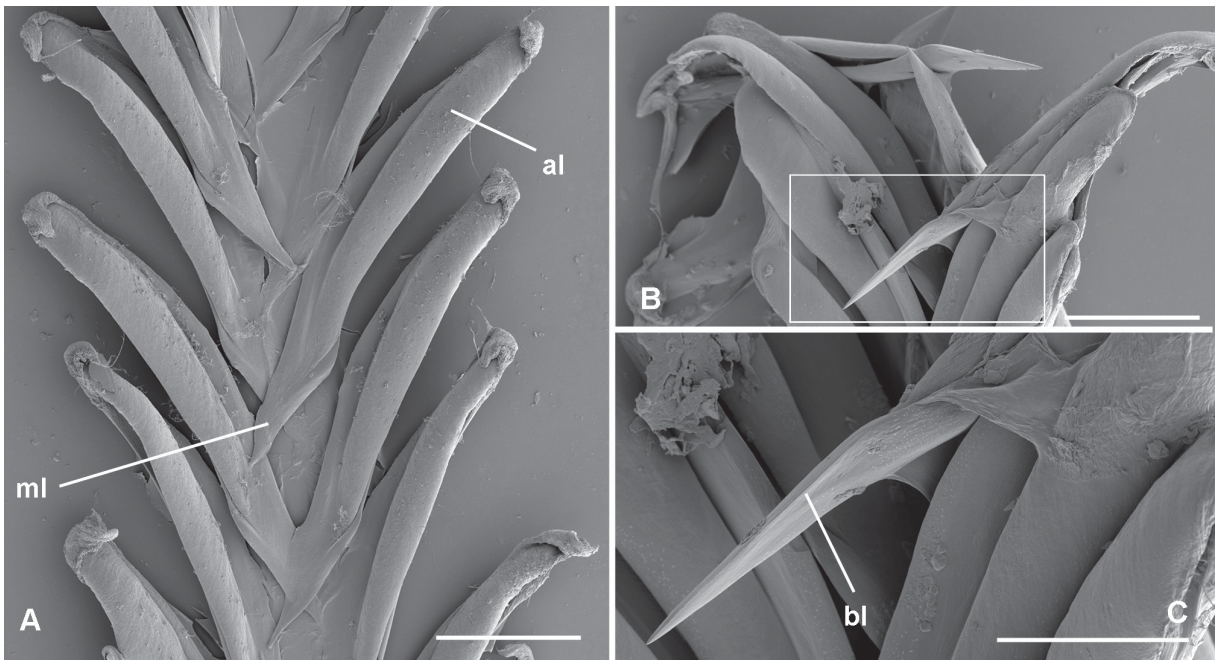

Fig. 2. Details of the radula of *Leucosyrinx* sp. 7. **A**. Dorsal view of the radular membrane. **B**. Bending plane of the radula, with some teeth in lateral view. **C**. Enlarged lateral view of the tip of marginal tooth showing the cutting edge, blade. Abbreviations: al = accessory limb of the marginal tooth; bl = cutting edge, blade; ml = major limb of the marginal tooth. Scale bars: A–B = 100 µm; C = 50 µm.

Remarks

The Antarctic-subAntarctic genus *Antarctospira* shares the axial sculpture pattern as well as the shape and position of the anal sinus with *Leucosyrinx* (Kantor *et al*. 2016). Notably, four out of the five species attributed to *Antarctospira* were initially classified as *Leucosyrinx*: *Antarctospira badenpowelli* (Dell, 1990) (type species), *A. mawsoni* (Powell, 1958), *A. paragenota* (Powell, 1951), *A. falklandica* (Powell, 1951). However, the examination of the radula revealed that *Antarctospira* possesses a radula with hypodermic marginal teeth thus suggesting its placement within the family Borsoniidae Bellardi, 1875. Furthermore, all species of *Antarctospira* have a much shorter and broader siphonal canal, which is barely separable from high and broad aperture. Its paucispiral protoconch is larger, attaining 2.5 mm in diameter (vs ca 1 mm in *Leucosyrinx*).

Genus ***Comitas*** Finlay, 1926 (family Pseudomelatomidae)

Comitas Finlay, 1926: 251.

Type species

Surcula oamarutica Suter, 1917 (= *Drillia fusiformis* Hutton, 1877) (Lower Miocene, New Zealand) (OD).

Remarks

Species of *Comitas* have a very distinctive radula (Fig. 3F), reliably distinguishing them from all other conoideans, including *Leucosyrinx*. Nonetheless, the radula was examined in very few species, namely: *Comitas galatheae* Powell, 1969 (Kosuge 1986: pl. 33 figs 7–11); *C. murrawolga* (Garrard, 1961) and *C. onokeana vivens* Dell, 1956 (Kantor & Taylor 2000: fig. 2a–e); *C. pachycercus* Sysoev & Bouchet, 2001 (Sysoev & Bouchet 2001: figs 14, 16); *Comitas* sp. (Bouchet *et al.* 2011*:* fig. 15c–d). The mentioned species together with the type species of the genus can be separated from *Leucosyrinx* on the following conchological characters: the shell is generally large, usually over 50 mm in length, with broad and long axial ribs, always extending to the periphery and sometimes to the shell base. The anal sinus is moderately deep, medium broad U-shaped, on the subsutural ramp and occupying the lower part of the subsutural ramp, not on all its width, so that the deepest point is closer to shoulder than to suture (Fig. 3E). Correspondingly the sinus line in its upper part is prosocline, but convex.

There is significant overlap in shell characters between *Comitas* and *Leucosyrinx*, so that attributing the species known only from empty shells is sometimes problematic. Thus, although Powell (1966) recognized the differences in position of the anal sinus between these genera, he attributed without discussion numerous species with subsutural sinus to *Comitas* (Powell 1969) that are conchologically closer to *Leucosyrinx* as defined here.

Genus ***Sibogasyrinx*** Powell, 1969 (family Cochlespiridae)

Leucosyrinx (*Sibogasyrinx*) Powell, 1969: 343 (23-411).

Type species

Surcula pyramidalis Schepman, 1913 (OD).

Remarks

The molecular phylogenetic analysis of nine species of *Sibogasyrinx* (Kantor & Puillandre 2021) demonstrated that all species attributed to the genus have a row of nodules situated directly below the suture (Fig. 3G–H). On the contrary, none of *Leucosyrinx* as defined here by molecular analysis has these

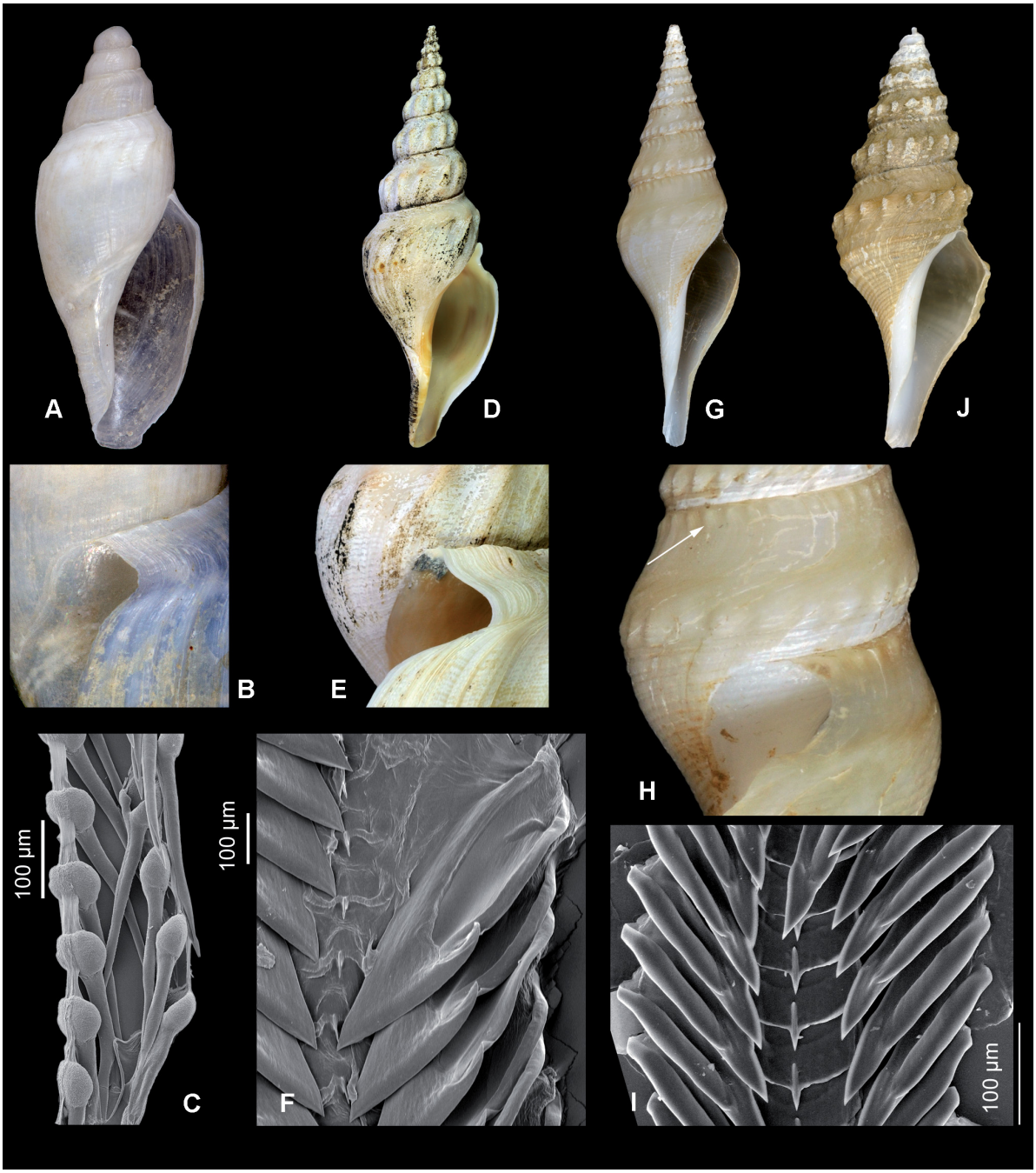

Fig. 3. Genera of Conoidea Fleming, 1822, similar to *Leucosyrinx* Dall, 1889 and confused with it. **A–C**. *Antarctospira badenpowelli* (Dell, 1990) (family Borsoniidae). **A–B**. Holotype, USNM 613118, Victoria Land, McMurdo Sound, east of Cape Hallett,72°08′ S,172°10′ E, 433 m, SL 19.9 mm, apertural view of the shell and enlarged anal sinus. **C**. Paratype, USNM 860180, South Shetland Is., 72°06′ S, 172°12′ E, 433 m, SL 21.5 mm; radula. **D–F**. *Comitas* sp. (family Pseudomelatomidae), MNHN-IM-2007-17918, Philippines, Bohol Sea, 762–786 m, SL 114.3 mm; apertural view of the shell, enlarged anal sinus, radula. **G–I**. *Sibogasyrinx* cf. *pyramidalis* 1 (Schepman, 1913) (family Cochlespiridae), MNHN-IM-2009-13451, Philippines, off Luzon I., 593–600 m, SL 46.5 mm; apertural view of the shell, enlarged anal sinus (arrow indicates the subsutural row of nodules, present only in Cochlespiridae), radula. **J**. *Comispira mai* (B.-Q. Li & X.-Z. Li, 2008), MNHN-IM-2013-61657, South China Sea, 1128–1278 m, SL 35.5 mm.

nodules. The significance of this diagnostic character was not recognized prior to the current publication and many species with subsutural nodules were erroneously attributed to *Leucosyrinx* or *Comitas* mostly by Powell (1969). Radula in *Sibogasyrinx* is characterized by duplex marginal teeth of varying morphology and the presence of a well-defined central formation with a long cusp (Kantor & Puillandre 2021).

Genus ***Comispira*** Kantor, Fedosov & Puillandre, 2018 (family Cochlespiridae)

Comispira Kantor, Fedosov & Puillandre, 2018: 48.

Type species

Leucosyrinx mai Li & Li, 2008 (OD).

Remarks

Species of this genus resemble *Sibogasyrinx* in the presence of the subsutural row of nodules, but differ in usually more pronounced spiral sculpture on the shell base, of broadly-spaced and rather strong spiral cords. It should be mentioned that some species of *Comispira*, whose generic position is confirmed by molecular analysis, can have very weak, nearly obsolete subsutural nodules and rather uniform weak spiral sculpture on the shell base (Kantor *et al*. 2022). The radula is similar to that of *Sibogasyrinx*.

The mentioned diagnostic characters of *Leucosyrinx* and of similar genera allowed critical re-assessment of numerous species described on the basis of the shells alone and attributed to the above mentioned genera at one point or another.

Leucosyrinx floraecharlottae sp. nov.
urn:lsid:zoobank.org:act:ADDB5B90-B92A-4419-826D-25A8EC49C954
Figs 4A–F, 5A

Etymology

The species is named after Flora and Charlotte, the daughters of Tanya Karagyozova, the project manager of the ERC project HYPERDIVERSE.

Material examined

Holotype (sequenced)
SOLOMON SEA • Vitiaz Strait; 6°00′ S, 147°36′ E; depth 706–715 m; PAPUA NIUGINI, stn CP3995; MNHN-IM-2013-19852.

Other material (all sequenced)
PAPUA NEW GUINEA • 2 lv; 8°14′ S, 150°32′ E; depth 760–769 m; BIOPAPUA, stn CP3736; MNHN-IM-2009-17046, MNHN-IM-2009-17052 • 1 lv; 9°14′ S, 152°18′ E; depth 694–766 m; BIOPAPUA, stn CP3741; MNHN-IM-2009-17050 • 1 lv; New Britain, north of Rabaul; 4°4′ S, 151°50′ E; depth 702–724 m; BIOPAPUA, stn CP3672; MNHN-IM-2009-17133.

Description

Measurements (holotype). SL 29.2 mm, AL (with canal) 13.3 mm, AL (without canal) 8.9 mm, SW 9.1 mm.

Shell (holotype). Medium-sized, fusiform, with high spire, fragile, of uniform light tan in color. 9.75 teleoconch whorls. Paucispiral protoconch of 1.5 rounded whorls, flattened on top. Protoconch–teleoconch transition indistinct due to erosion, marked by appearance of axial ribs. Teleoconch whorls roundly angled at shoulder, with weakly concave subsutural ramp. Shallow, impressed, slightly wavy

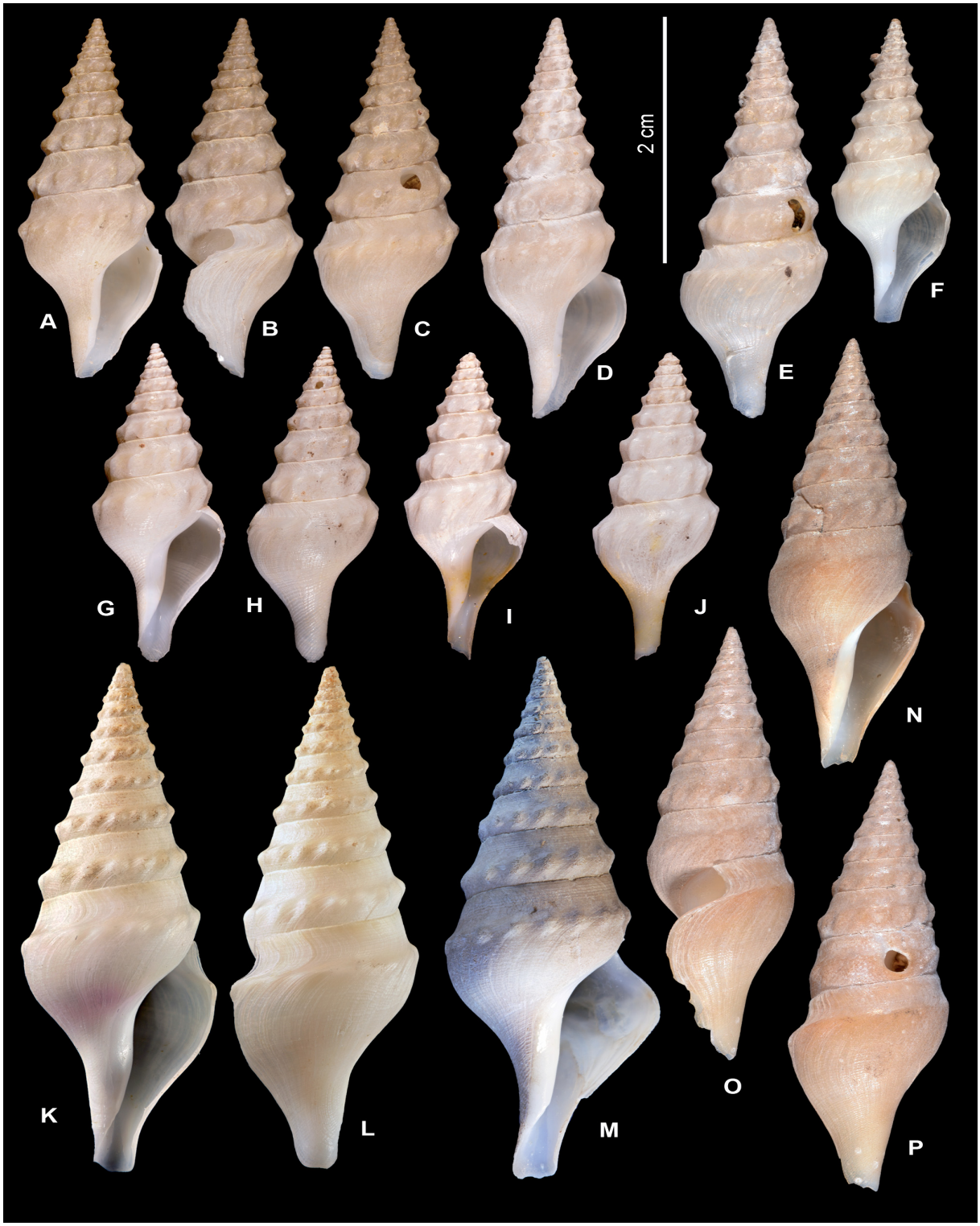

Fig. 4. A–F. *Leucosyrinx floraecharlottae* sp. nov. **A–C**. Holotype, MNHN-IM-2007-38823, SL 26.0 mm. **D–E**. MNHN-IM-2009-17050, SL 32.7 mm. **F**. MNHN-IM-2009-17052, SL 24.8 mm. **G–J**. *Leucosyrinx lemarcisi* sp. nov. **G–H**. Holotype, MNHN-IM-2007-38823, SL 26.0 mm. **I–J**. MNHN-IM-2007-38850, SL 25.0 mm. **K–P**. *Leucosyrinx farhatorum* sp. nov. **K–L**. Holotype, MNHN-IM-2007-42503, SL 41.2 mm. **M**. MNHN-IM-2009-16752, SL 42.7 mm. **N–P**. MNHN-IM-2009-13499, SL 35.1 mm. All shells at the same scale.

suture. 17 strong, oblique, short, broad, rounded axial folds on body whorl, 14 on penultimate whorl. Folds fade on subsutural ramp, weaken towards lower suture, disappear at body whorl periphery. Folds closer spaced on upper teleoconch whorls, on last whorl intervals narrower than folds. Weak spiral sculpture of low, rounded, indistinct narrow cords over entire shell. Numerous, thin growth lines, prominent on subsutural ramp. Shell base weakly convex, smooth transition to long, straight canal. Narrow, elongate-oval aperture, poorly differentiated from canal. Inner lip slightly convex. Columellar and parietal sides with narrow, distinct callus, lighter than remaining last whorl. Moderately deep, subsutural, broadly arcuate anal sinus extends across subsutural ramp, confluent with large forward extension of outer lip.

Radula (Fig. 5A; studied in holotype). Short, 32 rows of teeth, 11–12 nascent. Central formation reduced to inconspicuous folds of radular membrane. Marginal teeth duplex, ~410 μm in length (4.6% of AL without canal). Anterior part of tooth dorso-ventrally flattened, with sharp cutting edges in lateral view. Major limb narrowly lanceolate, slightly curved. Accessory limb nearly twice as narrow, ~0.75 of total tooth length, inserted into shallow but distinct socket on dorsal side of major limb.

DNA diagnosis (based on 5 *cox1* sequences)

'A' in site 220, 'C' in site 448, 'C' in site 598.

Remarks

The largest specimen attains SL 32.7 mm.

Leucosyrinx floraecharlottae sp. nov. is somewhat variable in shell slenderness, from nearly biconic in holotype to medium-broad fusiform.

The holotype of the new species bears a resemblance to *L. verrillii* (Dall, 1881), the type species of the genus from the Atlantic, in terms of its shell shape and sculpture pattern. However, it differs in having a generally slenderer and smaller shell with much less pronounced spiral sculpture. Another similar species is *L. breviplicata* (E.A. Smith, 1899), which differs in much more pronounced and broadly-spaced spiral cords. The molecular phylogenetic analysis has demonstrated that these two species are not closely related to *L. floraecharlottae* sp. nov.

Leucosyrinx floraecharlottae sp. nov. demonstrates close resemblance to *L. lemarcisi* sp. nov., and to a lesser extent to *L. ringevali* sp. nov., *L. farhatorum* sp. nov. and *L. rattiae* sp. nov., all of them not phylogenetically related to *L. floraecharlottae*. For the morphological differences see remarks of the corresponding species.

Distribution

Papua New Guinea, 694–760 m.

Leucosyrinx lemarcisi sp. nov.
urn:lsid:zoobank.org:act:ED2EA493-88AF-491B-841F-2CF0E71B95CA
Fig. 4G–J

Etymology

The species is named after Thomas Lemarcis, member of the ERC "HYPERDIVERSE" team, for his contribution to the neogatropod molecular phylogeny.

Material examined

Holotype (sequenced)
SOCIETY ISLANDS • Moorea; 17°33′ S, 149°55′ E; depth 800–830 m; TARASOC, stn DW3467; MNHN-IM-2007-38823

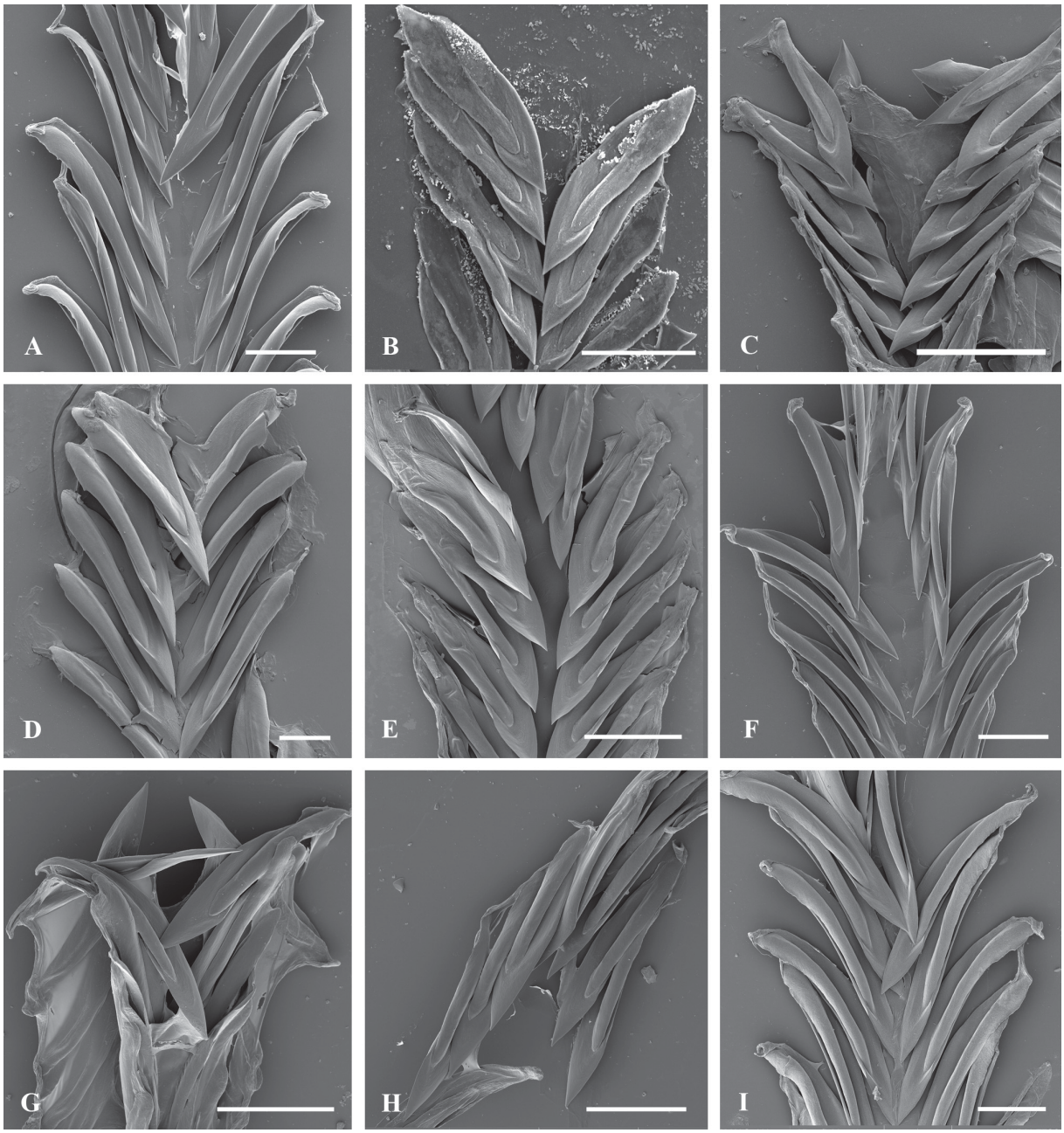

Fig. 5. Radulae of species of *Leucosyrinx* Dall, 1889. **A**. *L. floraecharlottae* sp. nov., holotype, MNHN-IM-2007-38823, SL 26.0 mm. **B**. *L. farhatorum* sp. nov., holotype, MNHN-IM-2007-42503, SL 41.2 mm (anteriormost part). **C**. *L. farhatorum*, MNHN-IM-2009-13498, SL 24.8 mm. **D**. *L. zucconi* sp. nov., holotype, MNHN-IM-2009-16820, SL 71.9 mm. **E**. *L. rattiae* sp. nov., MNHN-IM-2009-16768, SL 20.2 mm. **F**. *L. derzellei* sp. nov., MNHN-IM-2009-14833, SL 32.7 mm. **G–H**. *L. legalli* sp. nov., MNHN-IM-2009-16912, SL 29.3 mm. **G**. Bending plane of the radula. **H**. Dorsal view of teeth. **I**. *Leucosyrinx* sp. 15, MNHN-IM-2009-13331, SL 27.6 mm. Scale bars = 100 µm.

Other material (all sequenced)

SOCIETY ISLANDS • 1 lv; Bora Bora; 16°35′ S, 151°44′ E; depth 1013–1060 m; TARASOC, stn DW3417; MNHN-IM-2007-39255 • 1 lv; Bora Bora; 16°32′ S, 151°48′ E; depth 798–830 m; TARASOC, stn DW3419; MNHN-IM-2007-38850 • 1 lv; Moorea; 17°27′ S, 149°48′ E; depth 1000–1145 m; TARASOC, stn DW3462; MNHN-IM-2007-38674.

Description

Measurements (holotype). SL 26.0 mm, AL (with canal) 13.5 mm, AL (without canal) 8.7 mm, SW 8.6 mm.

Shell (holotype). Small, fusiform, with high spire, fragile, of uniform light tan color. About 8 teleoconch whorls. Paucispiral protoconch of about 2 rounded whorls. Transition between protoconch and teleoconch indistinct due to protoconch and earliest teleoconch whorls erosion. Teleoconch whorls angled at shoulder, with distinctly concave subsutural ramp. Distinct, shallow, impressed suture. 12 strong, oblique, broad, rounded axial ribs on body whorl, 14 on penultimate one. Ribs rapidly disappear on subsutural ramp, slightly weaken towards lower suture, disappear at body whorl periphery. Intervals between ribs slightly broader than ribs themselves. Weak spiral sculpture of low, rounded, and narrow cords over entire shell surface, including subsutural ramp, slightly stronger on shell base and canal Numerous, thin growth lines, prominent on subsutural ramp. Shell base weakly curving, smooth transition to long, straight canal. Narrow, elongate-oval aperture, poorly differentiated from canal. Inner lip nearly straight. Columellar and parietal sides with narrow, distinct callus. Moderately deep, subsutural, broadly arcuate anal sinus extends across subsutural ramp, confluent with large forward extension of outer lip.

Radula. Not examined.

DNA diagnosis (based on 4 *cox1* sequences)

‘G’ in site 73, ‘T’ in site 181, ‘C’ in site 544, ‘C’ in site 613.

Remarks

In shell outline this new species is very similar to *Leucosyrinx floraecharlottae* sp. nov., differing in a smaller size, less numerous axial ribs on shoulder and in stronger pronounced spiral cords on subsutural ramp. There is also a certain similarity to *L. herosae* sp. nov., which is much larger (up to 47 mm). Another similar species is *Leucosyrinx* sp. 18, represented in our material by two specimens. The new species differs from *Leucosyrinx* sp. 18 in having a relatively lower spire. None of them are phylogenetically related to *L. lemarcisi* sp. nov.

Distribution

Society Is., 800–1013 m.

Leucosyrinx farhatorum sp. nov.
urn:lsid:zoobank.org:act:2935C93B-7AE1-4EDD-AC64-D1F18F5C30B9
Figs 4K–P, 5B–C

Leucosyrinx sp. C – Kantor & Puillandre 2021: figs 11f, 13j.

Etymology

The species is named after Sarah Farhat, member of the ERC “HYPERDIVERSE” team, and her family for her contribution to the knowledge of the genome evolution of neogastropods.

Material examined

Holotype (sequenced)
SOLOMON ISLANDS • New Georgia; 7°58′ S, 157°34′ E; depth 650–836 m; SALOMON 2, stn CP2219; MNHN-IM-2007-42503.

Other material (all sequenced)
SOLOMON ISLANDS • 1 lv; 7°43′ S, 156°24′ E; depth 664–682 m; SALOMON 2, stn CP2246; MNHN-IM-2009-16752.

VANUATU • 2 lv; SE Malékula I.; 16°22′ S, 167°50′ E; depth 637–644 m; SANTO 2006, stn AT130; MNHN-IM-2009-13498, MNHN-IM-2009-13499.

Description

Measurements (holotype). SL 41.2 mm, AL (with canal) 19.7 mm, AL (without canal) 12.8 mm, SW 12.7 mm.

Shell (holotype). Medium-sized, fusiform, with a high spire, fragile, uniform light tan in color. 11+ teleoconch whorls, uppermost whorls and protoconch missing. Teleoconch whorls roundly angled at shoulder, with flat subsutural ramp. Shallow but distinct, narrowly canaliculate, and slightly wavy suture. 16 strong, oblique, medium broad, and rounded axial folds on body whorl, 17 on penultimate one. Folds fade on subsutural ramp, slightly weaken towards lower suture, disappear at body whorl slightly above periphery. Folds more closely spaced and distinct on upper teleoconch whorls, on posterior part of last whorl they weaken, nearly disappearing. Weak spiral sculpture of low, rounded, and indistinct narrow cords over entire shell. On subsutural ramp 12–13 cords on last whorl and 10 on penultimate whorl. Numerous thin growth lines, also prominent on subsutural ramp. Shell base weakly evenly convex, smooth transition to long, straight canal. Narrow, elongate-oval aperture, poorly differentiated from canal aperture. Inner lip slightly convex. Columellar and parietal sides with narrow, distinct callus. Moderately deep, subsutural, broadly arcuate anal sinus extends across subsutural ramp, confluent with large forward extension of outer lip.

Radula (Fig. 5B–C; studied in two specimens, holotype and MNHN-IM-2009-13498, Vanuatu). Similar in tooth morphology. Radula in holotype short, of 25 rows of teeth, 8–10 nascent. Marginal teeth duplex, short, ~215 μm in length (1.6% of AL without canal), broad. Major limb broadly lanceolate, slightly curved. Accessory limb nearly twice as narrow, rather flat, ~0.8 of total tooth length, inserted into shallow but distinct socket on dorsal side of major limb. Radula of the second specimen is very similar, with still smaller marginal teeth, ~150 μm in length (1.9% of AL without canal).

DNA diagnosis (based on 4 *cox1* sequences)

'C' in site 121, 'G' in site 484, 'G' in site 520, 'C' in site 604.

Remarks

The best partition of the ASAP analysis combines *L. farhatorum* sp. nov. together with *L. zucconi* sp. nov. in a single PSH. Nevertheless, in the phylogenetic tree (Fig. 1, Supp. file 1) both species constitute monophyletic groups with high support that are not sister. Besides, they are rather distinct conchologically and have a slightly different shape of radular teeth. They both were found off the Solomon Is., although *L. farhatorum* is recorded at shallower depths. Therefore, we consider them as two independent species. The second-best ASAP partition recognized three PSHs, including two within *L. farhatorum*, which are nevertheless not monophyletic. Two specimens from Vanuatu (Fig. 4N–P) have a more slender shell with a less angulated shoulder. Radulae of specimens from Vanuatu and Solomon Is. are very similar

and distinct from that of other species of *Leucosyrinx* in having relatively short and broad marginal teeth (Fig. 5B–C). The genetic distance between the two groups within *L. farhatorum* could be linked to geographic variation.

The largest specimen measures SL 42.7 mm. Both available specimens from the Solomon Is. (Fig. 4K–M) are similar in sculpture pattern and shell shape.

The new species somewhat resembles *Sibogasyrinx pyramidalis*, differing in a shorter canal, more pronounced axial folds on shoulder, absence of subsutural row of nodules. From the similar *L. floraecharlottae* sp. nov. it differs in having a straight vs slightly concave subsutural ramp, better pronounced spiral cords on the ramp, as well as in much shorter and relatively broader radular marginal teeth. It is somewhat similar to *L. archibenthalis*, differing in a broader shell with more pronounced sutural knobs and in broader and shorter marginal radular teeth.

Distribution

Solomon Is., Vanuatu, 637–646 m.

Leucosyrinx zucconi sp. nov.
urn:lsid:zoobank.org:act:6BB71F3B-B868-491C-A039-72810DAC1FB3
Figs 5D, 6

Etymology

The species is named after Dario Zuccon, member of the ERC "HYPERDIVERSE" team and long-term member of the MNHN team, as a recognition of his many years of indispensable efforts in sequence production.

Material examined

Holotype (sequenced)
SOLOMON ISLANDS • Santa Isabel I.; 8°47′ N, 159°40′ E; depth 645–840 m; SALOMON 2, stn CP2181; MNHN-IM-2009-16820.

Other material (all sequenced)
SOLOMON ISLANDS • 1 lv; 7°28′ N, 156°14′ E; depth 1000–1050 m; SALOMON 2, stn CP2251; MNHN-IM-2009-13595 • 2 lv; 7°28′ N, 156°17′ E; depth 1059–1109 m; SALOMON 2, stn CP2252; MNHN-IM-2009-13574, MNHN-IM-2009-13575 • 1 lv; Santa Isabel I.; 8°47′ N, 159°38′ E; depth 762–1060 m; SALOMON 2, stn CP2182; MNHN-IM-2009-16765.

Description

Measurements (holotype). SL 71.9 mm, AL (with canal) 37.3 mm, AL (without canal) 23.0 mm, SW 25.4 mm.

Shell (holotype). Large, fusiform, with a high spire, uniformly greyish in color, strong, with very thin greyish, tightly adhering smooth periostracum. 9+ teleoconch whorls, uppermost whorls and protoconch missing. Teleoconch whorls distinctly angled at shoulder, with weakly concave subsutural ramp. Shallow but distinct, impressed, slightly wavy suture. Teleoconch whorls, except last one with strong, oblique, medium broad, and rounded axial folds, absent on subsutural ramp, slightly weaken towards lower suture, 23 folds on penultimate and antepenultimate whorls. Folds fade at border between penultimate and last whorl. Last whorl shoulder distinctly angulated. Spiral sculpture of low, very narrow, but distinct strongly wavy cords over entire shell. 18 cords on subsutural ramp of last whorl and 20 of penultimate whorl. Numerous thin growth lines, also prominent on subsutural ramp. Shell base weakly evenly

convex, smooth transition to long, straight canal. Narrow, elongate-oval aperture, poorly differentiated from canal aperture. Inner lip slightly convex, nearly straight. Columellar and parietal sides with narrow, distinct callus. Moderately deep, subsutural, broadly arcuate anal sinus extends across subsutural ramp, confluent with large forward extension of outer lip.

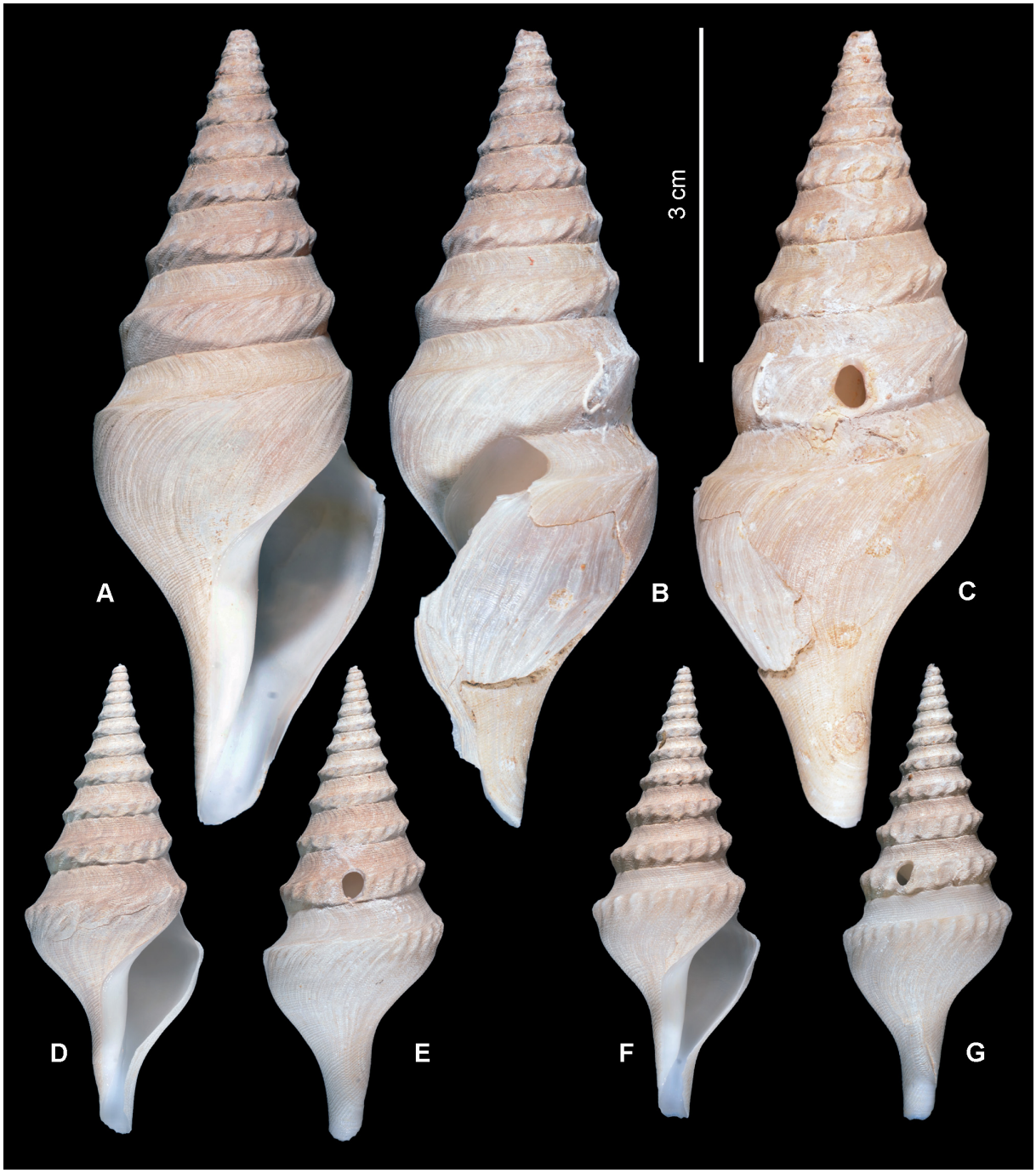

Fig. 6. *Leucosyrinx zucconi* sp. nov. **A–C**. Holotype, MNHN-IM-2009-16820, SL 71.9 mm. **D–E**. MNHN-IM-2009-13574, Solomon Is., 1059–1109 m, SL 42.5 mm. **F–G**. MNHN-IM-2009-13575, Solomon Is., 1059–1109 m, SL 40.8 mm. All shells at the same scale.

Radula (Fig. 5D) (studied in holotype). Marginal teeth duplex, ~450 μm in length, relatively short (1.95% of AL without canal), medium broad. Major limb lanceolate in strict dorsal view, slightly curved. Accessory limb more than twice as narrow, ~0.8 of total tooth length, inserted into distinct and rather deep socket on dorsal side of major limb.

DNA diagnosis (based on 2 *cox1* sequences)

'C' in site 14, 'G' in site 256, 'T' in site 499, 'C' in site 581, 'C' in site 586.

Remarks

The holotype is the largest specimen; the younger, nearly twice as small, has pagoda-like shape of the spire due to more distinct shoulder. The combination of the broad shell, pagodiform in younger specimens with more than 20 axial folds per whorl distinguish the species from other congeners.

Distribution

Solomon Is., 645–1059 m.

Leucosyrinx ringevali sp. nov.
urn:lsid:zoobank.org:act:E4F3F151-D5AB-4B5D-9DAE-618156F6F3A4
Fig. 7A–H

Etymology

The species is named after Allan Ringeval, member of the ERC "HYPERDIVERSE" team, for his contribution to the knowledge of toxin diversity in neogastropods.

Material examined

Holotype (sequenced)
MADAGASCAR • off Majunga; 15°25′ S, 45°55′ E; depth 943–950 m; MIRIKY, stn CP3253; MNHN-IM-2009-16916.

Other material (all sequenced)
MADAGASCAR • 2 lv; off Majunga and Cape Saint-André; 15°22′ S, 45°57′ E; depth 780–1020 m; MIRIKY, stn CP3279; MNHN-IM-2007-36693, MNHN-IM-2009-16884 • 1 lv; same data as for holotype; MNHN-IM-2009-16919.

Description

Measurements (holotype, largest specimen). SL 34.2 mm, AL (with canal) 15.5 mm, AL (without canal) 10.4 mm, SW 10.2 mm.

Shell (holotype). Medium-sized, narrow fusiform, with high spire, uniform light tan in color. Slightly over 10 teleoconch whorls. Paucispiral protoconch of about 2 rounded whorls, partially broken. Protoconch–teleoconch transition marked by appearance of axial folds. Teleoconch whorls strongly angled at shoulder, with distinctly concave subsutural ramp. Distinct shallow, impressed, and with wavy edge suture. 14 strong, oblique, broad, rounded axial folds on last whorl and 13 on penultimate whorl. Folds fade on sharply delimitated subsutural ramp, slightly weakening towards lower suture, disappear on whorl periphery. On last half of last whorl folds progressively weakening and not discernible near aperture. Intervals between the folds slightly exceed folds' width. Medium- to well-developed spiral sculpture of rounded, narrow equally developed cords over entire shell, visible on axial folds and in interspaces between them. 8–9 on subsutural ramp of last and penultimate whorls. Numerous, thin growth lines, prominent on subsutural ramp. Shell base slightly convex, weakly curving, smooth

Fig. 7. A–H. *Leucosyrinx ringevali* sp. nov. **A–C**. Holotype, MNHN-IM-2009-16916, SL 34.2 mm. **D–E**. MNHN-IM-2009-16919, Madagascar, 943–950 m, SL 26 mm. **F–H**. MNHN-IM-2007-36693, Madagascar, 780–1020 m, SL 27 mm. **I–M**. *Leucosyrinx vanweddingenae* sp. nov. **I–K**. Holotype, MNHN-IM-2009-14918, SL 27 mm. **L–M**. MNHN-IM-2009-16909, Madagascar, 650–850 m, SL 25.9 mm. **N–R**. *Leucosyrinx rattiae* sp. nov. **N–O**. MNHN-IM-2009-16767, Solomon Is., 1045–1118 m, SL 29.2 mm. **P–R**. Holotype, MNHN-IM-2009-16769, SL 25 mm. All shells at the same scale.

transition to long and straight canal. Narrow, elongate-oval aperture, poorly differentiated from canal. Inner lip nearly straight. Columellar and parietal sides with narrow, distinct callus. Moderately deep, subsutural, broadly arcuate anal sinus extends across subsutural ramp, confluent with large forward extension of outer lip.

Radula. Not examined.

DNA diagnosis (based on 4 *cox1* sequences)

'C' in site 290, 'C' in site 496, 'C' in site 544, 'T' in site 605.

Remarks

Although only four specimens are available, the species demonstrates a rather high variability in shell shape. The holotype is the largest and most slender specimen. The other specimens have broader shells with faster constricting shell base.

There is a certain similarity to *Leucosyrinx madagascarensis*, but the new species differs in a smaller shell and in a more delicate spiral sculpture. The new species is also similar to *L. floraecharlottae* sp. nov., differing in better pronounced spiral cords on the subsutural ramp and axial folds not extending to the ramp. Both species are not sister to *L. ringevali* sp. nov. in the phylogenetic tree.

Distribution

Madagascar, 780–943 m.

Leucosyrinx vanweddingenae sp. nov.
urn:lsid:zoobank.org:act:F4AD5344-967D-4CC8-A0FA-58341D58195A
Fig. 7I–M

Etymology

The species is named after Mélanie van Weddingen, member of the ERC "HYPERDIVERSE" team, for her contribution to the management of the neogastropod collection of the MNHN.

Material examined

Holotype (sequenced)
SOUTH MADAGASCAR • 1 lv; 25°43′ S, 44°24′ E; depth 729–732 m; ATIMO VATAE, stn CP3597; MNHN-IM-2009-14918.

Other material (sequenced)
MADAGASCAR • 1 lv; off Majunga; 15°22′ S, 45°58′ E; depth 650–850 m; MIRIKY, stn CP3252; MNHN-IM-2009-16909.

Description

Measurements (holotype, largest specimen). SL 27.1 mm, AL (with canal) 12.5 mm, AL (without canal) 8.5 mm, SW 9.3 mm.

Shell (holotype). Small, narrow fusiform, with high spire, rather strong, uniformly off white. 8.5 teleoconch whorls. Paucispiral, bulbous, light tan protoconch, of about 1.75 rounded whorls. Protoconch–teleoconch transition indistinct, marked by appearance of shoulder keel. Teleoconch whorls markedly angled at shoulder, with distinctly concave subsutural ramp. Distinct, shallow, impressed suture. 15 strong, weakly oblique, broad, rounded axial folds on last whorl and 14 on penultimate whorl, with

intervals slightly broader than folds. Folds fade on sharply delimitated subsutural ramp, slightly weaken towards lower suture, folds disappear on last whorl periphery. Very weak spiral sculpture of rounded, narrow, equally developed cords on periphery of last whorl and shell base, indiscernible on subsutural ramp, around 20 on periphery, shell base and canal. Intervals between cords uneven, 1–3 times cords' width. Numerous weak, thin growth lines. Shell base slightly convex, weakly curving, smooth transition to medium long and straight canal. Narrow, elongate-oval aperture, poorly differentiated from canal. Inner lip nearly straight. Columellar and parietal sides with narrow, distinct callus. Moderately deep, subsutural, broadly arcuate anal sinus extends across subsutural ramp, confluent with large forward extension of outer lip.

Radula. Not examined.

DNA diagnosis (based on 2 *cox1* sequences)

'T' in site 74, 'A' in site 346, 'A' in site 508, 'C' in site 640.

Remarks

Only two specimens are available. The second specimen (MNHN-IM-2009-16909) is similar to the holotype, but the axial folds disappear in the last half of the last whorl. The subsutural ramp has indistinct spiral striation.

The species is very similar to *L. ringevali* sp. nov., which was collected in close proximity at similar depths, but differs in a much weaker spiral sculpture, which in *L. ringevali* consists of much more numerous, distinct and uniformly closely spaced cords. Besides, according to the phylogenetic tree, the species are not closely related. There is a certain similarity to *L. derzellei* sp. nov., but the new species differs in a smaller and paler shell and in much weaker spiral sculpture.

Distribution

Madagascar, 650–729 m.

Leucosyrinx rattiae sp. nov.
urn:lsid:zoobank.org:act:DCD2473D-D65A-4149-84E4-2D059261382A
Figs 5E, 7N–R

Leucosyrinx sp. D – Kantor & Puillandre 2021: fig. 13f.

Etymology

The species is named after Claudia Ratti, member of the ERC "HYPERDIVERSE" team, for her contribution to the management of the neogastropod collection of the MNHN.

Material examined

Holotype (sequenced)
SOLOMON ISLANDS • NW Santa Isabel I.; 7°49′ S, 157°41′ E; depth 1045–1118 m; SALOMON 2, stn CP2217; MNHN-IM-2009-16769.

Other material (all sequenced)
SOLOMON ISLANDS • 2 lv; same data as for holotype; MNHN-IM-2009-16767, MNHN-IM-2009-16768.

Description

Measurements (holotype). SL 24.9 mm, AL (with canal) 13.0 mm, AL (without canal) 8.4 mm, SW 9.7 mm.

Shell (holotype). Small, fusiform, nearly biconic, with medium high spire, uniformly light tan in color, fragile. About 8 teleoconch whorls. Paucispiral, smooth, eroded protoconch of less than 1.5 whorls. Teleoconch whorls roundly angled at the shoulder, with a distinctly concave subsutural ramp. Distinct, shallow, impressed, suture with wavy edge. 15 strong, oblique, broad, rounded axial folds on last and penultimate whorls. Folds fade on sharply delimitated subsutural ramp, extending without weakening towards lower suture, disappear on whorl periphery. Folds well-developed on all whorls, intervals between folds slightly broader than folds. Medium- to well-developed spiral sculpture of rounded, narrow equally developed cords over entire shell, including axial folds and interspaces between them. Cords pronounced on subsutural ramp, 5–6 on last and penultimate whorls. Numerous thin, prominent on the subsutural ramp growth lines. Shell base slightly convex, weakly curving, smooth transition to medium long and straight canal. Narrow, elongate-oval aperture, poorly differentiated from canal. Inner lip nearly straight. Columellar and parietal sides with narrow, distinct callus. Moderately deep, subsutural, broadly arcuate anal sinus extends across subsutural ramp, confluent with large forward extension of outer lip.

Radula (Fig. 5E; studied in MNHN-IM-2009-16768). Marginal teeth duplex, ~230 μm in length, relatively short (3.7% of AL without canal), rather broad and short. Major limb broadly lanceolate in dorsal view, curved. Accessory limb more than twice as narrow, ~0.75 of total tooth length, inserted into distinct deep socket on dorsal side of major limb.

DNA diagnosis (based on 2 *cox1* sequences)

'T' in site 307, 'G' in site 325, 'C' in site 460.

Remarks

The largest second specimen measures SL 28.7 mm, with a relatively longer siphonal canal.

In shell outline the new species resembles several species, particularly *L. farhatorum* sp. nov. and *L. ringevali* sp. nov., none being closely related according to the phylogenetic tree. Another similar species is *L. herosae* sp. nov., from which it differs by the much smaller size and a relatively lower spire.

Distribution

The species is known only from the type locality.

Leucosyrinx derzellei sp. nov.
urn:lsid:zoobank.org:act:A6BBDEE8-3B6A-4DBC-A96A-038324A0E155
Figs 5F, 8A–F

Etymology

The species is named after Alessandro Derzelle, member of the ERC "HYPERDIVERSE" team, for his contribution to the analysis of neogastropod genomes.

Material examined

Holotype (sequenced)
SOUTH MADAGASCAR • 25°43′ S, 44°24′ E; depth 729–732 m; ATIMO VATAE, stn CP3597; MNHN-IM-2009-14986.

Other material (all sequenced)
NORTH-WESTERN MADAGASCAR • 1 lv; off Majunga; 15°25′ S, 45°55′ E; depth 943–950 m; MIRIKY, stn CP3253; MNHN-IM-2009-16918.

Fig. 8. A–F. *Leucosyrinx derzellei* sp. nov. **A–C**. MNHN-IM-2009-14986, holotype, SL 33.3 mm. **D**. MNHN-IM-2009-14833, south Madagascar, 821–910 m, SL 32.7 mm. **E**. MNHN-IM-2009-14814, south Madagascar, 821–910 m, SL 32.7 mm. **F**. MNHN-IM-2009-16918, NW Madagascar, 943–950 m, SL 35.8 mm. **G–K**. *Leucosyrinx legalli* sp. nov. **G–I**. Holotype, MNHN-IM-2009-16915, SL 30.2 mm. **J–K**. Madagascar, 650–850 m, MNHN-IM-2009-16912, SL 29.3 mm. **L–M**. *Leucosyrinx* sp. 15, Philippines, 593 m, MNHN-IM-2009-13331, SL 27.6 mm. All shells at the same scale.

SOUTH MADAGASCAR • 2 lv; 25°35′ S, 44°15′ E; depth 821–910 m; ATIMO VATAE, stn CP3595; MNHN-IM-2009-14814, MNHN-IM-2009-14833 • 3 lv; same data as for holotype; MNHN-IM-2009-14817, MNHN-IM-2009-14819, MNHN-IM-2009-14984.

Description

Measurements (holotype). SL 33.3 mm, AL (with canal) 13.2 mm, AL (without canal) 8.6 mm, SW 10.5 mm.

Shell (holotype). Shell medium-sized, thin, fusiform, with high spire, tan in color, with slightly darker band on shoulder and lighter shell base and canal. Slightly over 10 teleoconch whorls. Paucispiral, of about 1.75 evenly rounded and microshagreened whorls protoconch. Protoconch-teleoconch transition indistinct, marked by emergence of shoulder keel, smooth initially but soon acquiring axial folds. Teleoconch whorls roundly angled at shoulder, with distinctly concave subsutural ramp. Shallow, impressed, and slightly wavy suture. 14 strong, oblique, broad, and rounded axial folds on shoulder of last whorl and 13 on penultimate whorl. Folds fade on subsutural ramp, strongly weaken towards lower suture, rapidly disappear on whorl periphery. Folds more closely spaced on five upper teleoconch whorls, on last whorl intervals between folds slightly broader than folds. Relatively distinct spiral sculpture is of low, rounded, and narrow cords over entire shell. On subsutural ramp and shoulder cords more closely spaced, with intervals narrower than cords themselves, broader spaced on shell base and canal, with intervals exceeding width of cords. Numerous thin, prominent on subsutural ramp growth lines. Shell base weakly curving, smooth transition to long and straight canal. Narrow, elongate-oval aperture, poorly differentiated from canal. Inner lip slightly convex. Columellar and parietal sides with narrow, distinct callus, slightly lighter than remaining part of last whorl. Moderately deep, subsutural, broadly arcuate anal sinus extends across subsutural ramp, confluent with large forward extension of outer lip. Lower margin of the sinus parallel to shoulder.

Radula (Fig. 5F; studied in MNHN-IM-2009-14833). Radula short, comprises around 25 rows of teeth, 8 nascent. Marginal teeth duplex, ~310 μm (2.6 % AL without canal). Major limb narrow lanceolate in dorsal view, curved. Accessory limb relatively broad, constitutes half of tooth width, ~0.75 of total tooth length, inserted into distinct deep socket on dorsal side of major limb.

DNA diagnosis (based on 7 *cox1* sequences)

‘G’ in site 49, ‘A’ in site 307, ‘G’ in site 382, ‘A’ in site 554.

Remarks

The species is moderately variable in shell shape, length of the canal and degree of development of the axial folds.

It is most similar to sympatric *Leucosyrinx legalli* sp. nov., differing in a relatively shorter canal and a higher spire. It is also very close to *Leucosyrinx* sp. 15 from the Philippines. None of the similar species is phylogenetically closely related to *L. derzellei* sp. nov.

There is a certain similarity with *Leucosyrinx melvilli* (Schepman, 1913) from 918 m in Indonesia. The new species differs in a smaller size (35.8 vs 62 mm), less numerous axial folds (14 vs 22 on the last whorl) and a more angular shoulder. From sympatric *L. madagascarensis*, the new species differs in a slenderer shell with a less bulging shoulder as well as in less pronounced and more numerous spiral cords.

Distribution

From north-western to southern Madagascar, 729–943 m.

Leucosyrinx legalli sp. nov.
urn:lsid:zoobank.org:act:588504FF-AD5E-42F3-9D3C-925CF7729B2C
Figs 5G–H, 8G–K

Etymology

The species is named after Michel Le Gall, an indespensible volunteer companion of many years of the MNHN expeditions.

Material examined

Holotype (sequenced)
MADAGASCAR • off Majunga; 15°25′ S, 45°55′ E; depth 943–950 m; MIRIKY, stn CP3253; MNHN-IM-2009-16915.

Other material (sequenced)
MADAGASCAR • 1 lv; off Majunga; 15°22′ S, 45°58′ E; depth 650–850 m; MIRIKY, stn CP3252; MNHN-IM-2009-16912.

Description

Measurements (holotype). SL 30.2 mm, AL (with canal) 14.1 mm, AL (without canal) 8.5 mm, SW 9.0 mm.

Shell (holotype). Medium-sized, thin, fusiform, slender, with high spire, uniformly light tan in color. 9.75 weakly roundly angled at shoulder teleoconch whorls, with slightly concave subsutural ramp. Paucispiral protoconch of about 1.5 evenly rounded whorls. Protoconch and first teleoconch whorls eroded, protoconch–teleoconch transition indistinct. Very shallow, impressed, and slightly wavy suture. 13 weak, oblique, narrow, and rounded axial folds on shoulder of last whorl and 13 on penultimate whorl. Folds fade on subsutural ramp, hardly reach lower suture on penultimate whorl, hardly discernible below shoulder of last whorl. Folds better pronounced and closer spaced on upper whorls, with intervals of about same width as folds, on penultimate and last whorls intervals about twice as broad than folds. Medium distinct spiral sculpture of low, rounded, and narrow cords over entire shell, 6–7 cords on subsutural ramp of last and penultimate whorls, on upper whorls subsutural ramp smooth. Numerous thin, prominent on subsutural ramp growth lines. Shell base weakly curving, smooth transition to long, straight rather broad canal. canal. Narrow, elongate-oval aperture, poorly differentiated from canal, outer lip broken. Inner lip slightly convex. Columellar and parietal sides with narrow, distinct callus, slightly lighter than remaining part of last whorl. Moderately deep, subsutural, broadly arcuate anal sinus extends across subsutural ramp, confluent with large forward extension of outer lip.

Radula (Fig. 5G–H; examined in MNHN-IM-2009-16912). Marginal teeth duplex, ~240 μm (3.0% AL without canal). Major limb lanceolate in dorsal view, weakly curved, with sharp cutting edges of tip (Fig. 5G). Accessory limb constitutes about half of tooth width, ~0.75 of total tooth length, inserted into very shallow socket on dorsal side of major limb.

DNA diagnosis (based on 2 *cox1* sequences)

'A' in site 202, 'G' in site 355, 'C' in site 359, 'T' in site 478.

Remarks

The species is sympatric at one station with *L. derzellei* sp. nov. and is morphologically most close to it (but not phylogenetically). It differs in less angular whorls, a slenderer shell and a relatively taller last whorl.

Distribution

North-western Madagascar, 650–943 m.

Leucosyrinx sp. 15
Figs 5I, 8L–M

Material examined (sequenced)

PHILIPPINES • 1 lv; Luzon I.; 15°48′ N, 121°47′ E; depth 593 m; AURORA 2007, stn CP2664; MNHN-IM-2009-13331.

Description

Radula (Fig. 5I). Short, comprises around 30 rows of teeth, 6–7 nascent. Marginal teeth duplex, ~370 µm (5.2% AL without canal). Major limb narrow lanceolate in dorsal view, curved. Accessory limb relatively broad, constitutes about half of tooth width, ~0.75 of total tooth length, inserted into distinct deep socket on dorsal side of major limb.

DNA diagnosis (based on 1 (!) *cox1* sequence)

'C' in site 400, 'A' in site 460, 'C' in site 514.

Remarks

The species is very similar to *Leucosyrinx derzellei* sp. nov. from Madagascar, differing in less angular axial folds at shoulder. Besides, marginal radular teeth are longer in *Leucosyrinx* sp. 15 in relation to AL (5.2% vs 2.6%). The phylogenetic analysis clearly demonstrates that both species are separate. Since the species is represented by a single specimen and the interspecific variability can not be estimated, we presently abstain from describing this specimen from the Philippines as a new species.

Leucosyrinx schepmani sp. nov.
urn:lsid:zoobank.org:act:AF034A13-FDE2-4EEF-9F40-FF30BF35D7DA
Fig. 9A–F

Etymology

The species is named after Mattheus Marinus Schepman, famous Dutch malacologist for his contribution to the study of deep-water gastropods, including Conidae, who described several species of *Leucosyrinx*.

Material examined

Holotype (sequenced)
SOLOMON ISLANDS • Santa Isabel I.; 8°47′ N, 159°38′ E; depth 762–1060 m; SALOMON 2, stn CP2182; MNHN-IM-2009-16761.

Other material (all sequenced)
PAPUA NEW GUINEA • 1 lv; New Ireland; 2°42′ S, 150°02′ E; depth 827–966 m; KAVIENG 2014, stn CP4483; MNHN-IM-2013-58844.

PHILIPPINES • 2 lv; Luzon I.; 15°45′ N, 121°45′ E; depth 562 m; AURORA 2007, stn CP2663; MNHN-IM-2009-13432, IM-2009-13433 • 1 lv; Luzon I.; 15°53′ N, 121°54′ E; depth 518–538 m; AURORA 2007, stn CP2750; MNHN-IM-2009-13464.

SOLOMON SEA • 1 lv; Induna I.; 4°35′ S, 152°25′ E; depth 575–616 m; MADEEP, stn CP44266; MNHN-IM-2013-45461.

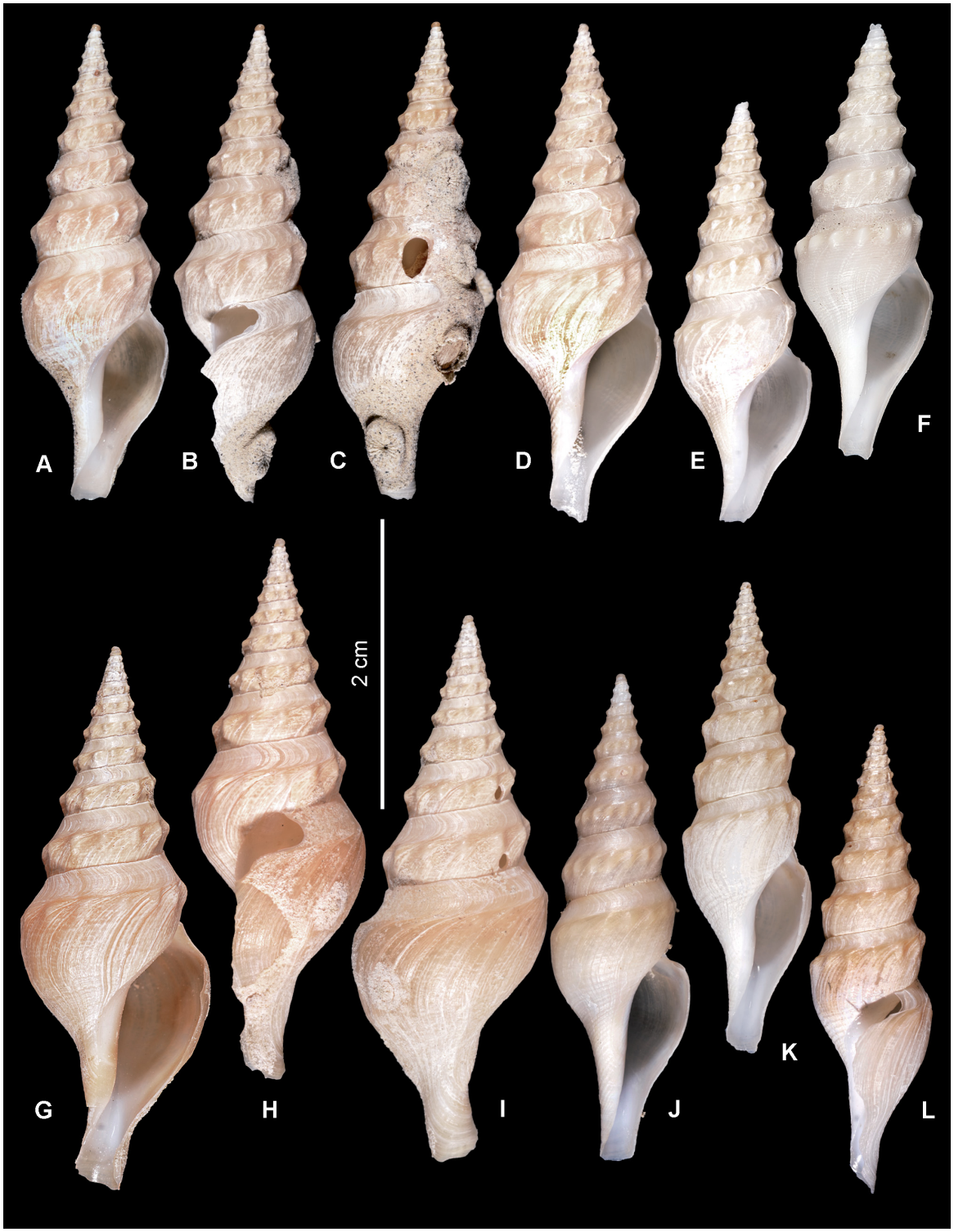

Fig. 9. A–F. *Leucosyrinx schepmani* sp. nov. **A–C**. MNHN-IM-2009-16761, holotype, SL 33 mm. **D**. MNHN-IM-2013-58844, Papua New Guinea, 827–966 m, SL 34.4 mm. **E**. MNHN-IM-2009-13464, Philippines, 518–538 m, SL 28.8 mm. **F**. MNHN-IM-2009-13432, Philippines, 562 m, SL 30 mm. **G–L**. *Leucosyrinx oliverioi* sp. nov. **G–I**. MNHN-IM-2007-17928, holotype, SL 37.5 mm. **J**. MNHN-IM-2009-17078, Papua New Guinea, 490–715 m, SL 33.6 mm. **K–L**. MNHN-IM-2007-17690, Vanuatu, 667–750 m, SL 32.7 mm. All shells at the same scale.

Description

Measurements (holotype). SL 33.0 mm, AL (with canal) 14.4 mm, AL (without canal) 10.0 mm, SW 9.8 mm.

Shell (holotype). Shell medium-sized, thin, elongate fusiform, slender, with high spire, uniformly light tan in color. 9.75 distinctly roundly angled at shoulder teleoconch whorls, with slightly concave, nearly straight subsutural ramp. Paucispiral protoconch of about 1.5 evenly rounded bulbous whorls, light brown. Posterior part of protoconch and first teleoconch whorl eroded protoconch–teleoconch transition indistinct is indistinct. Shallow, impressed suture. 12 distinct, oblique, narrow, and rounded axial folds on shoulder of last whorl and 12 on penultimate whorl. Folds fade on subsutural ramp, hardly reach lower suture on penultimate whorl, equally pronounced on all teleoconch whorls. Very weak spiral sculpture of low, rounded, and narrow cords, with interspaces exceeding cords width, absent on subsutural ramp, visible below shoulder. Numerous thin, prominent on subsutural ramp growth lines. Shell base weakly curving, smooth transition to long, straight rather broad canal. Narrow, elongate-oval aperture, poorly differentiated from canal, outer lip fragile, partially broken. Inner lip slightly concave, nearly straight. Columellar and parietal sides with narrow, distinct callus, of same color as the remaining part of last whorl. Moderately deep, subsutural, broadly arcuate anal sinus extends across subsutural ramp, confluent with large forward extension of outer lip.

Radula. Not examined.

DNA diagnosis (based on 6 *cox1* sequences)

'C' in site 250, 'C' in site 463, 'A' in site 508.

Remarks

The other studied specimens are generally rather similar to the holotype in shape and sculpture pattern. The most variable character is the convexity of the last whorl. Spiral sculpture is more variable and some specimens have rather distinct spiral cords, visible even on subsutural ramp (e.g., in MNHN-IM-2009-13432 from the Philippines – Fig. 9F).

The species is very similar, hardly distinguishable conchologically from *L. oliverioi* sp. nov., but they are not sister species.

Distribution

Philippines, Solomon Sea, Papua New Guinea, 518–827 m.

Leucosyrinx oliverioi sp. nov.
urn:lsid:zoobank.org:act:A5E2AB47-6BEB-4DB7-A66F-8A24EE96FA18
Figs 9G–L, 10A

Etymology

The species is named after Marco Oliverio (Sapienza University of Rome, Italy), world known specialist in phylogeny and taxonomy of molluscs and our companion of many years in expeditions organized by MNHN.

Material examined

Holotype (sequenced)
SOLOMON ISLANDS • NW Santa Isabel I.; 7°45′ S, 157°38′ E; depth 930–977 m; SALOMON 2, stn CP2216; MNHN-IM-2007-17928.

Other material (all sequenced)

PAPUA NEW GUINEA • 1 lv; Kimbe Bay; 5°21′ S, 150°45′ E; depth 490–715 m; BIOPAPUA, stn CP3679; MNHN-IM-2009-17078.

SOLOMON ISLANDS • 1 lv; Guadalcanal; 9°25′ N, 160°32′ E; depth 537–619 m; SALOMONBOA 3, stn CP2773; MNHN-IM-2009-6103 • 1 lv; E of Malaita; 8°41′ N, 161°04′ E; depth 556–864 m; SALOMONBOA 3, stn CP2800; MNHN-IM-2009-18960.

VANUATU • 1 lv; Big Bay; 14°55′ N, 166°56′ E; depth 667–750 m; BOA1, stn CP2422; MNHN-IM-2007-17690.

Description

Measurements (holotype). SL 37.5 mm, AL (with canal) 18.6 mm, AL (without canal) 12.8 mm, SW 12.9 mm.

Shell (holotype). Shell medium-sized, broad fusiform, with high spire, uniformly light yellow in color, thin. Nearly 10 distinctly roundly angled at shoulder teleoconch whorls, with slightly concave, nearly straight subsutural ramp. Paucispiral protoconch of about 1.5 evenly rounded strongly convex whorls, tan. Distinct slightly adpressed suture. 13 distinct, strong oblique, and rounded axial folds on shoulder of penultimate whorl and 12 on antepenultimate whorl. On last whorl folds present only on apertural side, disappear on dorsal side. Folds fade on subsutural ramp, hardly reach lower suture on penultimate whorl, equally pronounced on all teleoconch whorls except last one. Weak spiral sculpture, hardly discernible on subsutural ramp, below shoulder of very weak, low, rounded, wavy cords, with interspaces narrower than cords' width. Numerous thin, prominent on subsutural ramp growth lines. Shell base moderately curving, smooth transition to long, straight rather broad canal. Narrow, elongate-oval aperture, poorly differentiated from canal, outer lip fragile, partially broken. Inner lip is slightly concave, nearly straight. Columellar and parietal sides with narrow, distinct callus, of same color as remaining part of last whorl. Moderately deep, subsutural, broadly arcuate anal sinus extends across subsutural ramp, confluent with large forward extension of outer lip.

Radula (Fig. 10A; studied in holotype). Short, comprises around 30 rows of teeth, 8–9 nascent. Marginal teeth duplex, ~470 μm in length (3.7% AL without canal). Major limb narrow lanceolate in dorsal view, curved. Accessory limb relatively broad, constitutes slightly over half of tooth width, ~0.8 of total tooth length, inserted into distinct deep socket on dorsal side of major limb.

DNA diagnosis (based on 5 *cox1* sequences)

'C' in site 281, 'T' in site 364, 'G' in site 559.

Remarks

The holotype has a broader shell than other studied specimens, so that intraspecific variability exceeds interspecific when comparing the species with *L. schepmani* sp. nov. The axial folds are weaker or absent on the posterior part of the last whorl in all specimens. The spiral cords are very weak below the shoulder, but better pronounced on the shell base and canal.

The species is very similar, hardly distinguishable conchologically from *L. schepmani* sp. nov., and no clear morphological gap was found.

Distribution

Vanuatu, Solomon Is., Papua New Guinea, 490–930 m.

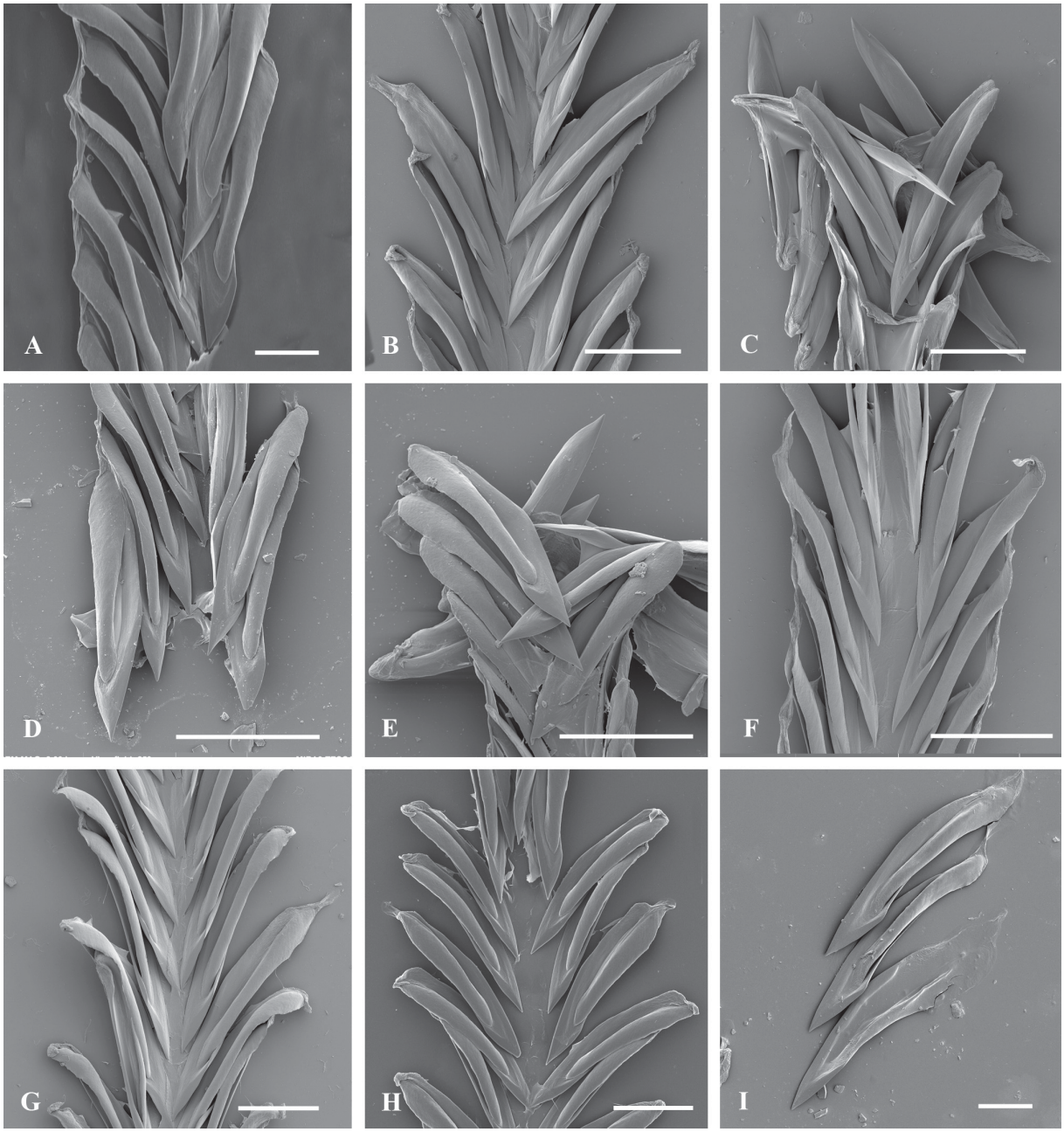

Fig. 10. Radulae of species of *Leucosyrinx* Dall, 1889. **A**. *L. oliverioi* sp. nov., holotype, MNHN-IM-2007-17928, SL 37.5 mm. **B–C**. *L. claviforma*, MNHN- IM-2013-58303, SL 19.1 mm. **B**. Dorsal view of the radula membrane. **C**. Bending plane, showing marginal teeth in different views. **D–E**. *L. urbanae* sp. nov., MNHN-IM- 2009-17215, SL 14.1 mm. **D**. Dorsal view of the radula membrane. **E**. Bending plane, showing marginal teeth in different views. **F**. *Leucosyrinx* sp. 24, MNHN-IM-2013-66098, SL 21.6 mm. **G**. *Leucosyrinx* sp. 22, MNHN-IM-2013-48155, SL 24.2 mm. **H**. *Leucosyrinx* sp. 8, MNHN-IM-2009-29323, SL 20.1 mm. **I**. *L. boiteuxi* sp. nov., MNHN-IM-2013-19848, SL 46.5 mm. Scale bars = 100 µm.

Leucosyrinx sp. 25
Fig. 11A–D

Material examined (all sequenced)

PHILIPPINES • 1 lv; Luzon I.; 15°48′ N, 121°47′ E; depth 593 m; AURORA 2007, stn CP2664; MNHN-IM-2009-13429 • 1 lv; Luzon I.; 15°36′ N, 121°57′ E; depth 1378–1436 m; AURORA 2007, stn CP2752; MNHN-IM-2009-13478.

DNA diagnosis (based on 2 *cox1* sequences)

'G' in site 76, 'C' in site 103, 'C' in site 337, 'C' in site 529.

Remarks

This medium-sized upper to lower bathyal species is represented in our material by two specimens collected off Luzon I., Philippines. The smaller one has a strongly broken shell (Fig. 11D). They bear strong similarity to *L. legalli* sp. nov., *L. schepmani* sp. nov. and *L. oliverioi* sp. nov. Due to very limited material we abstain from proposing a formal description of the species.

Distribution

Philippines, 593–1378 m.

Leucosyrinx claviforma (Kosuge, 1992)
Figs 10B–C, 12A–F

Comitas claviforma Kosuge, 1992: 165, pl. 58 figs 7–8.

Leucosyrinx claviforma – Sysoev 1996: 11, fig. 28.

Type material

Holotype
WESTERN AUSTRALIA • off Port Hedland, 17°58′ S, 118°25′ E; depth 376 m; WAM 45-86.

Material examined (all sequenced)

BISMARCK SEA • 1 lv; N Bagabag Is; 4°45′ S, 146°12′ E; depth 456–582 m; PAPUA NIUGINI, stn CP3978; MNHN-IM-2013-9614.

PAPUA NEW GUINEA • 1 lv; Woodlark Is.; 9°07′ S, 152°14′ E; depth 473–491 m; BIOPAPUA, stn DW3738; MNHN-IM-2009-17180 • 1 lv; submarine mountains off Bougainville; 5°33′ S, 154°00′ E; depth 369–377 m; BIOPAPUA, stn DW3745; MNHN-IM-2013-52048 • 1 lv; New Ireland; 2°23′ S, 150°37′ E; depth 416–535 m; KAVIENG 2014, stn CP4437; MNHN-IM-2013-58303 • 2 lv; New Ireland; 2°15′ S, 150°14′ E; depth 450–474 m; KAVIENG 2014, stn CP4446; MNHN-IM-2013-58380, MNHN-IM-2013-58382.

SOLOMON SEA • 2 lv; SE of Tuam Is; 6°04′ S, 148°09′ E; depth 460–528 m; PAPUA NIUGINI, stn CP4007; MNHN-IM-2013-9729, MNHN-IM-2013-9731 • 1 lv; SE of Tuam Is; 6°04′ S, 148°10′ E; depth 500–555 m; PAPUA NIUGINI, stn CP4008; MNHN-IM-2013-9725 • 3 lv; SE of Tuam Is; 6°04′ S, 148°12′ E; depth 500–575 m; PAPUA NIUGINI, stn CP4009; MNHN-IM-2013-19932, MNHN-IM-2013-19934, MNHN-IM-2013-9730.

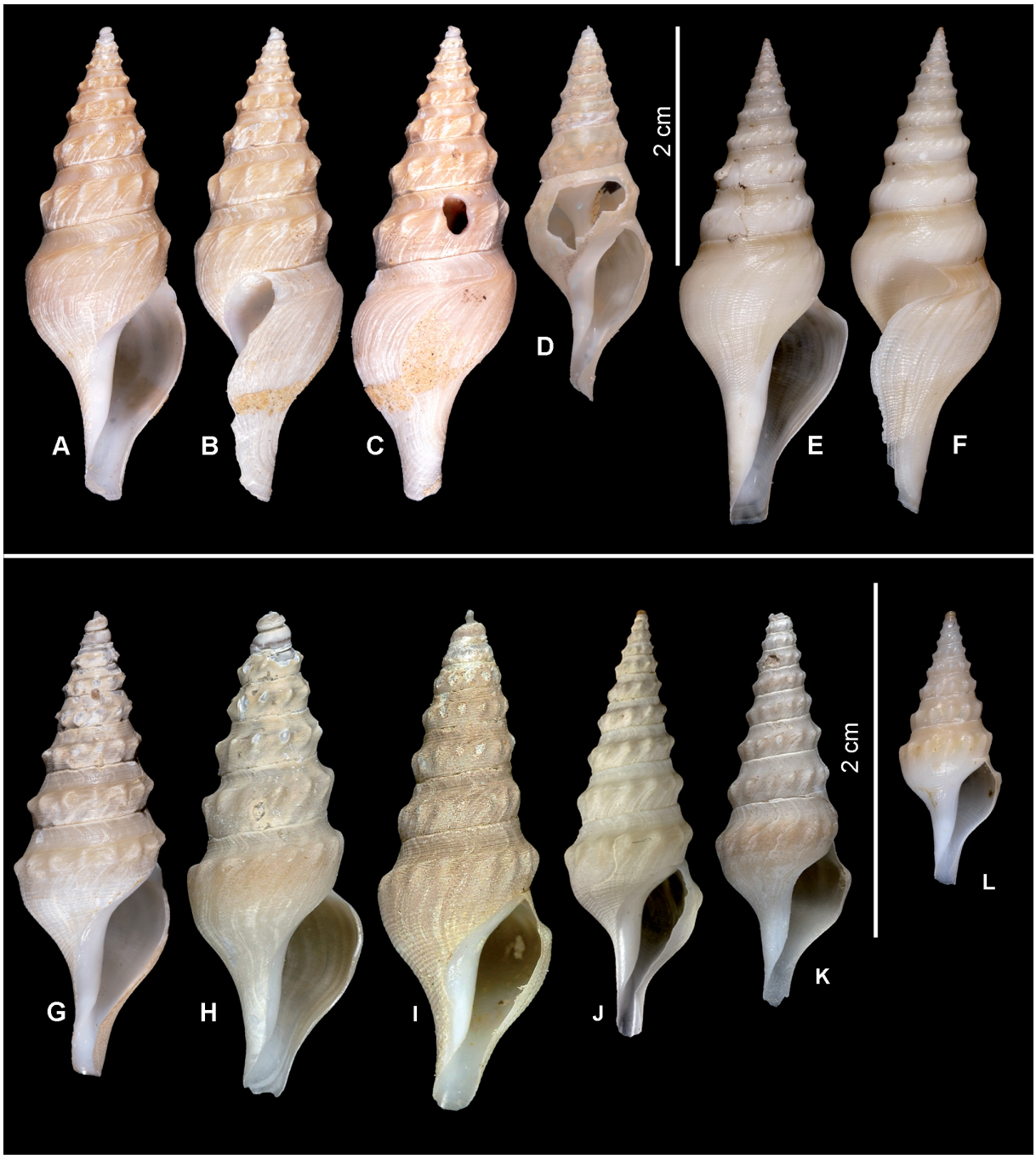

Fig. 11. A–D. *Leucosyrinx* sp. 25. **A–C**. MNHN-IM-2009-13478, Philippines, 1378–1436 m SL 39.8 mm. **D**. MNHN-IM-2009-13429, Philippines, 593 m, SL 31.6 mm. **E–F**. *Leucosyrinx* sp. 10, MNHN-IM-2009-16749, Solomon Is., 396–423 m, SL 41 mm. **G–H**. *Leucosyrinx* sp. 21. **G**. MNHN-IM-2009-13325, Philippines, 953 m, SL 26.4 mm. **H**. MNHN-IM-2009-13324, Philippines, 1155–1302 m, SL 27.5 mm. **I**. *Leucosyrinx* sp. 20, MNHN-IM-2009-16833, Solomon Is., 1136–1750 m, SL 28.5 mm. **J–K**. *Leucosyrinx* sp. 18. **J**. MNHN-IM-2013-58789, Papua New Guinea, 672–1150 m, SL 24.3 mm. **K**. MNHN-IM-2009-16911, Madagascar, 650–850 m, SL 22.4 mm. **L**. *Leucosyrinx* sp. 14; MNHN IM-2013-48145, Coral Sea, 490–830 m, SL 15.6 mm. A–F = at the same scale; G–L = at the same scale.

Description

Shell. Medium sized, reaching 38+ mm, thin but solid, narrow fusiform, with very high spire, light yellowish in color. Paucispiral small protoconch of nearly 2 convex evenly rounded smooth whorls. Whorls distinctly angulated on shoulder, with distinctly concave subsutural ramp, last whorl can be weakly roundly angular at transition to shell base. Shallow and impressed suture. Strong, oblique, broad, and rounded axial folds on shoulder of teleoconch whorls. Folds fade on subsutural ramp, strongly weaken towards lower suture, disappear shortly below shoulder on last whorl. Number of folds per whorl increasing with shell size, 17–18 on last whorl. Rather distinct spiral sculpture of closely spaced, low, rounded, straight on subsutural ramp and wavy below suture cords over entire shell. Shell base strong to weakly convex, smooth transition to long, straight canal. Narrow, elongate-oval aperture, poorly differentiated from canal. Deep, subsutural, broadly arcuate anal sinus extends across subsutural ramp, confluent with large forward extension of outer lip.

Radula (Fig. 10B–C; studied in two specimens, MNHN-IM-2013-58303 and MNHN-IM-2013-52048). Short, comprises around 25 rows of teeth, 8–9 nascent. Morphologically similar in both specimens. Marginal teeth duplex, relatively long, ~205–290 µm (4.8–6.2% AL without canal). Major limb medium narrow lanceolate in dorsal view, curved. Accessory limb narrow, constitutes less than half of tooth width, ~0.8 of total tooth length, inserted into distinct medium deep socket on dorsal side of major limb.

DNA diagnosis (based on 12 *cox1* sequences)

'C' in site 70, 'G' in site 97, 'C' in site 139, 'C' in site 586.

Remarks

The species was described based on a single dead-collected and strongly worn shell (Fig. 12A), lacking protoconch and upper teleoconch whorls with SL 38.1 mm. Sequenced specimens at our disposal originated from Papua New Guinea and the Solomon and Bismarck seas from depths of 370–500 m. Although our specimens are significantly smaller (reaching 24.3 mm vs 38.1 mm in the holotype), conchologically they are rather similar to the holotype in a characteristic narrow fusiform shell with a very high spire and a prominent angulation of the shoulder. The shell shape and prominence of the axial folds are moderately variable in the species. Our examined specimens with SL 19–24 mm were already adults judging from their fully developed very long penises.

Another similar species is *Leucosyrinx granuloplicata* (Kosuge, 1992), also from Western Australia at depths of 276–497 m. It differs in more pronounced and broader spaced folds on the whorl shoulders (Fig. 12G). Since the variability of *L. granuloplicata* is not known, it is not possible to decide whether it is an extreme form of *L. claviforma*, or a distinct species. Presently, we consider it as a valid species.

Distribution

Western Australia, Maldive Is. (Sysoev 1996), Papua New Guinea, Solomon and Bismarck seas (this study), 376–1170 m.

Leucosyrinx sp. 12
Fig. 12H

Material examined (sequenced)

VANUATU • 1 lv; SE Malékula I.; 16°22′ S, 167°50′ E; depth 637–644 m; SANTO 2006, stn AT130; MNHN-IM-2007-42637.

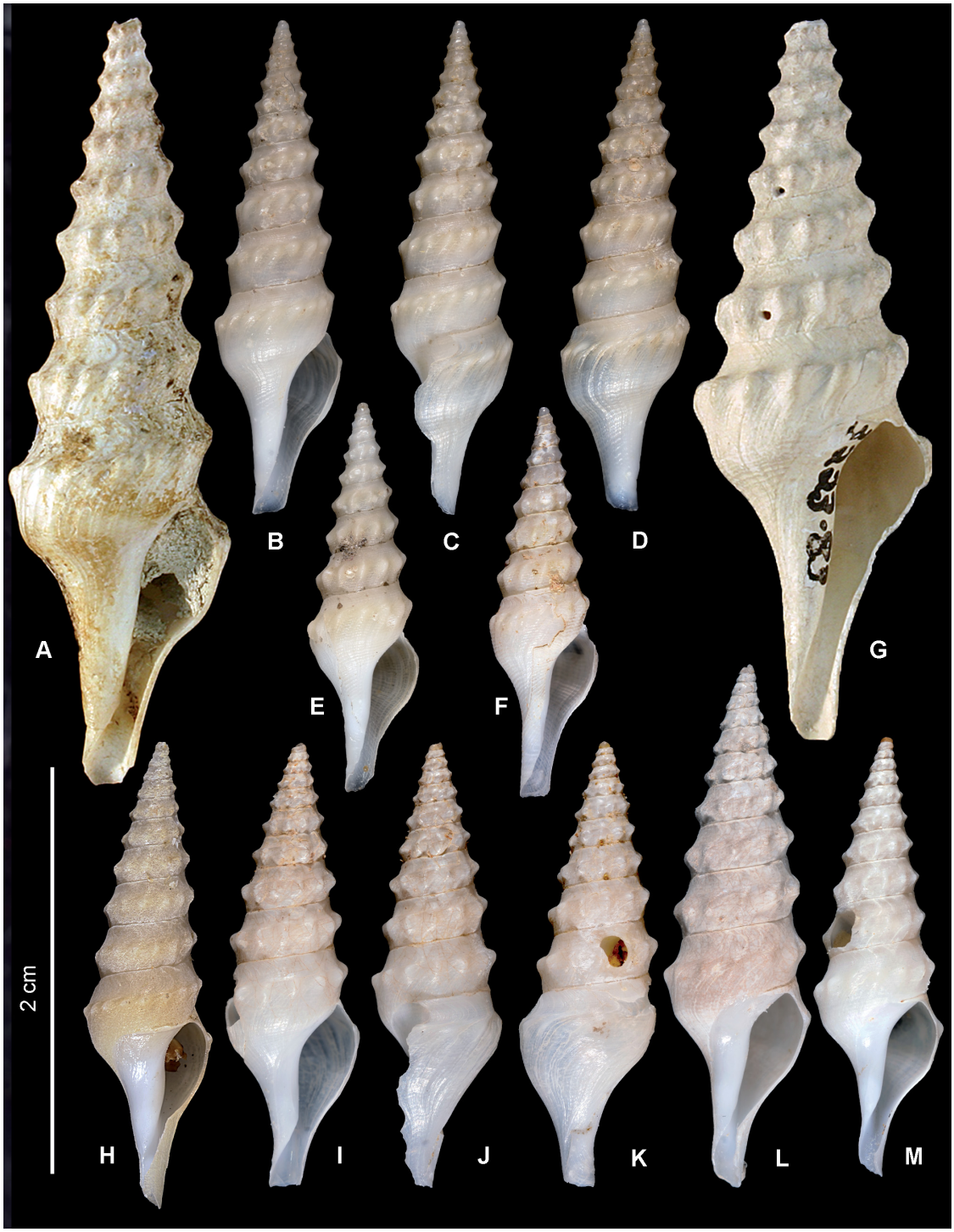

Fig. 12. A–F. *Leucosyrinx claviforma* (Kosuge, 1992). **A**. Holotype, WAM 45-86, SL 38 mm (courtesy of WAM). **B–D**. MNHN-IM-2013-19932, Solomon Sea, 500–575 m, SL 24.3 mm. **E**. MNHN-IM-2013-9614, Bismarck Sea, 456–582 m, SL 19.2 mm. **F**. MNHN-IM-2013-58303, Papua New Guinea, 416–535 m, SL 19.1 mm. **G**. *Leucosyrinx granuloplicata* (Kosuge, 1992), holotype, WAM S14436 SL 35.3 mm (courtesy of WAM). **H**. *Leucosyrinx* sp. 12, MNHN-IM-2007-42637, Vanuatu, SL 22.9 mm. **I–M**. *Leucosyrinx gaelae* sp. nov. **I–K**. MNHN-IM-2009-17135, holotype, SL 21.9 mm. **L**. MNHN-IM-2009-16996, Papua New Guinea, 788–805 m, SL 25.3 mm. **M**. MNHN-IM-2009-16997, Papua New Guinea, 788–805 m, SL 21.8 mm. All shells at the same scale.

DNA diagnosis (based on 1 (!) *cox1* sequence)

'G' in site 253, 'T' in site 322, 'A' in site 353, 'C' in site 553.

Remarks

The species is represented by a single rather worn shell, which is rather similar to *Leucosyrinx claviforma*. The slight differences are more yellowish color, less distinct spiral cords and shoulder axial folds. However, the only available specimen is heavily corroded and the differences in prominence of spirals may be attributed to this. In the phylogenetic tree these species are not sister.

Leucosyrinx gaelae sp. nov.
urn:lsid:zoobank.org:act:6C0EDDB0-1001-4E86-BE55-1A86D875D745
Fig. 12I–M

Etymology

The species is named after Priscillia Gaël Bourguignon, member of the marine invertebrate team in the MNHN.

Material examined

Holotype (sequenced)
PAPUA NEW GUINEA • New Britain, north of Rabaul; 4°4′ S, 151°50′ E; depth 702–724 m; BIOPAPUA, stn CP3672; MNHN-IM-2009-17135.

Other material (all sequenced)
PAPUA NEW GUINEA • 3 lv; New Britain, north of Rabaul; 4°3′ S, 151°50′ E; depth 788–805 m; BIOPAPUA, stn CP3674; MNHN-IM-2009-16996, MNHN-IM-2009-16997, MNHN-IM-2009-17001 • 2 lv; same data as for holotype; IM-2009-17138, IM-2009-17211.

Description

Measurements (holotype). SL 21.9 mm, AL (with canal) 9.46 mm, AL (without canal) 6.3 mm, SW 6.4 mm.

Shell (holotype). Shell small, narrow fusiform, with high spire, very light tan in color, thin, semitransparent, fragile. 8.5 distinctly roundly angulated at shoulder teleoconch whorls. Upper part of protoconch missing. Subsutural ramp weakly concave on upper whorls, nearly straight on last and penultimate whorls. Shallow and impressed suture. Strong, oblique, broad, and rounded axial folds on shoulder of teleoconch whorls, forming nearly orthocline knobs, increasing in number from 9–10 on first whorl to 12 on penultimate and last whorls. Folds fade on subsutural ramp, do not reach lower suture, disappear below shoulder on last whorl. Weak, hardly discernible spiral sculpture of closely spaced, low, rounded cords over entire shell except subsutural ramp. Intervals between cords narrower than cords' width. Numerous thin, visible on subsutural ramp growth lines. Shell base weakly convex, passes smoothly into long and straight canal. Narrow, elongate-oval aperture, poorly differentiated from canal, outer lip fragile, partially broken. Inner lip is nearly straight, outer lip very thin and fragile. Columellar and parietal sides with narrow, distinct callus, of same color as remaining part of last whorl. Moderately deep, subsutural, broadly arcuate anal sinus extends across subsutural ramp, confluent with large forward extension of outer lip.

Radula. Not examined.

DNA diagnosis (based on 6 *cox1* sequences)

'A' in site 163, 'G' in site 169, 'C' in site 448, 'C' in site 548.

Remarks

The protoconch, retained in one specimen (MNHN-IM-2009-16997), is paucispiral, of about 1.75 strongly convex whorls, light brown. The transition between the protoconch and teleoconch is marked by the emergence of a shoulder keel.

The species is weakly variable. Most of the shells are partially broken due to the fragility. The number of knobs on the last whorl can reach 14–15. The species is most similar to *L. claviforma* and to *Leucosyrinx* sp. 12, differing in broader spaced axial folds, more like knobs, on the shoulder and a relatively lower spire.

There is a certain similarity in shell outline to *Sibogasyrinx suluensis* (Powell, 1969), differing in less pronounced and more closely spaced spiral cords below the shoulder on the last whorl, as well as in the absence of a subsutural row of knobs.

The specimen presented by Sysoev (1996: 11, fig. 28) as *Leucosyrinx claviforma* off Maldive Is. from depths of 786–1170 m may belong to *L. gaelae* sp. nov., which is found at greater depths than *L. claviforma* – 702–788 vs 370–500 m.

Distribution

Papua New Guinea, 702–788 m.

Leucosyrinx urbanae sp. nov.
urn:lsid:zoobank.org:act:F3094F19-FFC7-46AF-9DBA-9B9E0EAFD084
Figs 10D–E, 13A–D

Etymology

The species is named after Danièle Urban-Dehoux, a volunteer of many years of the malacological team of the MNHN.

Material examined

Holotype (sequenced)
SOLOMON ISLANDS • E of Malaita; 8°41′ N, 161°04′ E; depth 556–864 m; SALOMONBOA 3, stn CP2800; MNHN-IM-2009-18962.

Other material (all sequenced)
PAPUA NEW GUINEA • 1 lv; East of Manus I.; 2°11′ S, 147°18′ E; depth 499–517 m; BIOPAPUA, stn CP3691; MNHN-IM-2009-17215.

SOLOMON ISLANDS • 1 lv; NW Santa Isabel I.; 7°42′ S, 157°44′ E; depth 550–682 m; SALOMON 2, stn CP2214; MNHN-IM-2007-42510.

Description

Measurements (holotype). SL 14.2 mm, AL (with canal) 7.6 mm, AL (without canal) 4.0 mm, SW 4.0 mm.

Shell (holotype). Shell small, narrow fusiform, with moderately high spire, very light tan in color, thin, semitransparent, fragile. 7.5 teleoconch whorls with distinctly angular rounded shoulder and weakly

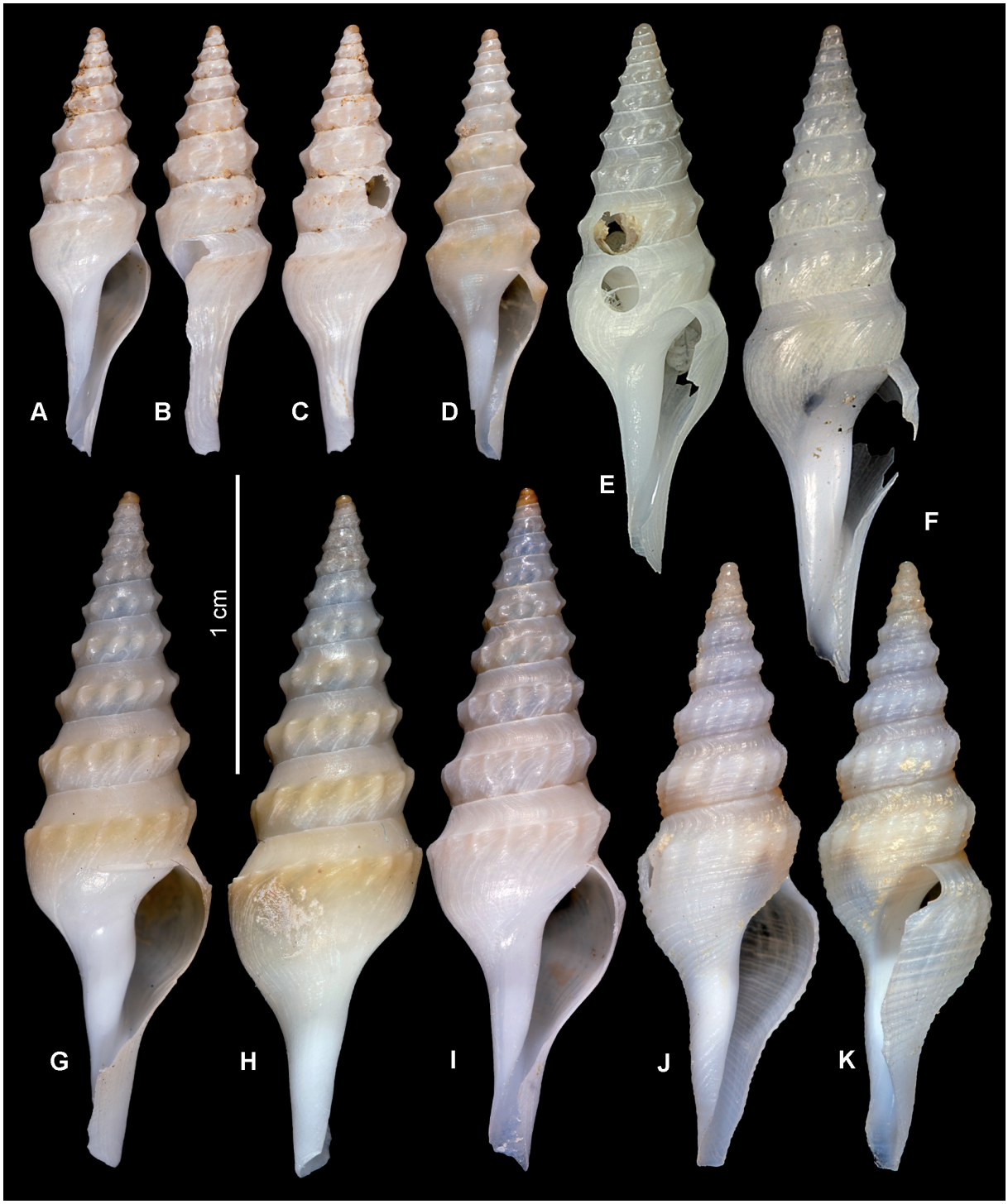

Fig. 13. A–D. *Leucosyrinx urbanae* sp. nov. **A–C**. Holotype, MNHN-IM-2009-18962, SL 14.2 mm. **D**. MNHN-IM- 2009-17215, Papua New Guinea, 499–517 m, SL 14.1 mm. **E**. *Leucosyrinx* sp. 23, MNHN-IM-2009-29312, SL 18.0 mm. **F**. *Leucosyrinx* sp. 24, MNHN-IM-2013-66098, SL 21.6 mm. **G–I**. *Leucosyrinx* sp. 22. **G–H**. MNHN-IM-2009-29110, southern New Caledonia, 756–769 m, SL 22.4 mm. **I**. MNHN-IM-2013-48160, Coral Sea, 900–950 m, SL 22.6 mm. **J–K**. *Leucosyrinx* sp. 8, MNHN-IM- 2009-29323, southern New Caledonia, 470–570 m, SL 20.1 mm. All shells at the same scale.

concave subsutural ramp. Paucispiral, small protoconch of about 1.75 convex evenly rounded whorls, light brownish, protoconch–teleoconch transition indiscernible due to shell erosion. Shallow, impressed suture. Strong, oblique, narrow, and rounded axial folds on shoulder of teleoconch whorls, increasing in number from 9 on first whorl to 11 on penultimate and 12 on last whorls. Folds fade on subsutural ramp, reach lower suture on upper whorls, disappear below shoulder on last whorl. On posterior half of last whorl folds progrwessively weaken, although still visible. Very weak spiral sculpture, hardly discernible on subsutural ramp and below shoulder on last whorl, of irregularly spaced low cords, slightly better pronounced on transition to canal. Numerous thin, visible on subsutural ramp growth lines. Shell base weakly convex, smooth transition to long and straight canal. Narrow, elongate-oval aperture, poorly differentiated from canal, inner lip nearly straight, outer lip very thin and fragile. Columellar and parietal sides with narrow, distinct callus, of same color as remaining part of last whorl. Moderately deep, subsutural, broadly arcuate anal sinus extends across subsutural ramp, confluent with large forward extension of outer lip.

Radula (Fig. 10D–E; studied in MNHN-IM-2009-17215). Marginal teeth duplex, ~190 μm in length (5.1% AL without canal). Major limb lanceolate in dorsal view, curved. Accessory limb relatively broad, at tooth base equals total tooth width, ~0.75 of total tooth length, inserted into distinct deep socket on dorsal side of major limb.

DNA diagnosis (based on 3 *cox1* sequences)

'C' in site 43, 'T' in site 412, 'C' in site 541.

Remarks

The two other specimens are similar to the holotype in shell outline and axial sculpture. The specimen MNHN-IM-2009-17215 (Fig. 13D) has a much better pronounced spiral sculture of closely spaced rounded cords, visible also on the subsutural ramp.

Conchologically it is similar to *Leucosyrinx* sp. 23 and, particularly, to *L. gaelae* sp. nov, differing in their smaller size and a longer siphonal canal, but they are phylogenetically not closely related.

Distribution

Solomon Is., Papua New Guinea, 499–556 m.

Leucosyrinx sp. 23
Fig. 13E

Material examined (sequenced)

NEW CALEDONIA • 1 lv; 22°23′ N, 167°26′ E; depth 810–960 m; TERRASSES, stn DW3085; MNHN-IM-2009-29312.

DNA diagnosis (based on 1 (!) *cox1* sequence)

'G' in site 31, 'C' in site 451, 'A' in site 538, 'T' in site 583.

Remarks

This separate species is represented in our material by a single broken specimen (SL 18.0 mm) and thus we abstain from its formal description. Conchologically it is most similar, if morphologically distinguishable, to *Leucosyrinx* sp. 24, and both are sister species in the phylogenetic tree: they may actually correspond to a single species.

Distribution

New Caledonia, 810–960 m.

Leucosyrinx sp. 24
Figs 10F, 13F

Material examined (sequenced)

NEW CALEDONIA • 1 lv; SE of Ile des Pins; 23°00′ S, 167°55′ E; depth 845–856 m; KANACONO, stn DW4782; MNHN-IM-2009-66098.

Description

Radula (Fig. 10F). Short, comprises around 25 rows of teeth, 10 nascent. Marginal teeth duplex, ~250 µm in length (5.4% AL without canal). Major limb narrow lanceolate in dorsal view, curved. Accessory limb relatively broad, constitutes slightly over half of tooth width, ~0.75 of total tooth length, inserted into distinct deep socket on dorsal side of major limb.

DNA diagnosis (based on 1 (!) *cox1* sequence)

'C' in site 19, 'C' in site 319, 'C' in site 346.

Remarks

This species is represented in our material by a single broken specimen (SL 21.6 mm) and thus we abstain from its formal description. Conchologically it is similar to *Leucosyrinx* sp. 23.

Distribution

New Caledonia, 845–856 m.

Leucosyrinx sp. 22
Figs 10G, 13G–I

Material examined (sequenced)

CORAL SEA • 1 lv; S Lansdowne Bank; 21°02′ S, 161°11′ E; depth 810–840 m; KANADEEP, stn CP5054; MNHN-IM-2013-48155 • 1 lv; S Lansdowne Bank; 21°08′ S, 161°13′ E; depth 900–950 m; KANADEEP, stn CP5055; MNHN-IM-2013-48160.

SOUTHERN NEW CALEDONIA • 1 lv; 22°23′ N, 167°22′ E; depth 756–769 m; EXBODI , stn CP3842; MNHN-IM-2009-29110.

Description

Radula (Fig. 10G). Short, comprises around 30 rows of teeth, 7 nascent. Marginal teeth duplex, ~315 µm in length (5.3% AL without canal). Major limb narrow lanceolate in dorsal view, curved. Accessory limb constitutes slightly less than half of tooth width, ~0.75 of total tooth length, inserted into distinct deep socket on dorsal side of major limb.

DNA diagnosis (based on 3 *cox1* sequences)

'G' in site 199, 'T' in site 316, 'C' in site 406, 'C' in site 658.

Remarks

This medium-sized species is represented in our material by three specimens, all incomplete, with broken aperture lips. Therefore, we abstain from its formal description as a new species.

Conchologically it is very similar if distinguishable from *L. gaelae* sp. nov., differing in a relatively longer siphonal canal; both species are phylogenetically not closely related. It is so far found in the Coral

Sea and off southern New Caledonia, while *L. gaelae* is recorded off New Britain, Papua New Guinea at similar depths.

Distribution

New Caledonia, Coral Sea, 756–900 m.

Leucosyrinx sp. 8
Figs 10H, 13J–K

Material examined (sequenced)

SOUTHERN NEW CALEDONIA • 1 lv; Pass de la Sarcelle, 22°27′ N, 167°25′ E; depth 470–570 m; TERRASSES, stn DW3083; MNHN-IM-2009-29323.

Description

Radula (Fig. 10H). Marginal teeth duplex, ~240 μm in length (4.6% AL without canal). Major limb medium broad, lanceolate in dorsal view, curved. Accessory limb constitutes slightly over half of tooth width, ~0.75 of total tooth length, inserted into distinct deep socket on dorsal side of major limb.

DNA diagnosis (based on 1 (!) *cox1* sequence)

'C' in site 286, 'C' in site 428, 'C' in site 436.

Remarks

This medium-sized (SL 20.1 mm) species is represented by a single specimen. Since the variability is unknown, we abstain from a formal description of the new species.

It is similar to *Leucosyrinx* sp. 22 (Fig. 13G–I), also from southern New Caledonia, although the phylogenetic tree demonstrates that they are not closely related. Conchologically it differs in a much better developed spiral sculpture of irregularly and broadly-spaced spiral cords.

Distribution

New Caledonia, 470–570 m.

Leucosyrinx boiteuxi sp. nov.
urn:lsid:zoobank.org:act:0CFCDF0C-8C7F-4990-AA08-C8413E768752
Figs 10I, 14A–D

Etymology

The species is named after Benoit Boiteux, a indespensible volunteer companion of many years of the MNHN expeditions.

Material examined

Holotype (sequenced)
BISMARCK SEA • NW Long I.; 5°12′ S, 146°59′ E; depth 470–508 m; PAPUA NIUGINI, stn DW3983; MNHN-IM-2013-19767.

Other material (all sequenced)

PAPUA NEW GUINEA • 1 lv; off Madang; 4°58′ S, 145°52′ E; depth 640–675 m; BIOPAPUA, stn CP3709; MNHN-IM-2013-52051.

SOLOMON SEA • 1 lv; Vityaz Strait; 6°00′ S, 147°36′ E; depth 706–715 m; PAPUA NIUGINI, stn CP3995; MNHN-IM-2013-19848.

Description

Measurements (holotype). SL 57.4 mm, AL (with canal) 23.7 mm, AL (without canal) 16.4 mm, SW 17.4 mm.

Shell (holotype). Shell large, fusiform, with high spire, greyish in color, thin but solid. Protoconch and uppermost teleoconch whorls missing, remaining teleoconch whorls 11.5, upper whorls distinctly roundly angled at shoulder, last and half of penultimate whorls with more rounded shoulder accentuated by low keel. Subsutural ramp concave on upper whorls and nearly flat on last and penultimate whorls. Deep, impressed suture. Strong, oblique, broad, rounded axial folds on shoulder of upper teleoconch whorls, fading on penultimate whorl and absent on last whorl. Folds fade on subsutural ramp, strongly weaken towards lower suture. Folds number increasing from 10 on first remaining whorl to 19 on anterpenultimate one. Weak spiral sculpture of low, rounded, wavy, and narrow cords over entire shell. Cords on subsutural ramp weaker than below shoulder, on shell base and canal intervals between cords equal or slightly exceed cords' width. Numerous thin, prominent on subsutural ramp growth lines. Shell base convex, smooth transition to long and straight canal. Narrow, elongate-oval aperture, poorly differentiated from canal, inner lip slightly concave, nearly straight. Columellar and parietal sides with narrow, distinct callus, slightly lighter than remaining last whorl. Deep, subsutural, broadly arcuate anal sinus extends across subsutural ramp, confluent with large forward extension of outer lip.

Radula (Fig. 10I; studied in MNHN-IM-2013-19848). Marginal teeth duplex, ~330 µm in length (2.5% AL without canal). Major limb lanceolate in dorsal view, curved. Accessory limb relatively broad, at tooth base equals total tooth width, ~0.75 of total tooth length, inserted into distinct deep socket on dorsal side of major limb

DNA diagnosis (based on 3 *cox1* sequences)

'A' in site 22, 'T' in site 67, 'G' in site 295, 'G' in site 568, 'C' in site 607.

Remarks

The two other studied specimens have a shell outline similar to the holotype, which is the largest specimen. In the smaller specimens (MNHN-IM-2013-52051, SL 36.9 mm; MNHN-IM-2013-19848, SL 46.5 mm), axial folds on the shoulder are present on the last whorl, although they progressively weaken on the last whorl in the latter specimen. This suggests that the fading of the folds occurs as the shell grows. The protoconch is present in the smallest specimen, but strong erosion makes it impossible to count the number of whorls.

The species bears some resemblance to *Leucosyrinx palawanica* (Powell, 1969), differing in having a straighter canal, a significantly lower last whorl and a larger size.

Distribution

Bismarck Sea, Solomon Sea, Papua New Guinea, 470–706 m.

Leucosyrinx margaritae (E.A. Smith, 1904) comb. nov.
Figs 14E–L, 15A–B

Pleurotoma (*Surcula*) *margaritae* E.A. Smith, 1904: 458.

Pleurotoma (*Surcula*) *margaritae* – Annandale & Stewart 1909: pl. 14 figs 2, 2a.
Comitas margaritae – Powell 1969: 268 (23–280), pl. 217 figs 1–2. — Tan & Islami 2021: 325–326, fig. 9d.

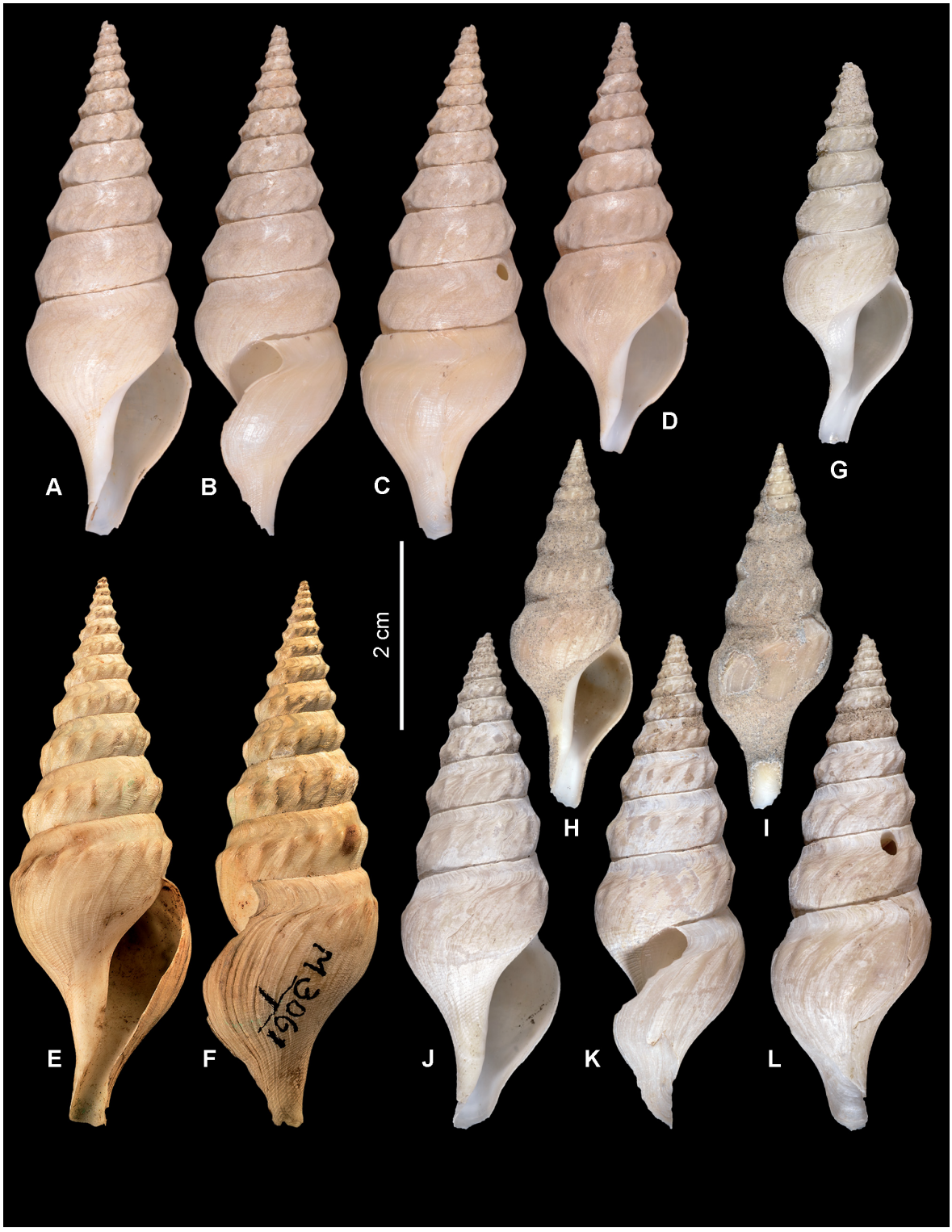

Fig. 14. A–D. *Leucosyrinx boiteuxi* sp. nov. **A–C**. Holotype, MNHN-IM-2013-19767, SL 57.4 mm. **D**. MNHN-IM-2013-19848, Solomon Sea, 706–715 m, SL 46.5 mm. **E–L**. *Leucosyrinx margaritae* (E.A. Smith, 1904). **E–F**. Holotype, ZSI, M 3061/1, SL 58.5 mm (from the site of ZSI, https://zsicollections.in/specimen/ZSI0000003727). **G**. MNHN-IM-2009-13446, Philippines, 944–1004 m, SL 40.9 mm. **H–I**. MNHN-IM-2013-45439, Solomon Sea, 575–616 m, SL 39.5 mm. **J–L**. MNHN-IM-2013-19747, Solomon Sea, 724 m, SL 53.1 mm. All shells at the same scale.

Type material

Holotype

ANDAMAN ISLANDS • off Andaman Is.; depth 405 ftm (= 740 m); ZSI, M 3061/1.

Other material examined (all sequenced)

PAPUA NEW GUINEA • 1 lv; Woodlark Is.; 9°12′ S, 152°16′ E; depth 556–645 m; BIOPAPUA, stn CP3740; MNHN-IM-2009-17151.

PHILIPPINES • 1 lv; off Luzon I.; 14°55′ N, 123°12′ E; depth 944–1004 m; AURORA 2007, stn CC2702; MNHN-IM-2009-13446.

SOLOMON SEA • 1 lv; N Long I.; 5°10′ S, 147°3′ E; depth 724 m; PAPUA NIUGINI, stn CP3982; MNHN-IM-2013-19747 • 1 lv; Vitiaz Strait; 6°00′ S, 147°36′ E; depth 706–715 m; PAPUA NIUGINI, stn CP3995; MNHN-IM-2013-19853 • 1 lv; SE of Tuam Is; 6°04′ S, 148°12′ E; depth 500–575 m; PAPUA NIUGINI, stn CP4009; MNHN-IM-2013-19931 • 1 lv; Induna I.; 4°35′ S, 152°25′ E; depth 575–616 m; MADEEP, stn CP4266; MNHN-IM-2013-45439.

Description

Shell. Large, reaching 60 mm. fusiform, with high spire, thin but solid, from very light yellowish to tan in color. Paucispiral small protoconch of 1.5 convex evenly rounded smooth whorls. Upper teleoconch whorls distinctly angulated on shoulder, last whorl in larger specimens nearly evenly rounded with shoulder slightly accentuated by obtuse keel. Subsutural ramp distinctly concave on upper whorls, can be nearly flat on last whorl. Strong, oblique, broad, and rounded axial folds on shoulder of teleoconch whorls. Folds fade on subsutural ramp, strongly weaken towards lower suture, not reaching it on penultimate whorl in large specimens. On the last and posterior part of penultimate whorls folds progressively weaken towards aperture. 14 folds were discernible on last whorl in largest studied specimen (SL 53.1 mm – Fig. 14J–L). Medium developed spiral sculpture, practically absent on ramp, but more distinct below shoulder, of variable in width, low, rounded, and wavy cords, with intervals similar or exceeding cords' width. Shell base strong to weakly convex, smooth transition to long canal. Narrow, elongate-oval aperture, poorly differentiated from canal. Deep, subsutural, broadly arcuate anal sinus extends across subsutural ramp, confluent with large forward extension of outer lip.

Radula (Fig. 15A–B; studied in two specimens, MNHN-IM-2009-13446 (Fig. 15A) and MNHN-IM-2013-19931 (Fig. 15B)). Morphologically similar in both specimens. Marginal teeth duplex, ~195–390 µm (2.8–3.1% AL without canal). Major limb medium narrow lanceolate in dorsal view, curved. Accessory limb constitutes about half of tooth width, inserted into distinct medium deep socket on dorsal side of major limb.

DNA diagnosis (based on 6 *cox1* sequences, low confidence)

'G' in site 139, 'G' in site 313, 'C' in site 401, 'G' in site 490, 'C' in site 523.

Remarks

The species is moderately variable in shell outline and sculpture pattern. Although the best ASAP partition recognizes the six sequenced specimens as a single species, the phylogenetic tree has low support of this node (PP = 0.87, but the bootstrap support is 99). Within the clade two subclades with higher support (0.94 and 0.99) are recognized, both containing specimens collected in the Solomon Sea. We may deal with species in status nascendi, but since the material is rather limited, we consider it as a single species.

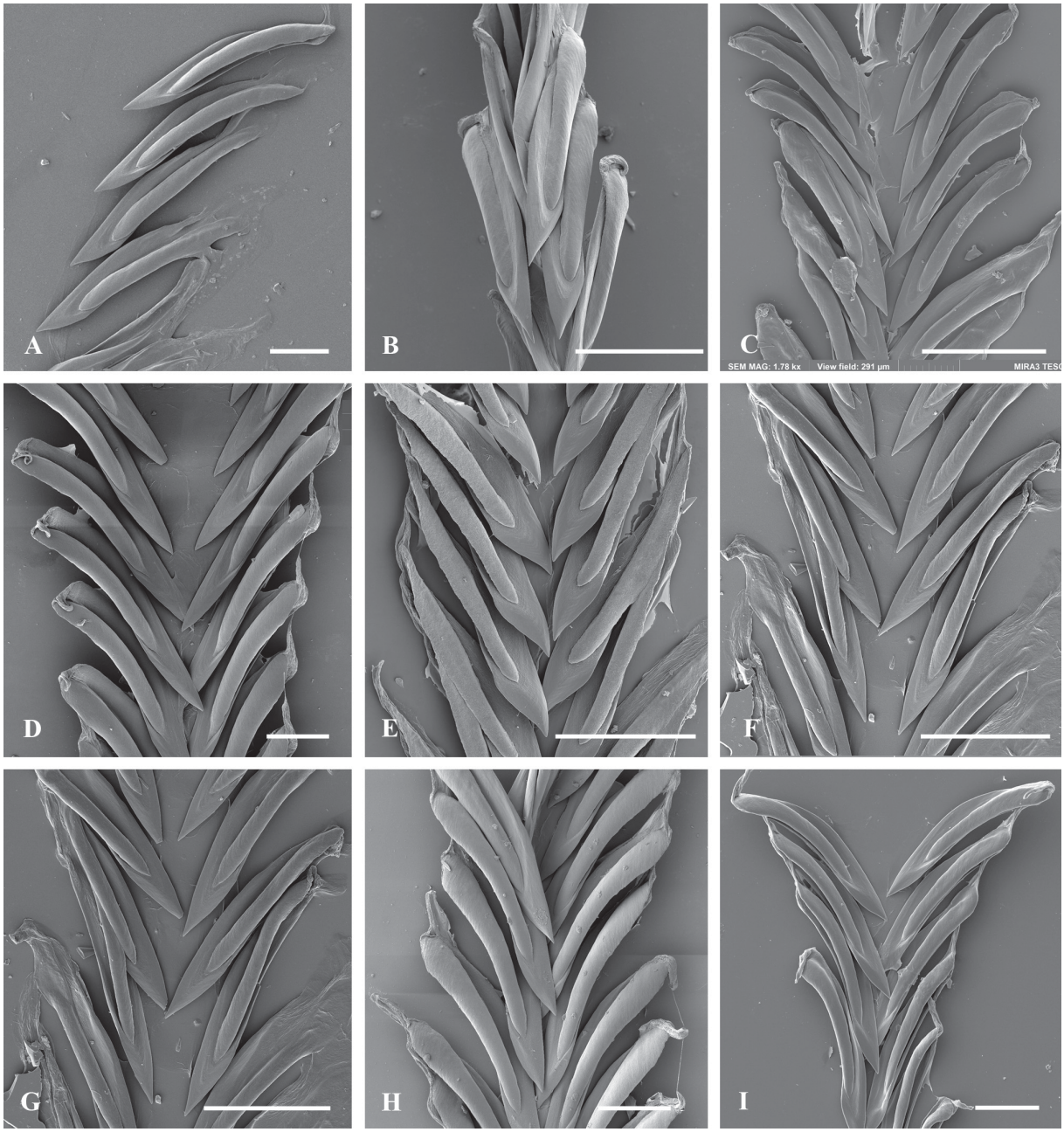

Fig. 15. Radulae of species of *Leucosyrinx* Dall, 1889. **A**. *L. margaritae* (E.A. Smith, 1904), MNHN-IM-2009-13446, SL 40.9 mm. **B**. *L. margaritae*, MNHN-IM-2013-19931, SL 27.5 mm. **C**. *L. zahariasi* sp. nov., MNHN-IM-2013-69116, SL 15.8 mm (AL 4.4). **D**. *L. jeedara* Kantor, Hallan & Criscione, 2022, holotype, AMS C.483810, SL 31.3 mm. **E**. *L. truwalamuka* Kantor, Hallan & Criscione, 2022, holotype, AMS C.557045, SL 30.9 mm. **F**. *Leucosyrinx* sp. 21, MNHN-IM-2009-13324, SL 27.5 mm. **G**. *L. herosae* sp. nov., MNHN-IM-2009-17089, SL 32.2 mm. **H**. *L. bourgeoisae* sp. nov., holotype, MNHN-IM-2013-19785, SL 32.1 mm. **I**. *Leucosyrinx* sp. 1, MNHN-IM-2013-66109, New Caledonia, 700–740 m, SL 28.2 mm. Scale bars = 100 µm.

We apply the name *L. margaritae* with some reservation. Our specimens have similar size (53 vs 60 mm in the holotype), were collected at similar depths (556–944 vs 740 m) and have a rather similar shell outline. Nevertheless, the spiral sculpture is more pronounced in the holotype (Fig. 14E–F), in which the spiral cords are distinct also on the subsutural ramp. Due to the limited material it is impossible to decide at the moment whether this difference is of intra- or interspecific significance. The specimen illustrated by Tan & Islami (2021: fig. 9d) is more similar to our specimens than to the holotype in terms of sculpture, but seemingly has eroded shell surface. *Leucosyrinx* in general is characterized by the presence of numerous alike species, hardly if even distinguishable morphologically. Therefore, application of existing names to the species is subjective, but in this case we prefer to use the existing name rather than describing a new very similar species.

In shell outline the species resembles *L. legalli* sp. nov., but *L. margaritae* differs in its much larger size.

Distribution

From Andaman Is., off Java, to the Philippines, Papua New Guinea, and Solomon Sea, 556–944 m.

Leucosyrinx zahariasi sp. nov.
urn:lsid:zoobank.org:act:7F740E0D-2145-4B33-90F7-0EACE0F6C8E2
Figs 15C, 16

Etymology

The species is named after Paul Zaharias from MNHN, taxonomist and molecular biologist specializing on the studies of Conoidea and a member of the ERC HYPERDIVERSE team, for his contribution to the knowledge of the group.

Material examined

Holotype (sequenced)
NEW CALEDONIA • off Ile des Pins; 22°48′ S, 167°15′ E; depth 440–470 m; TERRASSES, stn CP3115; MNHN-IM-2009-6979.

Other material (all sequenced)
NEW CALEDONIA • 2 lv; off Ile des Pins; 22°51′ S, 167°15′ E; depth 500 m; TERRASSES, stn 3118; MNHN-IM-2009-6873, MNHN-IM-2009-6981 • 2 lv; SW of Ile des Pins; 22°45′ S, 167°13′ E; depth 400–405 m; KANACONO, stn DW4660; MNHN-IM-2013-68027, MNHN-IM-2013-68315 • 3 lv; SW of Ile des Pins; 22°53′ S, 167°17′ E; depth 530–545 m; KANACONO, stn DW4666; MNHN-IM-2013-68072, MNHN-IM-2013-68623, MNHN-IM-2013-68624 • 3 lv; SW of Ile des Pins; 22°49′ S, 167°15′ E; depth 445 m; KANACONO, stn DW4669; MNHN-IM-2013-69084, MNHN-IM-2013-69085, MNHN-IM-2013-69116.

Description

Measurements (holotype). SL 31.3 mm, AL (with canal) 15.9 mm, AL (without canal) 11.0 mm, SW 10.4 mm.

Shell (holotype). Shell medium-sized, medium broad fusiform, with medium high spire, very light tan in color, thin and fragile. Protoconch is partially broken, intact one in other specimens of 1.75 smooth and glossy strongly convex whorls. Protoconch–teleoconch transition marked by appearance of definitive sculpture. 8.5 teleoconch whorls, upper whorls distinctly roundly angled at shoulder, less angled on last whorl. Subsutural ramp strongly concave on upper whorls and nearly flat on last whorl. Deep, narrowly channeled suture. Strong, opisthocline narrow, closely spaced, and rounded axial folds on shoulder of upper teleoconch whorls, fading on penultimate whorl and absent on last one. Folds fade

on subsutural ramp, reach lower suture on upper telecoconch whorls, increase in number from 12 on first teleoconch whorl to 26 on antepenultimate one. On body whorl shoulder is accentuated by obtuse low keel. Medium strong spiral sculpture of low, rounded, wavy, and narrow cords over entire shell. Cords on subsutural ramp feeble, below shoulder distinct, on shell base and canal intervals between cords equal or slightly narrower cords' width. Numerous thin, prominent on subsutural ramp growth lines, on last whorl some growth lines on subsutural ramp distinctly thickened. Shell base lightly convex, passes smoothly into long and straight canal. Narrow, elongate-oval aperture, poorly differentiated from canal, inner lip slightly concave, nearly straight. Columellar and parietal sides with narrow, distinct callus, slightly lighter than remaining last whorl. Deep, subsutural, broadly arcuate anal sinus extends across subsutural ramp, confluent with large forward extension of outer lip.

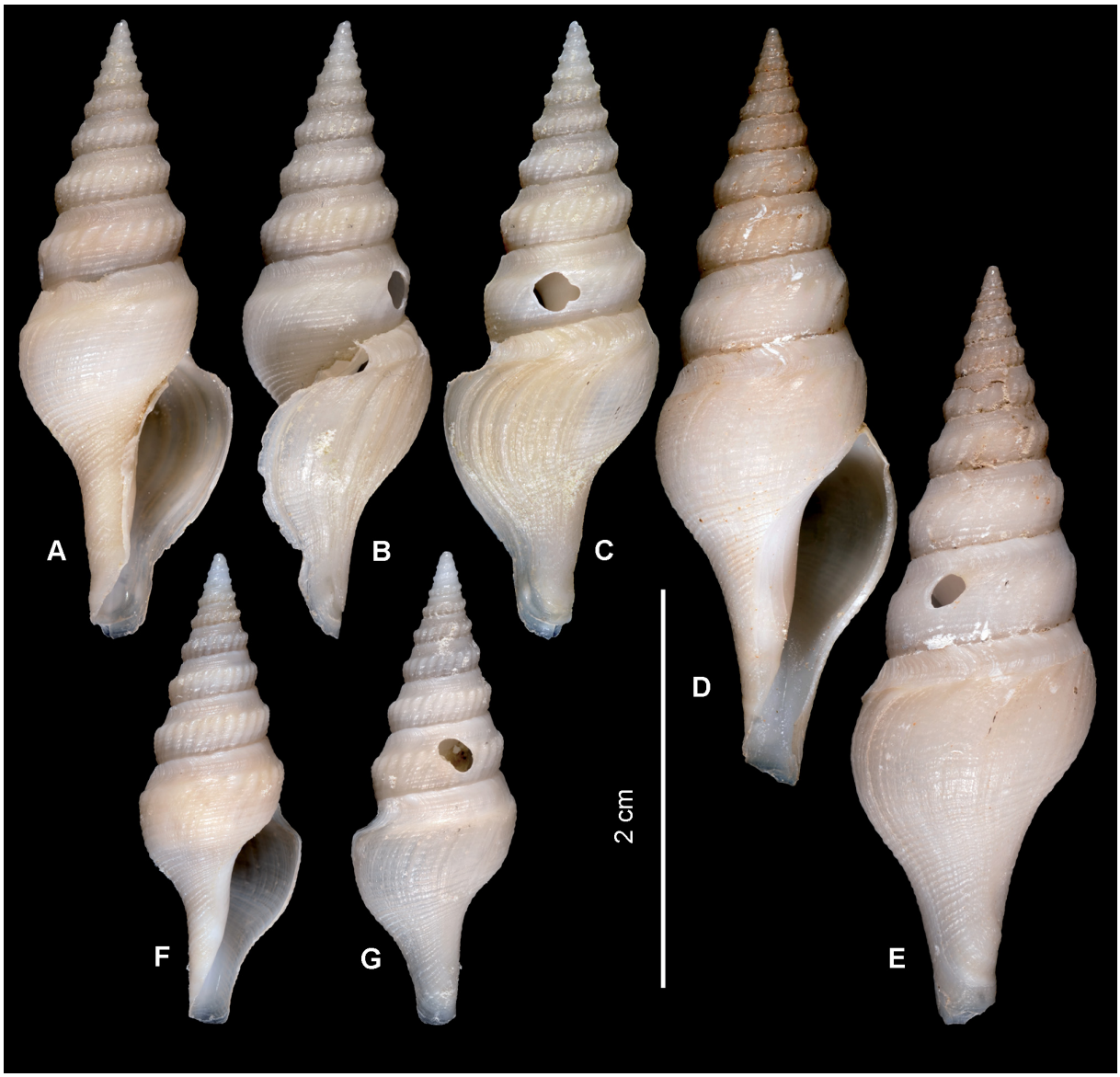

Fig. 16. *Leucosyrinx zahariasi* sp. nov. **A–C**. Holotype, MNHN-IM-2009-6979, SL 31.3 mm. **D–E**. MNHN-IM-2009-6873, New Caledonia, 500 m, SL 38.3 mm. **F–G**. MNHN-IM-2013-68027, New Caledonia, 400–405 m, SL 24.0 mm. All shells at the same scale.

Radula (Fig. 15C; studied in MNHN-IM-2013-69116). Marginal teeth duplex, ~180 μm in length (4.1% AL without canal). Major limb lanceolate in dorsal view, curved. Accessory limb relatively broad, at tooth base equals total tooth width, ~0.8of total tooth length, inserted into distinct although shallow socket on dorsal side of major limb.

DNA diagnosis (based on 12 *cox1* sequences)

'G' in site 355, 'C' in site 568, 'C' in site 589, 'C' in site 607.

Remarks

The species is relatively stable in shell characters with clear tendency of reduction and complete disappearance of the axial folds on last whorls in larger specimens. The largest available specimen measures SL 38.3 mm.

It is somewhat similar in shell outline, but phylogenetically not closely related, to *Leucosyrinx margaritae*, differing in much closer spaced, more narrow and numerous axial folds and a smaller shell.

Distribution

Southern New Caledonia off Ile des Pins, 440–530 m.

Leucosyrinx sp. 10
Fig. 11E–F

Material examined (sequenced)

SOLOMON ISLANDS • 1 lv; Vella Gulf; 8°04′ N, 159°56′ E; depth 396–423 m; SALOMON 2, stn CP2259; MNHN-IM-2009-16749.

Remarks

The species is represented in our material by a single specimen; we therefore abstain from its description.

It bears similarity to *L. zahariasi* sp. nov. in similarly narrow and numerous axial folds and in the profile of the teleoconch whorls, but differs in a broader shell and more distinct spirtal sculpture consisting of much narrower cords with broader intervals, also well-developed on the subsutural ramp, while the cords are very weak if recognizable on the ramp in *L. zahariasi*.

Distribution

Solomon Is., 396–423 m.

Leucosyrinx sp. 21
Figs 11G–H, 15F

Material examined (sequenced)

PHILIPPINES • 1 lv; Luzon I.; 15°48′ N, 121°47′ E; depth 593 m; AURORA 2007, stn CP2664; MNHN-IM-2009-13325 • 1 lv; Luzon I.; 15°00′ N, 123°06′ E; depth 1155–1302 m; AURORA 2007, stn CP2685; MNHN-IM-2009-13324.

Description

Radula (Fig. 15F; MNHN-IM-2009-13324). Long, comprising about 40 rows of teeth, 20 nascent. Marginal teeth duplex, ~200 μm in length (2.6% AL without canal). Major limb medium broad lanceolate

in dorsal view, curved. Accessory limb constitutes about half of tooth width, ~0.8 of total tooth length, inserted into distinct not deep socket on dorsal side of major limb.

DNA diagnosis (based on 2 *cox1* sequences)

'T' in site 205, 'G' in site 484, 'C' in site 532, 'T' in site 544.

Remarks

The species is represented by two incomplete specimens collected in geographic proximity, but at greatly different depth. The specimens are also quite different in the shell outline. ASAP suggests their conspecifity that will need to be confirmed with additional material.

Leucosyrinx sp. 21 resembles several species – *L. floraecharlottae* sp. nov., *L. rattiae* sp. nov., and especially *L. herosae* sp. nov., none of them closely related phylogenetically.

Distribution

Philippines, 593–1155 m.

Leucosyrinx sp. 20
Fig. 11I

Material examined (sequenced)

SOLOMON ISLANDS • 1 lv; S of Malaita; 9°54′ N, 161°33′ E; depth 1136–1750 m; SALOMONBOA 3, stn CP2817; MNHN-IM-2009-16833.

DNA diagnosis (based on 1 (!) *cox1* sequence)

'G' in site 79, 'T' in site 169, 'C' in site 271, 'C' in site 289.

Remarks

The species is represented in our material by a single incomplete specimen and therefore we abstain from formal description.

In shell outline it resembles *Leucosyrinx* sp. 18, *Leucosyrinx* sp. 21., the holotype of *L. farhatorum* sp. nov. and *L. modicae* sp. nov., none of them closely related phylogenetically.

Leucosyrinx sp. 18
Fig. 11J-K

Material examined (sequenced)

MADAGASCAR • 1 lv; off Majunga; 15°22′ S, 45°58′ E; depth 650–850 m; MIRIKY, stn CP3552; MNHN-IM-2009-16911.

PAPUA NEW GUINEA • 1 lv; New Ireland; 2°48′ S, 150°42′ E; depth 672–1150 m; KAVIENG 2014, stn CP4480; MNHN-IM-2013-58789.

DNA diagnosis (based on 2 *cox1* sequences)

'G' in site 160, 'C' in site 226, 'C' in site 241, 'T' in site 604.

Remarks

The species is represented in our material by two specimens with a very distant occurences – Madagascar and Papua New Guinea. The ASAP analysis suggests conspecifity of the specimens and we thus consider their morphological differences as a result of geographic variation. Due to very limited material we abstain from a formal description of the new species. It resembles both *L. herosae* sp. nov. and *Leucosyrinx* sp. 17. From the former it differs in a much smaller shell (SL attaining 24.3 mm vs 47.2 mm) as well as in a much shorter canal. From the latter it differs in its somewhat smaller size and more gradually narrowing of the shell base towards the canal. The specimen from Madagascar also strongly resembles *L. derzellei* sp. nov. found in close proximity, differing in its somewhat smaller size (22.4 vs 33 mm); they are phylogenetically not closely related.

Distribution

Madagascar, Papua New Guinea, 650–672 m.

Leucosyrinx sp. 14
Fig. 11L

Material examined (sequenced)

CORAL SEA • 1 lv; Bellona Plateau, 21°16′ N, 159°16′ E; depth 490–830 m; KANADEEP, stn DW5013; MNHN IM-2013-48145.

DNA diagnosis (based on 1 (!) *cox1* sequence)

'T' in site 337, 'T' in site 562.

Remarks

The species is represented by a single subadult specimen (SL 15.6 mm) from New Caledonia.

The species resembles miniature *L. derzellei* sp. nov., and *Leucosyrinx* sp. 1, being approximately twice as small.

Leucosyrinx thisbe (E.A. Smith, 1906) comb. nov.
Fig. 17A–E

Pleurotoma (*Surcula*) *thisbe* E.A. Smith, 1906: 162.

Pleurotoma (*Surcula*) *thisbe* – Annandale & Stewart 1909: pt. 6, pl. 20 figs 1–2.
Comitas thisbe – Powell 1969: 276 (23–288), pl. 225 figs 1–2.

non *Comitas melvilli* (Schepman, 1913) – Tan & Islami 2021: 326, fig. 9e.

Type material

Holotype
SRI LANKA • SL 44 mm; off E of Ceylon; depth 1086 ftm (= 1986 m); ZSI, M 1233/1.

Material examined (sequenced)

SOLOMON ISLANDS • 1 lv; Savo; 9°4′ N, 159°38′ E; depth 1230–1306 m; SALOMONBOA 3, stn CP2781; MNHN-IM-2009-16821.

Description

Shell. Large, reaching 75 mm. broadly fusiform, with high spire, from greyish to light brownish, thick and solid. Protoconch unknown. Teleoconch whorls distinctly roundly angular on shoulder, subsutural ramp significantly deepened in relation to shoulder, concave or with nearly flat side. Medium pronounced to strong subsutural cord. Channeled suture. 18–19 strong, oblique, sinuous axial folds on and below shoulder on last and penultimate whorls, reaching lower suture on upper whorls and extend to shell base on last whorl. Well-developed spiral sculpture of similar in width, rather broad, low, rounded, and wavy cords over entire shell, including subsutural ramp, with intervals narrower than cords' width. Shell base medium convex, rapidly passing into medium-long straight canal. Rather broad, elongate-oval aperture, well differentiated from canal. Well-developed white columellar and parietal callus. Deep, subsutural, broadly arcuate anal sinus extends across subsutural ramp, confluent with large forward extension of outer lip.

Radula (studied in MNHN-IM-2009-16821). Typical of genus, duplex marginal teeth ~570 μm in length (2.8% AL without canal).

DNA diagnosis (based on 1 (!) *cox1* sequence)

'A' in site 88, 'G' in site 196, 'G' in site 544.

Remarks

This very distinct and very large species (SL up to 75.1 mm) is represented in our material by a single specimen. Contrary to most studied species of *Leucosyrinx*, *L. thisbe* comb. nov. has a strong thickened subsutural cord (more prominent in our specimen than in the holotype), and correspondingly, the suture is broadly channeled, while the subsutural ramp is significantly deepened in relation to the shoulder. Another unusual character is that very distinct sinuous axial folds (19 on the last whorl and similar number according to the photo of the holotype) extend well to the shell base and reach to the lower suture on the teleoconch whorls.

The species was known before from a single worn holotype with missing apex and strongly eroded upper whorls. We attribute our specimen to the species with some reservation. Our specimen is much larger (75 mm vs 44 in holotype), and the last whorl is more gradually constricting passing in the canal in comparison with the holotype. Both our specimen and the holotype were collected at large depths 1230–1306 and 1986 m, respectively. Tan & Islami (2021: fig. 9e) illustrated an additional specimen as *Comitas melvilli.* Their specimen is very similar to the holotype, although having a better pronounced subsutural cord, like in our specimen. *Leucosyrinx melvilli* (Fig. 17I–J), known only from the holotype, lacks the subsutural cord and has weaker and more numerous axial folds.

There is some similarity of *L. thisbe* comb. nov. to *L. eurina* in spiral and axial scultpture, as well as in the presence of a subsutural cord. Nevertheless, *L. thisbe* differs in having a higher last whorl, more gradually constricting while passing into canal.

Distribution

From Sri Lanka to Solomon Is., 1230–1986 m.

Leucosyrinx sp. 13
Fig. 17F–H

Material examined (sequenced)

NORTH NEW CALEDONIA • 1 lv; Grand Passage; 20°17′ S, 163°50′ E; depth 600–1100 m; CONCALIS, stn CP3027; MNHN-IM-2009-13552.

DNA diagnosis (based on 1 (!) *cox1* sequence)

'A' in site 121, 'C' in site 500, 'C' in site 538.

Remarks

The species, represented in our material by a singleton, strongly resembles the miniature *L. thisbe* comb. nov. (SL 39 vs 75 mm). It differs in the absence of strong subsutural cord and in its impressed suture instead of distinctly canaliculated one in *L. thisbe*. It also resembles *L. halicyria* (Melvill, 1904),

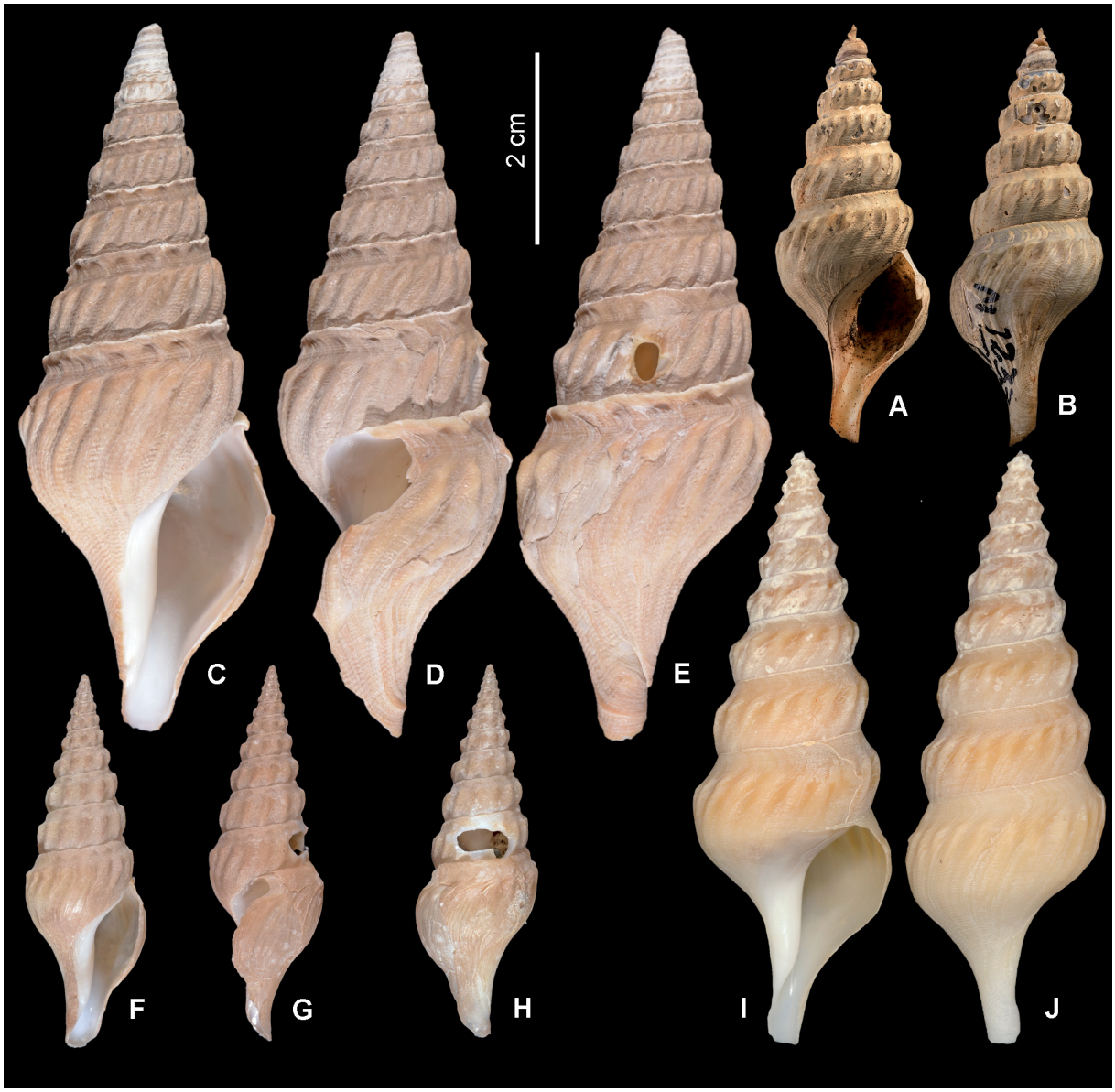

Fig. 17. A–E. *Leucosyrinx thisbe* (E.A. Smith, 1906). **A–B**. Holotype, ZSI, M 1233/1, SL 44 m (from the site of ZSI, https://zsicollections.in/specimen/ZSI0000003967). **C–E**. MNHN-IM-2009-16821, Solomon Is., 1230–1306 m, SL 75.1 mm. **F–H**. *Leucosyrinx* sp. 13, MNHN-IM-2009-13552, northern New Caledonia, 600–1100 m, SL 39.6 mm. **I–J**. *Leucosyrinx melvilli* (Schepman, 1913), syntype, NATURALIS, ZMA.MOLL.137982, SL 62 mm (photo courtesy of NATURALIS). All shells at the same scale.

differing in a darker shell and much thinner spiral cords. Another somewhat similar species is *L. melvilli* (Schepman, 1913), from which it differs in a less bulging last whorl and more gradual passing into the shell base and canal. None of them are phylogenetically closely related to *Leucosyrinx* sp. 13.

Leucosyrinx jeedara Kantor, Hallan & Criscione, 2022
Figs 15D, 18A–E

Leucosyrinx jeedara Kantor, Hallan & Criscione, 2022: 242, figs 9a–i, 11a–b.

Type material

Holotype

AUSTRALIA • Great Australian Bight; 34°44.4′ S, 131°50.4′ E; depth 1350–1321 m; AMS, C.483810.

Material examined

Total of 12 specimens, 6 sequenced (detailed data see Kantor *et al.* 2022: 242).

Description

Shell. Medium-sized, reaching 33 mm, broadly fusiform, with high spire, from chalky white to to light tan. Protoconch unknown. Teleoconch whorls distinctly roundly angular on shoulder, subsutural ramp, concave on all whorls. Weak subsutural cord. Channeled suture. Strong, oblique, slightly sinuous axial folds on and below shoulder on last and penultimate whorls, reaching lower suture on upper whorls and extend to shell base on last whorl. 19–24 on last whorl, 14–21 on penultimate whorl. Weak to moderately developed spiral sculpture of similar in width, low, rounded cords over entire shell, including subsutural ramp in some specimens, with intervals narrower than cords' width. Shell base medium convex, rapidly passing into medium-long canal. Medium broad, elongate-oval aperture, well differentiated from canal. Well-developed columellar and parietal callus of same color as remaining last whorl. Deep, subsutural, broadly arcuate anal sinus extends across subsutural ramp, confluent with large forward extension of outer lip.

Radula (Fig. 15D; studied in holotype and two paratypes: AMS C.532680 and AMS C.532695). Comprising 33 rows of teeth, 4 nascent. Marginal teeth duplex, ~420 μm in length (4.4% AL without canal). Major limb narrow lanceolate in dorsal view, curved. Accessory limb constitutes about half of tooth width, inserted into distinct medium deep socket on dorsal side of major limb.

DNA diagnosis (based on 3 *cox1* sequences)

'T' in site 56, 'A' in site 58, 'G' in site 217.

Remarks

The species exhibits uniformity in shell shape but is variable in the number of axial ribs and spiral cords. In shell outline and sculpture pattern *L. jeedara* most resembles *L. thisbe* comb. nov., differing in a less pronounced subsutural fold and a much smaller shell (33 vs 75 mm). It also resembles *L. mellvilli* differing in its smaller shell, higher last whorl and a relatively lower spire.

Distribution

Great Australian Bight, 962–1509 m (Kantor *et al.* 2022).

Leucosyrinx truwalamuka Kantor, Hallan & Criscione, 2022
Figs 15E, 18F–J

Leucosyrinx truwalamuka Kantor, Hallan & Criscione, 2022: 243, fig. 10a–g.

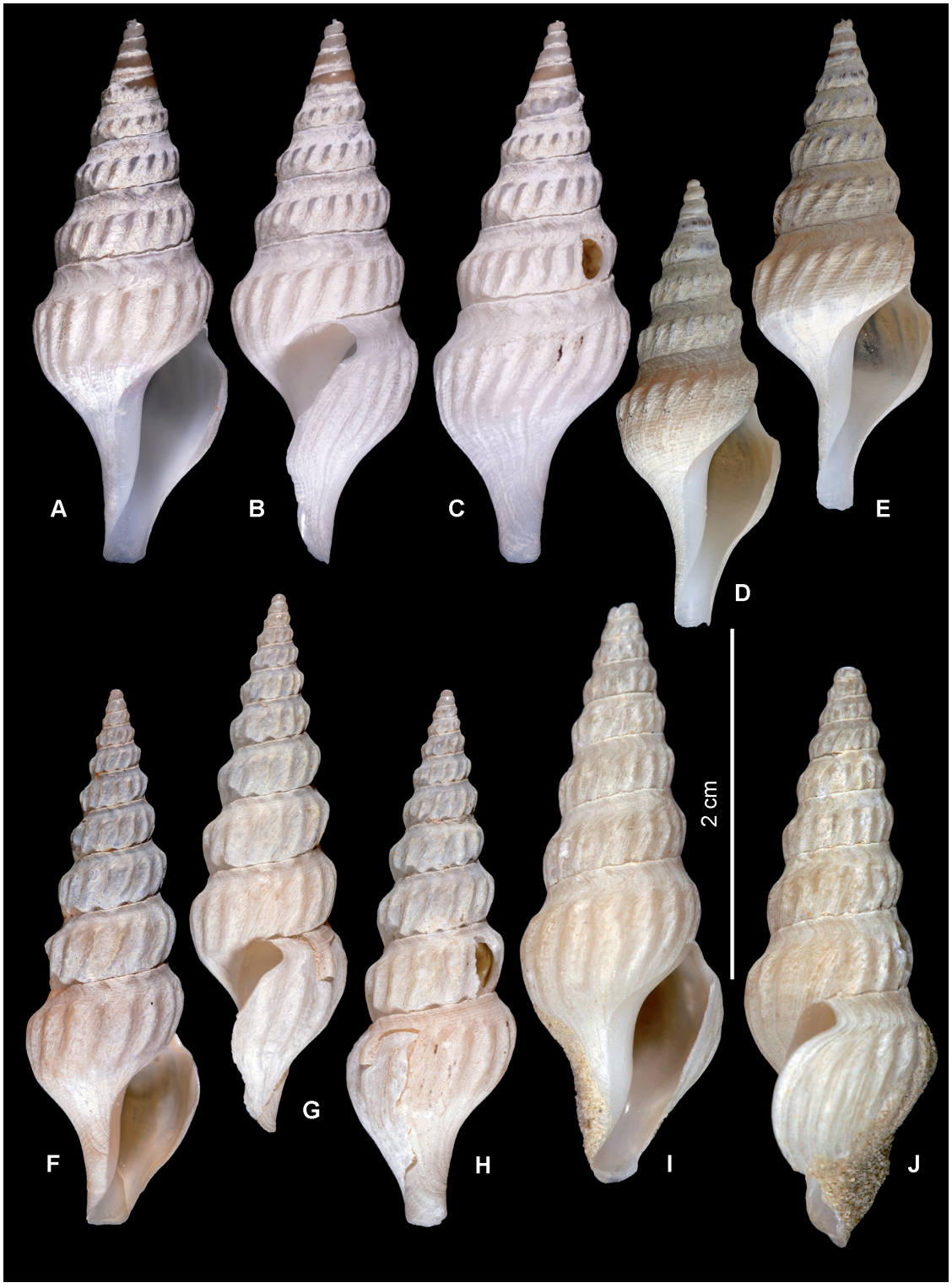

Fig. 18. A–E. *Leucosyrinx jeedara* Kantor, Hallan & Criscione, 2022. **A–C**. Holotype, AMS C.483810, Australia, Great Australian Bight, 1350–1321 m, SL 31.3 mm. **D**. Paratype, AMS C.571741, Australia, Great Australian Bight, 1509–1544 m, SL 25.6 mm. **E**. Paratype, AMS C.571740, Australia, Great Australian Bight, 1350–1321 m, SL 28.1 mm. **F–J**. *Leucosyrinx truwalamuka* Kantor, Hallan & Criscione, 2022. **F–H**. Holotype, AMS C.557045, Australia, Tasmania, 965–941 m, SL 30.9 mm. **I–J**. Paratype, TMAG E59172, Australia, Tasmania, 965–941 m, SL 33.2 mm. All shells at the same scale.

Type material

Holotype

AUSTRALIA • Tasmania, Baseline_14; 44°06.6′ S, 146°12.6′ E; depth 965–941 m; IN2018_V06_094; AMS C.557045.

Material examined

Total 6 specimens, 5 sequenced (detailed data see Kantor *et al.* 2022: 243).

Description

Shell. Medium-sized, reaching 31 mm, narrow fusiform, with very high spire, light tan. Paucispiral protoconch of about 1.75 rounded whorls. Teleoconch whorls convex, with indistinct shoulder, upper whorls somewhat angular on shoulder, subsutural ramp weakly concave, nearly flat. Impressed shallow suture. Strong, oblique, opisthocline axial folds on and below shoulder, 16–17 on last to anterpenultimate whorls, reaching lower suture on upper whorls and extend to shell base on last whorl. Very weak sculpture of similar in width, low, rounded cords seen only on some parts of shell and canal, present on subsutural ramp. Shell base medium convex, rapidly passing into short straight canal. Narrow elongate-oval aperture, poorly differentiated from canal. Well-developed columellar and parietal callus of same color as remaining last whorl. Medium deep, subsutural, broadly arcuate anal sinus extends across subsutural ramp, confluent with large forward extension of outer lip.

Radula (Fig. 15E; studied in holotype AMS C.557045). Long, comprising 46 rows of teeth, 17 nascent. Marginal teeth duplex, ~230 μm in length (2.6% AL without canal). Major limb medium broad lanceolate in dorsal view, curved. Accessory limb constitutes about half of tooth width, inserted into shallow socket on dorsal side of major limb.

DNA diagnosis (based on 3 *cox1* sequence)

'C' in site 34, 'G' in site 100, 'C' in site 259.

Remarks

The shells of younger specimens resemble *Leucosyrinx jeedara* in having a somewhat more angular whorl profile and, in some cases, more developed spiral sculpture.

Distribution

Off Tasmania, 965–1218 m.

Leucosyrinx herosae sp. nov.
urn:lsid:zoobank.org:act:7E56BC97-FC0A-46F8-B5ED-540A212407B4
Figs 15G, 19A–E

Leucosyrinx sp. G – Kantor & Puillandre 2021: figs 11e, 13d–e.

Etymology

The species is named after Virginie Héros, a long standing member of the MNHN malacological team, in recognition of her outstanding contribution to collecting, curating and managing the molluscan collection of MNHN.

Material examined

Holotype (sequenced)

BISMARCK SEA • N Bagabag Is; 4°44′ S, 146°11′ E; depth 540–580 m; PAPUA NIUGINI, stn CP3979; MNHN-IM-2013-19689.

Other material (all sequenced)

PAPUA NEW GUINEA • 1 lv; submarine mountains off Bougainville; 5°37′ S, 154°01′ E; depth 398–399 m; BIOPAPUA, stn DW3748; MNHN-IM-2009-17089 • 1 lv; submarine mountains off Bougainville; 5°39′ S, 153°59′ E; depth 620–663 m; BIOPAPUA, stn DW3749; MNHN-IM-2009-17059 • 1 lv; New Ireland; 2°23′ S, 150°39′ E; depth 490–610 m; KAVIENG 2014, stn CP4438; MNHN-IM-2013-58314.

Description

Measurements (holotype). SL 47.2 mm, AL (with canal) 22.6 mm, AL (without canal) 14.3 mm, SW 15.5 mm.

Shell (holotype). Shell medium-sized, thin but strong, glossy, fusiform, with medium high spire, uniformly light tan in color, narrow subsutural darker band. Paucispiral protoconch of about 1.5 rounded light brown whorls, protoconch–teleoconch transition indistinct due to protoconch erosion, marked by color change. 11 distinctly roundly angled at shoulder teleoconch whorls, concave subsutural ramp, nearly flat on last whorl. The suture is distinct shallow, impressed. 18 strong, oblique, broad, and rounded axial folds on body whorl, 14 on penultimate whorl. Folds fade on subsutural ramp, do not reach lower suture except upper whorls, disappear below shoulder on last whorl. Intervals between folds equal or slightly exceed folds width on last and penultimate whorls. Medium-developed spiral sculpture of distinct low, rounded, wavy, and narrow cords over entire shell, including subsutural ramp. Intervals between cords narrower than cords. Numerous and thin growth lines. Shell base rounded, convex, and passes smoothly into long, straight canal. Narrow, elongate-oval aperture, poorly differentiated from canal, inner lip nearly straight. Columellar and parietal sides with narrow, distinct callus, of same color as remaining last whorl. Deep, subsutural, broadly arcuate anal sinus extends across subsutural ramp, confluent with large forward extension of outer lip.

Radula (Fig. 15G; studied in MNHN-IM-2009-17089). Comprising about 30 rows of teeth, 15 nascent. Marginal teeth duplex, ~300 μm in length (3.2% AL without canal). Major limb broad lanceolate in dorsal view, weakly curved. Accessory limb narrow, less than half of tooth width, ~0.8 of total tooth length, inserted into distinct deep socket on dorsal side of major limb.

DNA diagnosis (based on 4 *cox1* sequences)

'A' in site 55, 'G' in site 349, 'T' in site 478.

Remarks

The species resembles *Leucosyrinx diomedea* (Powell, 1969), nevertheless differing in a slenderer shell with a longer canal, better pronounced spiral cords on the subsutural ramp and more rounded and shorter axial folds on the shoulder. There is also superficial resemblance to *Sibogasyrinx subula*, easily distinguished by the radular type as well as by the presence of the row of subsutural nodules, typical of *Sibogasyrinx*.

Distribution

Bismarck Sea, Papua New Guinea, 398–620 m.

Leucosyrinx sp. 17
Fig. 19F

Material examined (sequenced)

PAPUA NEW GUINEA • 1 lv; New Ireland; 2°41′ S, 150°04′ E; depth 761–825 m; KAVIENG 2014, stn CP4482; MNHN-IM-2013-58803.

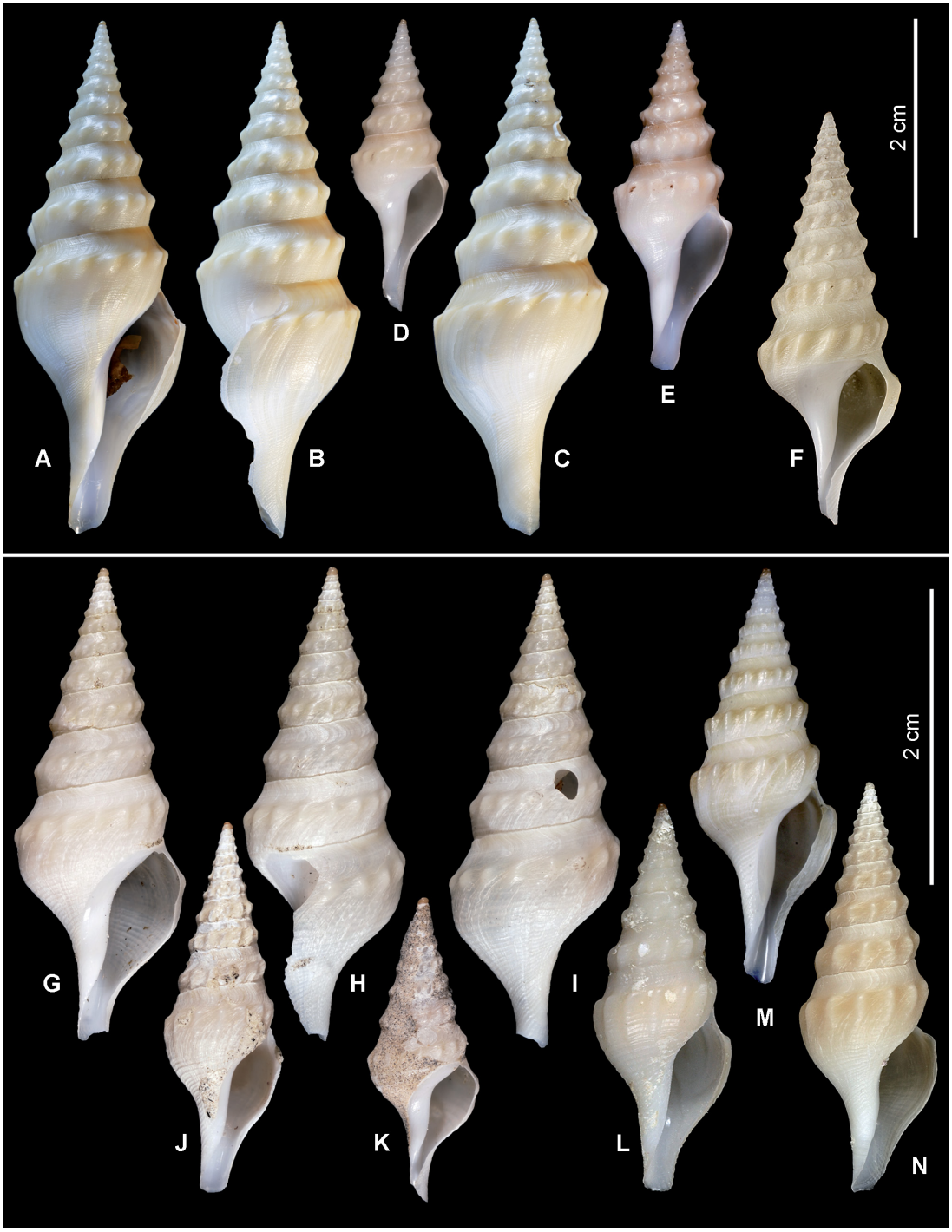

Fig. 19. A–E. *Leucosyrinx herosae* sp. nov. **A–C**. Holotype, MNHN-IM-2013-19689, SL 47.2 mm. **D**. MNHN-IM-2009-17059, Papua New Guinea, 620–663 m, SL 26.9 mm. **E**. MNHN-IM-2009-17089, Papua New Guinea, 620–663 m, SL 32.2 mm. **F**. *Leucosyrinx* sp. 17, MNHN-IM-2013-58803, Papua New Guinea, 761–825 m, SL 38.7 mm. **G–L**. *Leucosyrinx bourgeoisae* sp. nov. **G–I**. Holotype, MNHN-IM-2013-19785, SL 32.1 mm. **J**. MNHN-IM-2009-13590, Solomon Is., 782–884 m, SL 25.2 mm. **K**. MNHN-IM-2009-17002, Papua New Guinea, 788–805 m, SL 20.7 mm. **L**. MNHN-IM-2009-13417, New Caledonia, 775–792 m, SL 26.5 mm. **M**. *Leucosyrinx* sp. 1, MNHN-IM-2013-66109, New Caledonia, 700–740 m, SL 28. 2 mm. **N**. *Leucosyrinx* sp. 2, MNHN-IM-2009-16783, Solomon Is., 765–773 m, SL 27.9 mm. A–F = at the same scale; G–N = at the same scale.

DNA diagnosis (based on 1(!) *cox1* sequence)

'T' in site 67, 'C' in site 274, 'G' in site 511, 'G' in site 649.

Remarks

This molecularly distinct species is represented in our material by a single partially broken specimen (SL 38.7 mm), therefore, we abstain from describing a new species. It resembles *L. herosae* sp. nov., differing in a more convex last whorl, which constricts faster towards the canal, as well as in more distinct and broader spaced thin spiral cords, and more pronounced and more orthocline axial folds. The shape of the shell base resembles *L. luzonica*, differing in having a taller spire and broader spaced spiral cords. None of them are sister species of *Leucosyrinx* sp. 17 in the phylogenetic tree.

Leucosyrinx bourgeoisae sp. nov.
urn:lsid:zoobank.org:act:A0CCDF20-A2A0-4331-B845-A5A531C4B385
Figs 15H, 19G–L

Etymology

The species is named after Mauricette Bourgeois, a volunteer of many years in the malacology division of MNHN.

Material examined

Holotype (sequenced)
BISMARCK SEA • N Long I.; 5°9′ S, 147°2′ E; depth 805–865 m; PAPUA NIUGINI, stn DW3985; MNHN-IM-2013-19785.

Other material (all sequenced)
NEW CALEDONIA • 1 lv; SE Fairway; 21°32′ S, 162°32′ E; depth 775–792 m; EBISCO; stn CP2649; MNHN-IM-2009-13417.

PAPUA NEW GUINEA • 1 lv; New Britain, north of Rabaul; 4°3′ S, 151°50′ E; depth 788–805 m; BIOPAPUA, stn CP3674; MNHN-IM-2009-17002.

SOLOMON ISLANDS • 1 lv; 7°31′ S, 156°18′ E; depth 782–884 m; SALOMON 2, stn CP2249; MNHN-IM-2009-13590.

Description

Measurements (holotype). SL 32.1 mm, AL (with canal) 15.0 mm, AL (without canal) 9.9 mm, SW 11.3 mm.

Shell (holotype). Shell medium-sized, thin, fragile, broad fusiform, with medium high spire, very light-yellowish in color, nearly white. Paucispiral, small, bulbous protoconch of about 1.75 rounded light brown and microshagreened whorls, protoconch–teleoconch transition marked by distinct growth line and appearance of shoulder keel. 9.75 distinctly roundly angled at shoulder teleoconch whorls, with weekly concave subsutural ramp, nearly flat on last and penultimate whorls. Distinct, shallow, impressed suture. 15 medium strong, oblique, short axial folds, forming rounded closely spaced knobs on shoulder of last whorl and 16 on penultimate whorl. Folds fade on subsutural ramp, reach the lower suture on upper 4–5 whorls. On last whorl folds disappear shortly below shoulder. On last and penultimate whorls, intervals between folds slightly exceed folds' width. Distinct spiral sculpture below shoulder of slightly varying in width, low, slightly wavy cords over entire shell below shoulder, including canal. Intervals between cords 1–2 cords' width. On subsuturtal ramp sculpture indistinct, of very weak spiral striation.

Numerous thin but distinct growth lines. Shell base rounded, strongly convex, rapidly constricting and passing into long rather narrow, and straight canal. Medium broad, elongate-oval aperture poorly differentiated from canal, inner lip weakly convex. Columellar and parietal sides with narrow, distinct white callus. Deep, subsutural, broadly arcuate anal sinus extends across subsutural ramp, confluent with large forward extension of outer lip (judging from growth lines, since outer lip partially broken).

Radula (Fig. 15H; studied in holotype). Medium long, comprising about 35 rows of teeth, 11–12 nascent. Marginal teeth duplex, ~350 μm in length (3.5% AL without canal). Major limb narrow lanceolate in dorsal view, curved. Accessory limb about half of tooth width, ~0.75 of total tooth length, inserted into distinct socket on dorsal side of major limb.

DNA diagnosis (based on 3 *cox1* sequences)

'C' in site 50, 'C' in site 401, 'G' in site 403, 'C' in site 586.

Remarks

The species is moderately variable in shell shape and sculpture. Shell is from narrow to broad fusiform with a rapidly to gradually narrowing towards the canal base. In the single specimen from New Caledonia (Fig. 19L) the axial folds extend well to the shell base and reach the lower suture on the teleoconch whorls.

The species resembles *Leucosyrinx* sp. 18 and *L. margaritae*. From the former it differs in a generally broader shell and less pronounced shoulder knobs. From the latter, although being its sister species in the phyloegentic tree, it differs in having a somewhat shorter siphonal canal, although a clear morphological distinction can not be drawn. The studied specimen from New Caledonia is extremely similar to *Leucosyrinx* sp. 2 (Fig. 19N).

Distribution

From New Caledonia to Papua New Guinea and Bismarck Sea, 775–805 m.

Leucosyrinx sp. 1
Figs 15I, 19M

Material examined (sequenced)

NEW CALEDONIA • 1 lv; SE of Ile des Pins; 23°05′ S, 167°44′ E; depth 700–740 m; KANACONO, stn DW4748; MNHN-IM-2013-66109.

Description

Radula (Fig. 15I). Comprising about 25 rows of teeth, 8 nascent. Marginal teeth duplex, ~330 μm in length (3.9% AL without canal). Major limb narrow lanceolate in dorsal view, strongly curved. Accessory limb constitutes slightly over half of tooth width, ~0.75 of total tooth length, inserted into distinct deep socket on dorsal side of major limb.

DNA diagnosis (based on 1 (!) *cox1* sequence)

'G' in site 97, 'C' in site 205, 'C' in site 271, 'C' in site 418.

Remarks

This molecularly distinct species is represented in our material by a single specimen (SL 28.2 mm) and, due to the unknown intraspecific variability, we abstain from the formal description of a new species. It shows some resemblance to *Leucosyrinx* sp. 18, differing in a slightly broader shell with a higher spire.

It is very similar to *Leucosyrinx* sp. 14 from the Coral Sea, differing in its larger size. Both species are not closely related to *Leucosyrinx* sp. 1.

Leucosyrinx sp. 2
Figs 19N, 20A

Material examined (sequenced)

SOLOMON ISLANDS • 1 lv; Santa Isabel I.; 8°49′ N, 159°43′ E; depth 765–773 m; SALOMON 2, stn CP2179; MNHN-IM-2009-16783.

Description

Radula (Fig. 20A). Comprising about 35 rows of teeth, 12 nascent. Marginal teeth duplex, ~200 μm in length (2.7% AL without canal). Morphology of teeth very similar to that of *Leucosyrinx* sp. 1.

DNA diagnosis (based on 1 (!) **c***ox1* sequence)

'C' in site 163, 'G' in site 517, 'T' in site 622.

Remarks

This species is represented in our material by a single specimen. It is conchologically very similar to *Leucosyrinx* sp. 1. Since both species are represented by singletons and intraspecific variability is not known, we can not draw morphological differences between them.

Leucosyrinx exulans (Dall, 1890)
Fig. 21A–F

Pleurotoma exulans Dall, 1890: 302, pl. 5 fig. 7.

"*Leucosyrinx*" *exulans* – McLean 1971a: fig. 37 (radula of the holotype).

Type material

Holotype

GALAPAGOS IS. • SL 37 mm; off Isla de San Cristobal; 00°36′30″ S, 89°19′00″ W; depth 634 ftm (= 1160 m); *Albatross*, stn 2808; USNM 96499.

Material examined (sequenced)

NEW CALEDONIA • 1 lv; 23°33′ S, 169°44′ E, depth 3014–3069 m; KANADEEP 2, stn CP5066; MNHN-IM-2019-2111.

Description

Shell. Medium-sized, reaching 37 mm (holotype), fusiform, thin with medium high spire, yellowish-brown, with lighter canal. Protoconch and upper teleoconch whorls eroded in available material. Teleoconch whorls roundly angulated on shoulder, last whorl in larger specimens can be nearly evenly rounded with shoulder slightly accentuated by obtuse keel. Lightly concave on upper whorls subsutural ramp, can be nearly flat on last whorl. 18–19 on penultimate and last (when present) whorl rather strong, oblique, medium broad, and rounded axial folds on shoulder of teleoconch whorls. Folds fade on subsutural ramp, not reaching lower suture, progressively weaken on last whorl towards aperture in larger specimens. Distinct spiral sculpture similar in width, low, rounded, and wavy cords. Intervals between cords do not exceed the cords' width. Shell base strongly convex, rapidly constricting and passing into long rather narrow canal. Medium narrow, elongate-oval aperture. Shallow subsutural,

broadly arcuate anal sinus extends across subsutural ramp, confluent with large forward extension of outer lip.

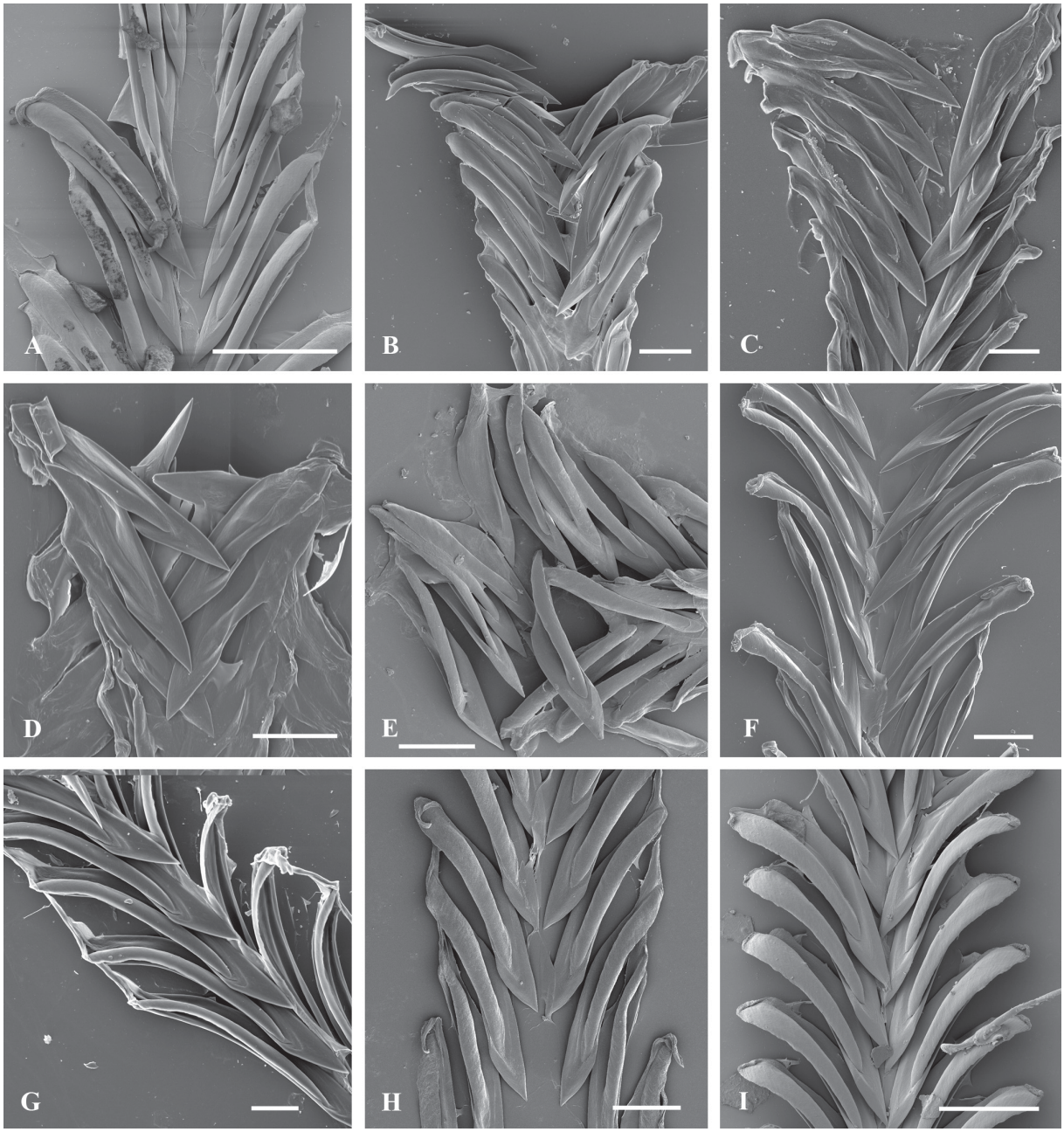

Fig. 20. Radulae of species of *Leucosyrinx* Dall, 1889. **A**. *Leucosyrinx* sp. 2, MNHN-IM-2009-16783, SL 27.9 mm. **B**. *Leucosyrinx* sp. 16, MNHN-IM-2009-13401, SL 25.7 mm. **C–D**. *L. bernardeti* sp. nov. **C**. Holotype, MNHN-IM-2013-48121, SL 34.4 mm. **D**. MNHN-IM-2007-17846, SL 27.3 mm. **E**. *L. bolognai* (Bozzetti, 2001), MNHN-IM-2009-16895, SL 43.3 mm. **F**. *L. luzonica* (Powell, 1969), MNHN-IM-2009-13444, SL 23.1 mm. **G**. *L. quinetae* sp. nov., MNHN-IM-2013-59549, SL 53.8 mm. **H**. *L. breviplicata* (E.A. Smith, 1899), MNHN-IM-2007-35063, SL 44 mm. **I**. *Leucosyrinx* sp. 26, MNHN-IM-2013-58381, SL 18.5 mm. Scale bars = 100 μm.

DNA diagnosis (based on 1 (!) *cox1* sequence)

'G' in site 25, 'T' in site 139, 'G' in site 439, 'T' in site 604.

Remarks

The species was previously known only from two lots in USNM, collected off Galapagos Is. at depths of 1160–1480 m. McLean (1971a) illustrated the radula of the holotype using light microscopy, revealing features similar to those of other species of *Leucosyrinx*.

A single specimen in our material was collected off southern New Caledonia at depths of 3014–3069 m. Although conchologically similar to the holotype, this specimen is significantly smaller (18 mm compared to 37 mm). Despite being collected far from the type locality, we tentatively attribute this specimen to *L. exulans*.

The conspecifity of our specimen with the holotype of *L. exulans* can only be confirmed by sequencing topotypic specimens. However, this is unlikely, as the species has not been recollected since its original description. In its current understanding, *L. exulans* is considered the most broadly distributed Pacific representative of the genus.

The species shows some resemblance to *L. anteridion* (Watson, 1881) but differs in its darker coloration and higher spire. Another similar species is *L. melvilli*, distant in the phylogenetic tree, although *L. melvilli* is characterized by a higher spire, more numerous axial ribs, and a more abrupt narrowing of the shell base toward the canal.

Distribution

Galapagos Is., New Caledonia, 1160–3014 m.

Leucosyrinx sp. 16
Figs 20B, 21G–H

Material examined (sequenced)

PHILIPPINES • 1 lv; Luzon I.; 15°37′ N, 121°59′ E; depth 1273–1333 m; AURORA 2007, stn CP2754; MNHN-IM-2009-13401.

Description

Radula (Fig. 20B). Medium long, comprising about 30 rows of teeth, 11-12 nascent. Marginal teeth duplex, ~370 μm in length (4.6% AL without canal). Major limb narrow lanceolate in dorsal view, curved. Accessory limb about half of tooth width, ~0.75 of total tooth length, inserted into distinct deep socket on dorsal side of major limb.

DNA diagnosis (based on 1 (!) *cox1* sequence)

'C' in site 112, 'T' in site 205, 'G' in site 268, 'G' in site 511.

Remarks

The species is represented in our material by a single specimen (SL 25.7 mm). There is a certain resemblance to the not closely related *L. exulans* in shell shape and coloration. The differences are the following: significantly weaker spiral sculpture, light, nearly white canal, angulated shell base at transition to canal.

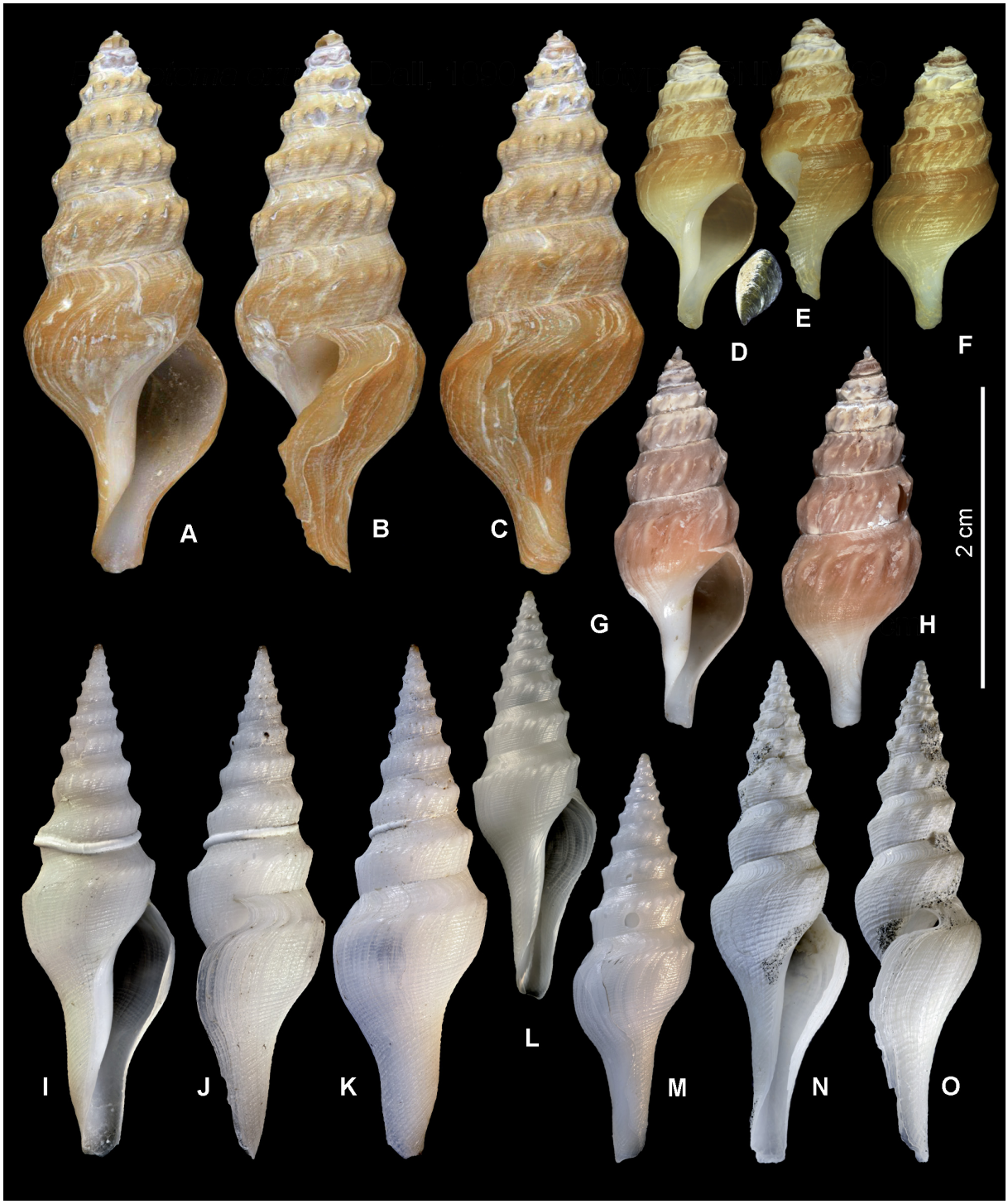

Fig. 21. A–F. *Leucosyrinx exulans* (Dall, 1890). **A–C**. Holotype, USNM 96499, SL 37 mm. **D–F**. MNHN-IM-2019-2111, SL 18.1 mm. **G–H**. *Leucosyrinx* sp. 16, MNHN-IM-2009-13401, SL 25.7 mm. **I–M**. *Leucosyrinx bernardeti* sp. nov. **I–K**. Holotype, MNHN-IM-2013-48121, SL 34.4 mm. **L–M**. MNHN-IM-2007-17846, Coral Sea, 603–630 m. **N–O**. *Leucosyrinx* sp. 3, MNHN-IM-2007-42445, Philippines, 357–372 m, SL 34.1 mm. All shells at the same scale.

Leucosyrinx bernardeti sp. nov.
urn:lsid:zoobank.org:act:976FD6A3-CB43-408C-90B8-472BF11D516D
Figs 20C–D, 21I–M

Leucosyrinx sp. F – Kantor & Puillandre 2021: figs 11d, 13k.

Etymology

The species is named after Jean-François Bernardet, member of the volunteer team of MNHN, working both on the mollusc and crustacean collections.

Material examined

Holotype (sequenced)
NEW CALEDONIA • Coral Sea, S Lansdowne Bank; 20°51′ N, 161°00′ E; depth not registered; KANADEEP, stn CP5049; MNHN-IM-2013-48121.

Other material (sequenced)
NEW CALEDONIA • 1 lv; Coral Sea, Chesterfield Plateau; 19°39′ N, 158°45′ E; depth 603–630 m; EBISCO, stn CP2600; MNHN-IM-2007-17846.

Description

Measurements (holotype). SL 34.4 mm, AL (with canal) 17.6 mm, AL (without canal) 10.4 mm, SW 10.3 mm.

Shell (holotype). Shell medium-sized, thin but rather strong, slender, narrowly fusiform, with a high spire, off-white. Paucispiral small protoconch of about 1.75 smooth, bulbous, yellow whorls, protoconch–teleoconch transition marked by appearance of definitive sculpture. Teleoconch whorls weakly obtusely angular on shoulder, subsutural ramp evenly moderately concave on all whorls. Distinct impressed suture. 26–27 moderately developed, slightly oblique, dense axial folds on and shortly below shoulder on last and penultimate whorls, folds do not reach lower suture on teleoconch whorls, gradually diminish on last whorl towards aperture, although still present. Well-developed spiral sculpture of similar width, narrow, low, rounded, and wavy cords over entire shell, including subsutural ramp. 5 slightly broader cords below suture and 4 significantly narrower ones on lower part of ramp and shoulder. Below shoulder on last whorl about 55 cords. Intervals between cords are in most cases narrower than the cords' width, although can exceed the cord's width on shell base and canal. Shell base weakly convex, gradually narrows on passing into long and broad weakly curving canal. Narrow oval, poorly differentiated from canal aperture. Well-developed columellar and parietal callus of same color as remaining shell. Medium deep, subsutural, broadly arcuate anal sinus extends across subsutural ramp, confluent with large forward extension of outer lip.

Radulae (Fig. 20C–D; studied in holotype and MNHN-IM-2007-17846, very similar). Marginal teeth duplex, ~320–465 μm in length (4.6–4.9% AL without canal). Major limb medium broad lanceolate in dorsal view, weakly curved. Accessory limb fible, less than half of tooth width, flattened, ~0.75 of total tooth length, inserted into distinct deep socket on dorsal side of major limb extending its entire length.

DNA diagnosis (based on 2 *cox1* sequences)

'G' in site 268, 'G' in site 337, 'G' in site 472, 'G' in site 535, 'G' in site 604.

Remarks

This highly distinct species is well differentiated from its congeners by its narrow fusiform shell shape and relatively weak development of the spiral sculpture elements. It closely resembles *Sibogasyrinx pikei* (Dell, 1963) from New Zealand in overall shell shape but differs notably in the absence of axial subsutural nodules, which are present in *S. pikei* (see below). The new species also bears a strong resemblance to *Leucosyrinx* sp. 3, differing in having more numerous and closely spaced spiral cords. In *Leucosyrinx* sp. 3, there are about 40 cords on the last whorl below the shoulder, whereas in *L. bernardeti* sp. nov. of the same size, there are about 55 cords. Additionally, the axial folds are absent on the last whorl in *Leucosyrinx* sp. 3, where they are replaced by an indistinct spiral keel.

Distribution

Coral Sea, 603–630 m.

Leucosyrinx sp. 3
Fig. 21N–O

Material examined (sequenced)

PHILIPPINES • 1 lv; off Bohol I., 8°49′ N, 123°38′ E; depth 357–372 m; PANGLAO 2005, stn CP2360; MNHN-IM-2007-42445.

DNA diagnosis (based on 1 (!) *cox1* sequence)

'C' in site 145, 'G' in site 166, 'C' in site 301, 'C' in site 463, 'C' in site 548.

Remarks

The medium-sized species (SL 34.1 mm) is represented in our material by a single specimen; therefore, we abstain from its formal description as a new species. It has strong resemblance to *L. bernardeti* sp. nov. (see the latter species for comparison).

Leucosyrinx bolognai (Bozzetti, 2001) comb. nov.
Figs 20E, 22A–E

Comitas bolognai Bozzetti, 2001: 18, unnumbered figure.

Type material

Holotype
MADAGASCAR • Tuléar; MNHN-IM-2000-2819.

Material examined (sequenced)

MADAGASCAR • 1 lv; Baie Mahajamba; 14°48′ S, 47°00′ E; depth 620–637 m; MIRIKY, stn CP3249; MNHN-IM-2009-16895 • 2 lv; off Majunga; 15°22′ S, 46°00′ E; depth 493–662 m; MIRIKY, stn CP3250; MNHN-IM-2009-16896, MNHN-IM-2009-16899.

Non-sequenced material
MADAGASCAR • 1 dd; 22°18′ S, 43°02′ E; depth 640–660 m;VAUBAN, stn CH112; MNHN-IM-2016-4822.

MOZAMBIQUE CHANNEL • 1 dd; 19°35′ S, 36°46′ E; depth 518–524 m; MAINBAZA, stn CC3153; MNHN-IM-2016-4628.

NE MADAGASCAR • 6 dd; 15°22′ S, 46°00′ E; depth 493–750 m; MIRIKY, stn CP3250 • 4 dd; 14°47′ S, 46°58′ E; depth 512–680 m; • 1 dd; 14°47′ S, 46°58′ E; depth 512–680 m; MIRIKY, stn CP3285; MNHN-IM-2016-4615.

SW MADAGASCAR • 3 dd; 22°25′ S, 43°05′ E; depth 530 m; Campagne crevettière 1986, stn 56; MNHN-IM-2016-4622, MNHN-IM-2016-4644 • 4 dd; 22°26′ S, 43°06′ E; depth 460 m; Campagne crevettière 1986, stn 57; MNHN-IM-2016-4640, MNHN-IM-2016-4636 • 1 dd; 22°26′ S, 43°06′ E; depth 475 m; Campagne crevettière 1986, stn 60; MNHN-IM-2016-4627 • 1 dd; 22°14′ S, 43°05′ E; depth 530 m; Campagne crevettière 1986, stn 62; MNHN-IM-2016-4635 • 1 dd; 22°27′ S, 43°05′ E; depth 530 m; Campagne crevettière 1986, stn 63; MNHN-IM-2016-4629 • 1 dd; 22°26′ S, 43°03′ E; depth 520 m; Campagne crevettière 1986, stn 65; MNHN-IM-2016-4634 • 1 dd; 22°11′ S, 43°03′ E; depth 540 m; Campagne crevettière 1986, stn 72; MNHN-IM-2016-4637 • 3 dd; 22°26′ S, 43°03′ E; depth 530 m; Campagne crevettière 1986, stn 74; MNHN-IM-2016-4639 • 1 dd; 22°13′ S, 43°03′ E; depth 560 m; Campagne crevettière 1986, stn 75; MNHN-IM-2016-4617 • 4 dd; 22°22′ S, 43°03′ E; depth 530 m; Campagne crevettière 1986, stn 76; MNHN-IM-2016-4635 • 1 dd; 22°10′ S, 43°03′ E; depth 525 m; stn79; MNHN-M-2016-4633 • 2 dd; 22°23′ S, 43°03′ E; depth 525 m; Campagne crevettière 1986, stn 81; MNHN-IM-2016-4641 • 1 dd; 22°11′ S, 43°03′ E; depth 520 m; Campagne crevettière 1986, stn 82; MNHN-IM-2016-4625 • 1 dd; 22°21′ S, 43°04′ E; depth 535 m; Campagne crevettière 1986, stn 84; MNHN-IM-2016-4621 • 1 dd; 22°18′ S, 43°02′ E; depth 590 m; Campagne crevettière 1986, stn 126; MNHN-IM-2016-4619 • 1 dd; 22°27′ S, 43°07′ E; depth 350 m; Chalutier "Mascareignes III", stn 3; MNHN-IM-2016-4642 • 1 dd; 22°17′ S, 43°04′ E; depth 425–450 m; Chalutier "Mascareignes III", stn 8; MNHN-IM-2016-4632 • 1 dd; 22°24′ S, 43°05′ E; depth 400–425 m; Chalutier "Mascareignes III", stn 12; MNHN-IM-2016-4620 • 1 dd; 22°18′ S, 43°05′ E; depth 425 m; Chalutier "Mascareignes III", stn 13; MNHN-IM-2016-4618 • 1 dd; 22°18′ S, 43°05′ E; depth 450–475 m; Chalutier "Mascareignes III", stn 37; MNHN-IM-2016-4631 • 1 dd; 22°24′ S, 43°06′ E; depth 400–500 m; Chalutier "Mascareignes III", stn 38; MNHN-IM-2016-4630 • 1 dd; 22°25′ S, 43°05′ E; depth 530 m; Chalutier "Mascareignes III", stn CH70; MNHN-IM-2016-4626.

Description

Shell. Very large, reaching 90 mm (82.9 mm in holotype), broadly fusiform, strong, with medium high spire, light orange or beige. Small, bulbous, paucispiral protoconch of about 1.75 conex microshagreened whorls, same color as teleoconch. Protoconch–teleoconch transition clearly markied by thickened growth line and appearance of shoulder keel. Teleoconch whorls obtusely angular on shoulder in smaller specimens and on upper teleoconch whorls of holotype. Subsutural ramp distinctly concave on all whorls. Distinct impressed suture. 14–16 on last whorl strong, slightly oblique axial folds present on and below shoulder. Folds can reach lower suture on teleoconch whorls and can extend to shell base. Intervals between folds similar or exceding folds' width. Moderately well-developed spiral sculpture of varying width and irregularly spaced very low, rounded cords, over entire shell except subsutural ramp. On ramp cords either lacking or very weak and hardly discernible. Intervals between cords from narrower than cords' width to twice as broad. Shell base moderately convex, gradually narrowing at passing into medium-long broad and straight canal, slightly inclined leftwards. Rather broad, elongate-oval to irregularly shaped aperture, poorly differentiated from canal. Well-developed white or light yellowish columellar and parietal callus. Columellar and parietal callus is well-developed. Shallow subsutural, arcuate, anal sinus extends across subsutural ramp, confluent with large forward extension of outer lip.

Radula (Fig. 20E; examined in MNHN-IM-2009-16895). Marginal teeth duplex, ~300 μm in length (2.4% AL without canal). Major limb medium broad lanceolate in dorsal view, weakly curved. Accessory limb about half of tooth width, ~0.75 of total tooth length, inserted into distinct deep socket on dorsal side of major limb.

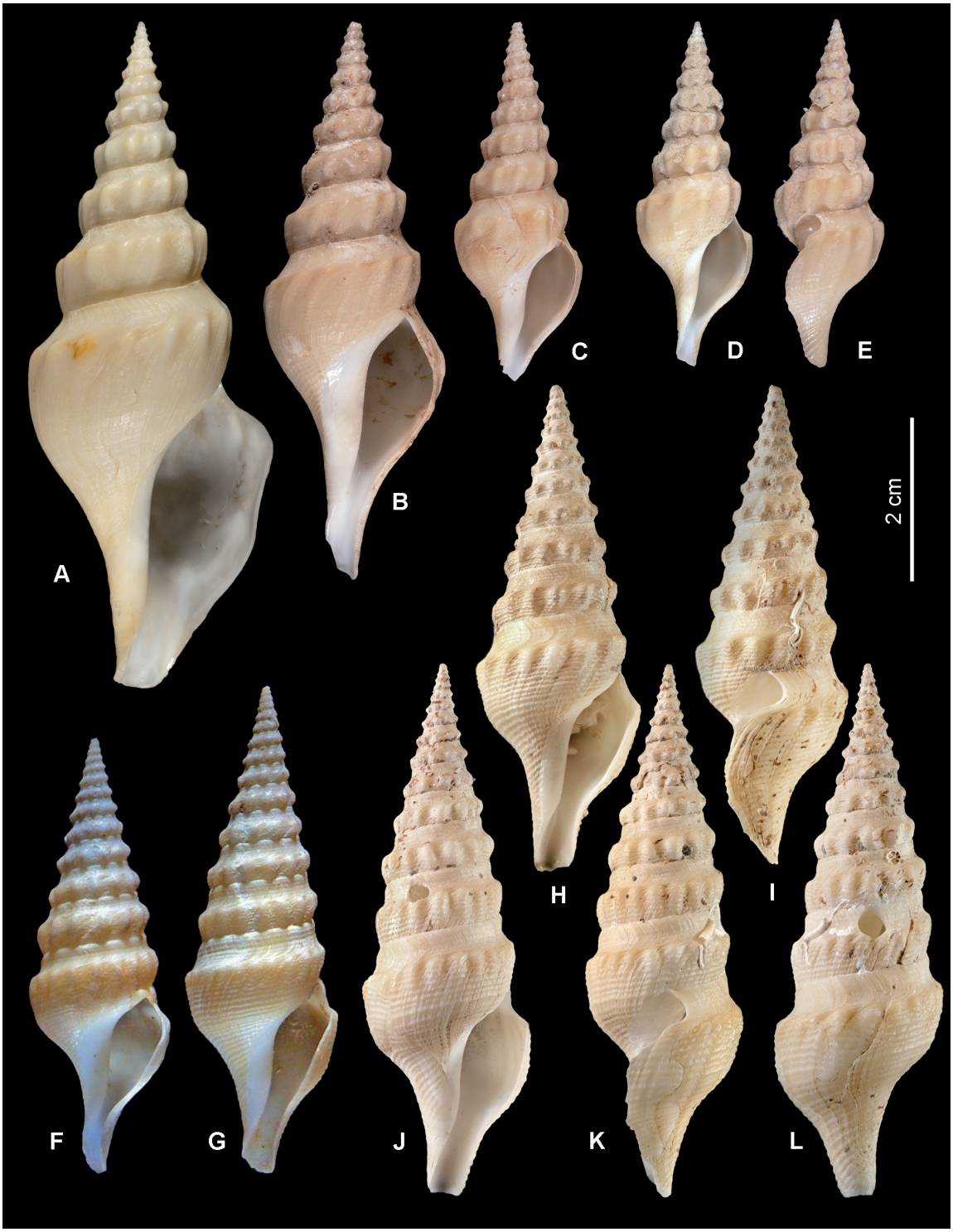

Fig. 22. A–E. *Leucosyrinx bolognai* (Bozzetti, 2001). **A**. Holotype, MNHN-IM-2000-2819, SL 82.9 mm. **B**. MNHN-IM-2009-16896, Madagascasr, 493–662 m, SL 69.4 mm. **C**. MNHN-IM-2009-16899, Madagascar, 493–662 m, SL 44.9 mm. **D–E**. MNHN-IM-2009-16895, Madagascar, 620–637 m, SL 43.3 mm. **F–L**. *Leucosyrinx madagascarensis* Ardovini, 2022. **F**. Holotype, MMM, SL 41 mm. **G**. Paratype 3, Ardovini collection, SL 46 mm. **H–I**. MNHN-IM-2009-16897, Madagascar, 493–662 m, SL 46.1 mm. **J–L**. MNHN-IM-2009-16898, same locality, SL 50.6 mm. All shells at the same scale. F–G photos courtesy of R. Ardovini.

DNA diagnosis (based on 3 *cox1* sequences)

'C' in site 289, 'C' in site 487, 'G' in site 556.

Remarks

This is the largest known species of *Leucosyrinx*, reaching up to 90 mm in length. Our largest sequenced specimen, with a shell length 69.4 mm, is comparable in size with the holotype. Our specimens closely resemble the holotype, particularly the largest one (MNHN-IM-2009-16896). The smaller sequenced specimens also show a strong similarity to the holotype when comparing corresponding whorls.

The type locality is given in broad terms, without specifying a depth range. Here, we confirm the occurrence of this species off northwestern Madagascar at depths of 493–620 meters.

The reclassification of this species from the genus *Comitas* to *Leucosyrinx*, supported by both molecular, conchological (shape and position of the anal sinus), and anatomical (radula) data, underscores the challenges in conchological differentiation between *Comitas* and *Leucosyrinx*.

Distribution

Madagascar, 350–640 m.

Leucosyrinx madagascarensis Ardovini, 2022
Fig. 22F–L

Comitas eurina (E.A. Smith, 1899) – Robin 2008: 449, fig. 10 (not Smith, 1899).
Leucosyrinx madagascarensis Ardovini, 2022: 7, text figs.

Leucosyrinx sp. E – Kantor & Puillandre 2021: pl. 13g.

Type material

Holotype

MADAGASCAR • west coast of Madagascar; depth 600–700 m; MMM.

Material examined (all sequenced)

MADAGASCAR • 2 lv; off Majunga; 15°22′ S, 46°00′ E; depth 493–662 m; MIRIKY, stn CP3250; MNHN-IM-2009-16897, MNHN-IM-2009-16898.

Non-sequenced material

NW MADAGASCAR • 16 dd; 15°27′ S, 46°0′ E; depth 403–750 m; MIRIKY, stn CP3250 • 2 dd; 14°27′ S, 47°25′ E; depth 347–408 m; MIRIKY, stn CP3291

SW MADAGASCAR • 1 dd; 22°10′ S, 43°05′ E; depth 525 m; Campagne crevettière 1986, stn 79; MNHN-IM-2016-4823 • 1 dd; 22°23′ S, 43°03′ E; depth 525 m; Campagne crevettière 1986, stn 81; MNHN-IM-2016-4824.

Description

Shell. Large, reaching 50.6 mm, strong, from narrow to medium broad fusiform, with high spire, light orange. Protoconch small, bulbous, paucispiral. Teleoconch whorls distinctly obtusely angular on shoulder, subsutural ramp distinctly concave on all whorls, from narrow to medium broad. Distinct impressed suture. 19–21 strong, slightly oblique to nearly ortocline axial folds on and below shoulder on last whorl, 16–20 on penultimate whorl, reach lower suture on teleoconch whorls and disappear

shortly below shoulder on last whorl. Intervals between folds narrower than folds' width. Very distinct spiral sculpture of similar width, closely spaced, rounded cords, over entire shell. On subsutural ramp cords weaker than on shoulder and below. Intervals between cords usually half of cords' width, rarely equal to the cords' width. About 30 cords on the last whorl on and below shoulder. Shell base strongly convex, quickly narrows at passing to medium-long rather narrow, slightly inclined leftwards canal. Rather broad, elongate-oval aperture, well differentiated from canal. Well-developed, white or light yellowish columellar and parietal callus. Medium deep, subsutural, arcuate anal sinus extends across subsutural ramp, confluent with large forward extension of outer lip.

Radula (studied in MNHN-IM-2009-16897). Comprising about 25 rows of teeth, 11 nascent. Marginal teeth duplex, ~360 μm in length (2.2% of AL without canal). Major limb medium broad lanceolate, strongly curved. Accessory limb twice as narrow, ~0.7 of total tooth length, inserted into deep distinct socket on dorsal side of major limb.

DNA diagnosis (based on 2 *cox1* sequences)

'G' in site 79, 'C' in site 347, 'G' in site 355, 'C' in site 418.

Remarks

Our sequenced specimens are very similar to the holotype and paratypes, illustrated by Ardovini (2022) and were mentioned as conspecific in the original description. Ardovini (2022) did not provide the exact collection site of his specimens, originating from the fishery boats stationed in the Tulear harbor but operating in the sea area north until the city of Morondava. Our specimens originated from off Majunga, much farther north from Morondava.

The species is most similar to *Leucosyrinx eurina* (E.A. Smith, 1899), but differs in having a slenderer light-orange shell compared to the white-greyish shell shell of *L. eurina* (E.A. Smith 1899; Tan & Islami 2021).

Distribution

Madagascar, 347–600 m.

Leucosyrinx luzonica (Powell, 1969)
Figs 20F, 23A–H

Comitas luzonica Powell, 1969: 269 (23-281), pl. 225 fig. 7.

Type material

Holotype

PHILIPPINES • off Hermana Mayor I., western Luzon; 15°58′15″ N, 119°40′20″ E; depth 1719 m; *Albatross*, stn 5439; USNM 238476.

Material examined (sequenced)

PHILIPPINES • 1 lv; Luzon I.; 15°06′ N, 123°03′ E; depth 1743–1754 m; AURORA 2007, stn CP2683; MNHN-IM-2009-13440 • 1 lv; Luzon I.; 15°06′ N, 123°03′ E; depth 1762–1806 m; AURORA 2007, stn CP2689; MNHN-IM-2009-13444 • 2 lv; Luzon I.; 15°36′ N, 121°56′ E; depth 1456–1471 m; AURORA 2007, stn CP2751; MNHN-IM-2009-13469, MNHN-IM-2009-13472.

SOUTH CHINA SEA • 1 lv; S off Taiwan Bank; 21°35′ N, 118°15′ E; depth 1634–1683 m; ZhongSha 2015, stn CP4163; MNHN-IM-2013-59559.

Fig. 23. A–H. *Leucosyrinx luzonica* (Powell, 1969). **A–C**. Holotype, USNM 238476, SL 42 mm (photo courtesy of USNM). **D–F**. MNHN-IM-2013-59559, off Taiwan Bank, 1634–1683 m, SL 39.1 mm. **G**. MNHN-IM-2009-13472, Philippines, 1456–1471 m, SL 26.6 mm. **H**. MNHN-IM-2009-13444, Philippines, 1762–1806 m, SL 23.1 mm. **I**. *Leucosyrinx* sp. 19, MNHN-IM-2007-42539, Solomon Is., 1250–1402 m, SL 26.8 mm. **J–L**. *Leucosyrinx diomedea* (Powell, 1969) comb. nov., holotype, USNM 239425, SL 49 mm (photo courtesy of USNM). All shells at the same scale.

Description

Shell. Medium-sized, reaching 42 mm (holotype), thin and fragile, broadly fusiform, with medium high spire, brownish-olive. Protoconch unknown. Teleoconch whorls obtusely angular on shoulder, with distinctly concave subsutural ramp. Narrowly channeled suture. 16–18 strong, slightly oblique, axial folds on and shortly below shoulder on last whorl, folds do not reach lower suture on teleoconch whorls. Well-developed spiral sculpture of similar width, rather broad, low, rounded cords over entire shell, less pronounced on subsutural ramp. Intervals between cords narrower than cords' width. Shell base strongly convex, rapidly narrowing, smooth transition to medium-long straight canal, slightly inclined leftwards. Rather broad, elongate-oval aperture, well differentiated from canal. Columellar and parietal callus well-developed, white. deep, subsutural, broadly arcuate anal sinus extends across subsutural ramp, confluent with large forward extension of outer lip (judging from growth lines, since outer apertural lip is incomplete in all our specimens).

Radula (Fig. 20F; studied MNHN-IM-2009-13444). Comprising about 30 rows of teeth, 11–12 nascent. Marginal teeth duplex, long, ~460 μm in length (6.6% of AL without canal). Major limb narrow lanceolate, slightly curved. Accessory limb more than twice as narrow, rather flat, ~0.75 of total tooth length, inserted into deep distinct socket on dorsal side of major limb.

DNA diagnosis (based on 5 *cox1* sequences)

'T' in site 34, 'T' in site 67, 'C' in site 85, 'G' in site 280.

Remarks

The species was originally described based on a single specimen and has not been mentioned in the literature since its original description. The reference to *L. luzonica* by Kantor *et al*. (2018) is attributed here to *L. quinetae* sp. nov. (see below), leaving the intraspecific variability of *L. luzonica* unstudied. In our material, we identified three molecularly distinct species strongly resembling the holotype of *L. luzonica* in shell characteristics, here referred to as *L. luzonica*, *L. quinetae*, and *Leucosyrinx* sp. 19. Applying the existing name to any of these species remains somewhat subjective. The two former species were collected close to the type locality (western Luzon, Philippines) – eastern Luzon and South China Sea (*L. luzonica*) and South China Sea (*L. quinetae*).

One minor character shared by both specimens we attributed to *L. luzonica* and the holotype of this species is the pattern of the spiral sculpture. In *L. luzonica*, the spiral cords are closely spaced, with intervals narrower than the width of the cords, whereas in *L. quinetae* sp. nov., the intervals are equal to or wider than the cords' width. Additionally, *L. quinetae* is significantly larger, reaching 60 mm in shell length.

The third similar species, *Leucosyrinx* sp. 19, is represented by a single specimen and exhibits a spiral sculpture pattern similar to that of *L. luzonica*. However, it is smaller (SL 26.8 mm) and was collected farther from the type locality of *L. luzonica* – off Solomon Is. – than specimens attributed here to *L. luzonica*. Therefore, we attribute the Powell's name to the species collected in the Philippines and South China Sea.

Leucosyrinx luzonica also shows clear similarities to the holotype of *Comitas thisbe diomedea* Powell, 1969, which was described from Celebes, Indonesia, at depths of 987–1022 m. In contrast, our specimens were collected from greater depths: 1456–1762 m in the Philippines and South China Sea. Given these similarities, it is possible that *L. luzonica* and *C. diomedea* are conspecific. Nevertheless, we presently consider *L. diomedea* as a separate species pending study of additional material from Indonesia.

Distribution

Philippines to South China Sea, 1456–1743 m.

Leucosyrinx sp. 19
Fig. 23I

Material examined (sequenced)

SOLOMON ISLANDS • 1 lv; NW of Malaita; 8°28′ N, 160°32′ E; depth 1250–1402 m; SALOMONBOA 3, stn CP2789; MNHN-IM-2007-42539.

DNA diagnosis (based on 1 (!) *cox1* sequence)

'C' in site 442, 'C' in site 487, 'G' in site 586.

Remarks

The species is represented in our material by a single, probably subadult, shell (SL 26.8 mm). It is very similar to *L. luzonica* both in shell outline and spiral sculpture and falls within the intraspecific variability of *L. luzonica.* It was collected at slightly shallower depths – 1250–1402 m vs 1456–1762 for *L. luzonica*, although the depth ranges nearly overlap. The molecular analysis clearly indicates that the single specimen represents a separate species. We did not attribute the name *luzonica* to it since it was collected further from the type locality of *L. luzonica* than the specimens that we attribute herein to it.

The species is also rather similar to *Leucosyrinx arcana* (339 m, Andaman Is.), although collected at much greater depths and having fewer axial ribs.

Leucosyrinx quinetae sp. nov.
urn:lsid:zoobank.org:act:155AB07E-50EC-4DD0-A646-6CF0A642B2D1
Figs 20G, 24A–G

Leucosyrinx luzonica – Kantor *et al.* 2018: 75, 77, figs 20d, 21b–f (non Powell, 1969).

Etymology

The species is named after Béatrice Quinet, a volunteer of many years in the molluscan team of MNHN.

Material examined

Holotype (sequenced)
SOUTH CHINA SEA • S of Taiping I.; 10°26′ N, 114°14′ E; depth 1707–1799 m; NanHai 2014, stn CP4108; MNHN-IM-2013-44303.

Other material (all sequenced)
SOUTH CHINA SEA • 3 lv; S of Taiwan Bank; 21°35′ N, 118°15′ E; depth 1634–1683 m; ZhongSha 2015, stn CP4163; MNHN-IM-2013-59549 to MNHN-IM-2013-59551.

Description

Measurements (holotype). SL 54.1 mm, AL (with canal) 27.3 mm, AL (without canal) 18.0 mm, SW 21.1 mm.

Shell (holotype). Shell large, broad fusiform, thin but strong, with medium high spire, covered by thin yellowish periostracum, greyish-olive in color, with slightly lighter canal. Protoconch and upper teleoconch whorls missing, remaining slightly over 7 whorls. Teleoconch whorls distinctly angled at

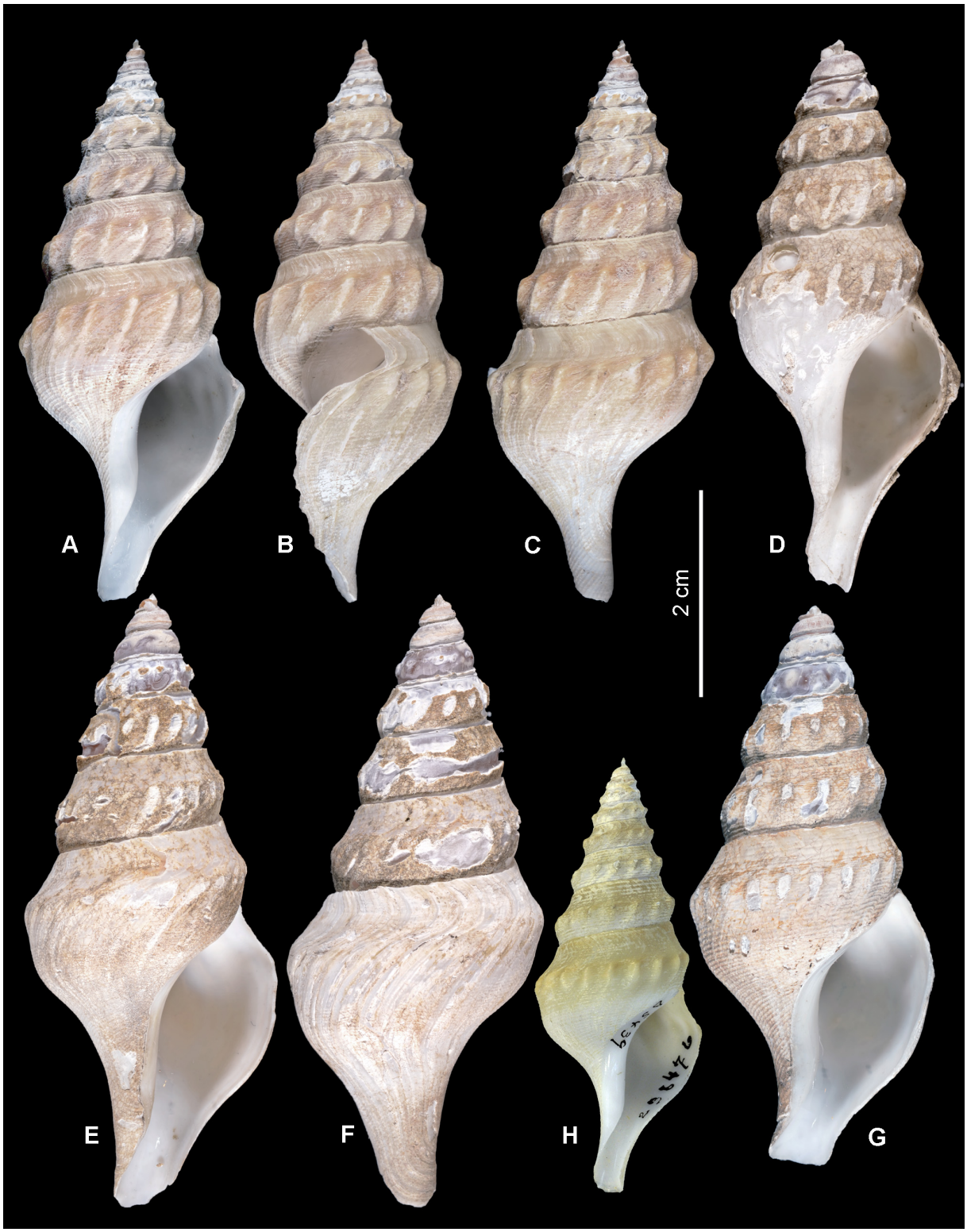

Fig. 24. A–G. *Leucosyrinx quinetae* sp. nov. **A–C**. Holotype, MNHN-IM-2013-44303, SL 54.1 mm. **D**. MNHN-IM-2013-59550, South China Sea, 1634–1683 m, SL 53.5 mm. **E–F**. MNHN-IM-2013-59550, South China Sea, 1634–1683 m, SL 59.9 mm. **G**. MNHN-IM-2013-59549, South China Sea, 1634–1683 m, SL 54 mm. **H**. *Leucosyrinx luzonica* (Powell, 1969), holotype, USNM 238476, SL 42 mm. All shells at the same scale.

shoulder, with concave subsutural ramp on all whorls. Distinct, shallow, impressed suture. 19 strong, oblique, narrow axial folds on last whorl, 14 on penultimate one. Folds fade on subsutural, reach lower suture on all whorls. On last whorl folds extend to periphery and shell base. Intervals between folds nearly twice exceed folds' width on last and penultimate whorls. Distinct sculpture of similar in size, low, slightly wavy cords over entire shell, including subsutural ramp. On subsuturtal ramp cords less pronounced and broader spaced, than on shoulder and shell base. The broadest intervals between cords equal or exceed cords's width. Numerous, thin, indistinct growth lines. Shell base rounded, strongly convex, rapidly constricting and passing into long rather narrow, straight canal. Medium broad, elongate-oval aperture, poorly differentiated from canal, inner lip weakly concave. Columellar and parietal sides covered by narrow, distinct white callus. Deep, subsutural, broadly arcuate anal sinus extends across subsutural ramp, confluent with large forward extension of outer lip.

Radulae (Fig. 20G; studied in holotype and MNHN-IM-2013-59549, very similar in both specimens). Rather long, comprising about 35 rows of teeth, 7–8 nascent. Marginal teeth duplex, ~410–620 μm in length (3.1–3.4% AL without canal). Major limb narrow lanceolate in dorsal view, strongly curved. Accessory limb about half of tooth width, ~0.75 of total tooth length, inserted into distinct socket on dorsal side of major limb.

DNA diagnosis (based on 4 *cox1* sequences)

'C' in site 22, 'T' in site 49, 'C' in site 421.

Remarks

The species can reach a shell length of 60 mm. There is considerable interspecific variability, with the canal ranging from narrow to broad, resulting in noticeably different shell outlines. The axial folds are most pronounced in the holotype, where they can be limited to knobs on a shoulder but may become faint and difficult to discern on the last whorl. In specimens of similar size, the number of folds on the last whorl varies between 16 and 21.

The holotype closely resembles that of *L. luzonica* (illustrated in Fig. 24H for comparison, shown at the same scale) and was initially identified as such by Kantor *et al*. (2018). However, other sequenced specimens exhibit significant differences, such as a wider and visually shorter canal or a slenderer shell (e.g., MNHN-IM-2013-59550, Fig. 24E–F). The spiral sculpture also shows some variation. In some specimens, only the broadest intervals between cords are wider than the cords themselves, while in the specimen MNHN-IM-2013-59549, the intervals are nearly twice as wide as the cords.

The new species differs from *L. luzonica* in having a much larger (60 mm vs 42 mm) and thicker shell, as well as in details in its spiral sculpture (see the Remarks section of *L. luzonica* for further comparison).

Distribution

South China Sea, 1634–1707 m.

Leucosyrinx modicae sp. nov.
urn:lsid:zoobank.org:act:132350F5-084B-4182-9232-BF5B5C2CDEDF
Fig. 25A–F

Leucosyrinx sp. B – Kantor & Puillandre 2021: fig. 13i.

Etymology

The species is named after Maria Vittoria Modica, world known specialist in toxinology and systematics of Neogastropoda and our many years companion in expeditions organized by MNHN.

Material examined

Holotype (sequenced)
SOLOMON ISLANDS • SW Santa Isabel I.; 8°24′ N, 159°23′ E; depth 897–1057 m; SALOMON 2, stn CP2197; MNHN-IM-2009-13570.

Other material (all sequenced)
SOLOMON ISLANDS • 1 lv; Santa Isabel I.; 8°47′ N, 159°38′ E; depth 762–1060 m; SALOMON 2, stn CP2182; MNHN-IM-2009-16764.

SOUTHERN NEW CALEDONIA • 1 lv; 22°19′ N, 167°22′ E; depth 815–870 m; EXBODI, stn CP3844; MNHN-IM-2013-52093.

Description

Measurements (holotype). SL 31.8 mm, AL (with canal) 15.4 mm, AL (without canal) 10.0 mm, SW 11.3 mm.

Shell (holotype). Shell medium-sized, thin, fragile, biconical, with high spire, very light-yellowish in color, nearly white. About 9 distinctly roundly angled at shoulder teleoconch whorls, with strongly concave on all whorls subsutural ramp. Protoconch missing, uppermost whorls strongly eroded. Distinct impressed suture. 13–14 strong, oblique axial folds on last and penultimate whorls. Folds fade on subsutural ramp, reach lower suture, extend to shell base. Intervals between folds 1.5–2 times exceed folds' width on last and penultimate whorls. Very distinct spiral sculpture of similar (except subsutural ramp) in width, low, slightly wavy cords over entire shell surface, distinct on shoulder and on axial folds. Intervals between cords narrower than cords' width, only between few cords intervals equal or even slightly exceed cords' width. On subsutural ramp cords distinct, significantly vary in width, can be nearly twice as broad then on and below shoulder, 9 cords on subsutural ramp of last whorl, 7 on penultimate. Numerous thin but distinct growth lines. Shell base rounded, medium convex, gradually constricting and passing into medium long straight canal. Narrow elongate-oval aperture, poorly differentiated from canal, inner lip weakly convex. Columellar and parietal sides covered by narrow, distinct white callus. Deep, subsutural, broadly arcuate anal sinus extends across subsutural ramp, confluent with large forward extension of outer lip.

Radula (examined in MNHN-IM-2013-52093). Typical of genus. Marginal teeth duplex, ~280 μm in length (4.7% AL without canal).

DNA diagnosis (based on 3 *cox1* sequences)

'C' in site 103, 'T' in site 145, 'C' in site 640.

Remarks

The protoconch is retained in one specimen (MNHN-IM-2013-52093). It is paucispiral, small, and bulbous, consisting of about 1.75 rounded, light brown, microshagreened whorls. The transition between the protoconch and teleoconch is indistinct, marked by the appearance of a shoulder keel. The holotype is the largest specimen.

The species is moderately variable: while the sculpture pattern is consistent across all available specimens, the slenderness of the shell varies (compare Fig. 25A and 25D).

The new species is somewhat similar to *L. bourgeoisae* sp. nov., but differs in having distinct spiral cords on the subsutural ramp and narrower, more closely spaced cords on the last whorl below the

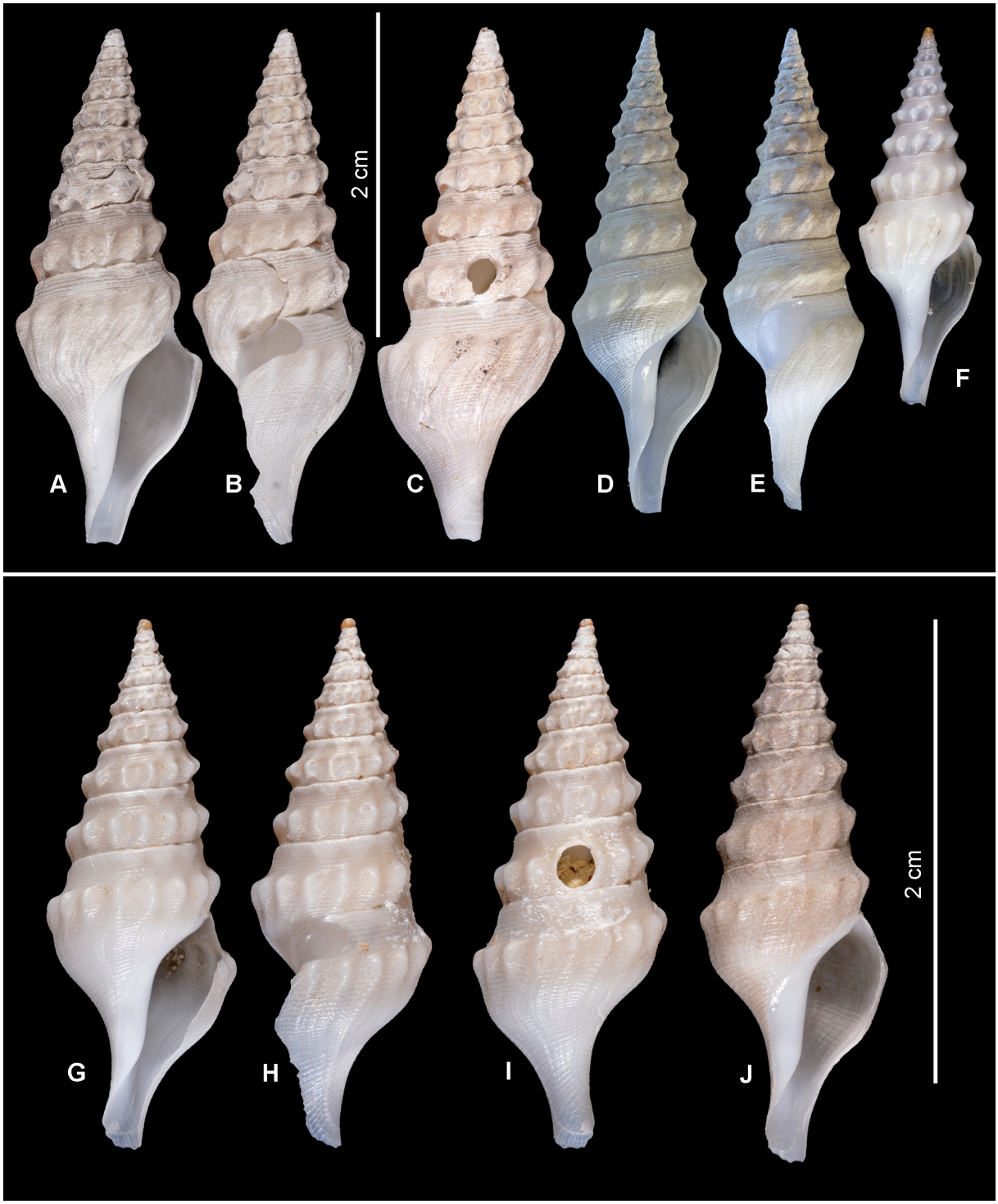

Fig. 25. A–F. *Leucosyrinx modicae* sp. nov. **A–C**. Holotype, MNHN-IM-2009-13570, SL 31.8 mm. **D–E**. MNHN-IM-2009-16764, Solomon Is., 762–1060 m, SL 29.9 mm. **F**. MNHN-IM-2013-52093, southern New Caledonia, 815–870 m, SL 23.3 mm. **G–J**. *Leucosyrinx maestratii* sp. nov. **G–I**. Holotype, MNHN-IM-2009-16770, SL 22.8 mm. **J**. MNHN-IM-2009-16789, Solomon Is., 970–1060 m, SL 24 mm. A–F at the same scale; G–J at the same scale.

shoulder. It also strongly resembles *L. maestratii* sp. nov., but differs in its larger size (SL up to 31.8 mm vs 24 mm). These species are not closely related in the phylogenetic tree.

Distribution

Southern New Caledonia and Solomon Is., 762–897 m.

Leucosyrinx maestratii sp. nov.
urn:lsid:zoobank.org:act:7C037EBD-C401-4D3D-939F-D101B59497DD
Fig. 25G–J

Etymology

The species is named after Philippe Maestrati, a long standing member of the MNHN malacological team, in recognition of his outstanding contribution to collecting, curating and managing the molluscan collection of MNHN.

Material examined

Holotype (sequenced)
SOLOMON ISLANDS • NW Santa Isabel I.; 7°49′ S, 157°41′ E; depth 1045–1118 m; SALOMON 2, stn CP2217; MNHN-IM-2009-16770.

Other material (sequenced)
SOLOMON ISLANDS • 1 lv; 7°38′ S, 156°59′ E; depth 970–1060 m; SALOMON 2, stn CP2270; MNHN-IM-2009-16789.

Description

Measurements (holotype). SL 22.8 mm, AL (with canal) 11.1 mm, AL (without canal) 7.3 mm, SW 8.1 mm.

Shell (holotype). Shell small, thin, fragile, biconical, with high spire, very light-yellowish, nearly white. Paucispiral light orange, small, bulbous, microshagreened, strongly eroded protoconch. Protoconch-teleoconch transition non discernible due to erosion. About 8.5 strongly roundly angled at shoulder teleoconch whorls, strongly concave on all whorls subsutural ramp. Distinct impressed suture. 15–16 strong, oblique axial folds, on last and penultimate whorls. Folds fade on subsutural ramp, reaching lower suture, extend to shell base. Intervals between folds equal or narrower than folds' width on last and penultimate whorls. Very distinct spiral sculpture of similar in width, low, slightly wavy cords over entire shell, distinct on shoulder, covering also axial folds. Intervals between cords are narrower than cords' width and only between few cords intervals equal to cords' width. Cords distinct on subsutural ramp, slightly vary in width, 8 cords on subsutural ramp of last and penultimate whorls. Numerous thin and indistinct growth lines. Shell base rounded, medium convex, quickly constricting and passing into medium long, slightly sinuous canal. Narrow, elongate-oval aperture, poorly differentiated from canal, inner lip weakly convex, nearly straight. Columellar and parietal sides with narrow, distinct white callus. Deep, subsutural, broadly arcuate anal sinus extends across subsutural ramp, confluent with large forward extension of outer lip.

Radula. Not examined.

DNA diagnosis (based on 2 *cox1* sequences)

'C' in site 232, 'G' in site 382, 'G' in site 502, 'C' in site 652.

Remarks

The species is very similar to *L. modicae* sp. nov., which nevertheless attains a larger size (up to 31.8 mm vs 24 mm in *L. maestratii* sp. nov.). The new species differs in more closely spaced axial folds and relatively broader spiral cords below shoulder, similar in width to those on the subsutural ramp. In the holotype, the number of cords on the last whorl below the subsutural ramp is 44, while in the similarly-sized specimen of *L. modicae* (IM-2013-52093, SL 23.3 mm) the number of cords is 65.

The molecular phylogenetic analysis demonstrated that these species are not closely related.

Distribution

Solomon Is., 970–1045 m.

Leucosyrinx breviplicata (E.A. Smith, 1899) comb. nov.
Figs 20H, 26A–K

Pleurotoma (*Surcula*) *breviplicata* E.A. Smith, 1899: 238–239.

Pleurotoma (*Surcula*) *breviplicata* – Annandale & Stewart 1909: pl. 9 fig. 3–3a.
Comitas breviplicata – Powell 1969: 272 (23-284), pl. 219 figs 3–4. — Kosuge 1992: 165, fig. 2, pl. 58 fig. 4.

Type material

Holotype
ANDAMAN ISLANDS • SL 25.1 mm; 13°17′15″ N, 93°10′ E; depth 185 ftm (= 338 m); ZSI, M 923/1.

Material examined (sequenced)

SOLOMON ISLANDS • 1 lv; NW of Santa Isabel I.; 7°39′ S, 157°43′ E; depth 495–650 m; SALOMON 2, stn CP2213; MNHN-IM-2007-35063 • 1 lv; Choiseul; 6°39′ S, 156°14′ E; depth 490–520 m; SALOMON 2, stn CP2226; MNHN-IM-2009-16803 • 1 lv; Choiseul; 6°37′ S, 156°13′ E; depth 508–522 m; SALOMON 2, stn CP2227; MNHN-IM-2007-42499 • 5 lv; Choiseul; 6°35′ S, 156°11′ E; depth 609–625 m; SALOMON 2, stn CP2228; MNHN-IM-2007-17933, MNHN-IM-2007-42525 to MNHN-IM-2007-42527, MNHN-IM-2009-16786 • 2 lv; Vella Gulf; 7°55′ S, 156°51′ E; depth 485–520 m; SALOMON 2, stn CP2263; MNHN-IM-2009-16810, MNHN-IM-2009-16814. • 1 lv; Rendova; 8°38′ S, 157°22′ E; depth 195–197 m; SALOMON 2, stn CP2284; MNHN-IM-2009-16788.

SOLOMON SEA • 1 lv; SE of Tuam Is; 6°04′ S, 148°12′ E; depth 500–575 m; PAPUA NIUGINI, stn CP4009; MNHN-IM-2013-19930 • 1 lv; Ainto Bay; 6°08′ S, 149°17′ E; depth 410–614 m; MADEEP, stn CP4338; MNHN-IM-2013-46381.

Description

Shell. Medium-sized, nearly reaching 50 mm, thin but strong, narrow fusiform, with high spire, from off-white to light cream. Small paucispiral protoconch of 1.5–1.75 strongly convex microshagreened whorls. Protoconch-teleoconch transition indistinct, marked by appearance of definitive sculpture. Teleoconch whorls obtusely angular on shoulder, subsutural ramp weakly to moderately concave, in larger specimens nearly flat on last whorl. Distinct, impressed suture. 13–14 strong oblique axial folds on and below shoulder on last whorl in specimens with SL over 40 mm. Folds mostly do not reach lower suture on teleoconch whorls, disappear shortly below shoulder, rarely extend to periphery. Well-developed spiral sculpture. 3–5 variously developed spiral cords on subsutural ramp, on upper whorls below ramp thin cords separated by intervals exceeding the cords' width, on last and penultimate whorls cords relatively broader with intervals narrower than cords. Immediately on shoulder 4–5 more narrow

Fig. 26. A–K. *Leucosyrinx breviplicata* (E.A. Smith, 1899) comb. nov. All specimens, except holotype, from the Solomon Is. **A–B**. Holotype, ZSI, M 923/1, SL 25.1 mm (from ZSI, https://zsicollections.in/specimen/ZSI0000003966). **C**. MNHN-IM-2007-42525, 609–625 m, SL 33.4 mm. **D**. MNHN-IM-2007-17933, SL 33.1 mm. **E**. MNHN-IM-2009-16803, 490–520 m, SL 33.7 mm. **F**. MNHN-IM-2009-16788, 195–197 m, SL 44.5 mm. **G**. MNHN-IM-2013-19930, 500–575 m, SL 26.8 mm. **H–J**. MNHN-IM-2009-16810, 485–520 m, SL 45.1 mm. **K**. MNHN-IM-2009-16814, 485–520 m, SL 46.8 mm. **L**. *Leucosyrinx kirai* (Powell, 1969) comb. nov., holotype ANSP 232552, SL 35.3 mm (photo from ANSP website http://clade.ansp.org/malacology/collections/details.php?mode=details&catalognumber=232552). All shells at the same scale.

cords, crossing folds and distinct on their summits, below shoulder spiral cords broadly-spaced, with intervals 1–3 times as wide as cords. On shell base and canal cords more closely spaced and broader than on periphery. 30–37 cords on last whorl below shoulder. Shell base weakly to strongly convex, gradually or rapidly narrows passing into long sinuous canal. Narrow elongate-oval aperture, well differentiated from canal. Well-developed white columellar and parietal callus. Deep, subsutural, broadly arcuate anal sinus extends across subsutural ramp, confluent with large forward extension of outer lip.

Radulae (Fig. 20H; examined in MNHN-IM-2007-42499, MNHN-IM-2007-17933, MNHN-IM-2007-42526, MNHN-IM-2007-35063, MNHN-IM-2009-16810). comprising 25–38 rows of teeth, 8–12 nascent. Marginal teeth similar in studied specimens, duplex, ~370–415 μm in length (3.4–3.5% AL without canal). Major limb narrow to medium lanceolate in dorsal view, strongly curved. Accessory limb about half of tooth width, inserted into distinct socket on dorsal side of major limb.

DNA diagnosis (based on 10 *cox1* sequences)

'G' in site 148, 'C' in site 346, 'G' in site 388, 'T' in site 517.

Remarks

Most ASAP partitions (Supp. file 2) suggest the presence of two molecularly distinct sister PSHs within *L. breviplicata*. However, in the BA tree (Supp. file 1), one of the two PSHs is not monophyletic. Both PSHs have nearly identical shells, with no clear boundary to distinguish them. As a result, we treat these PSHs as a single species. This species shows considerable variability in shell slenderness, but its spiral sculpture pattern is consistent, characterized by distinct, broadly-spaced cords on the periphery and most of the shell base.

We tentatively apply the name *breviplicata* to this species. First, the holotype is much smaller (SL 26 mm) than our specimens, although it may represent an immature individual. Second, the holotype was described from the Andaman Is., whereas all our specimens were collected from the Solomon Is. and Papua New Guinea. Nonetheless, Kosuge (1992) illustrated a dead shell collected off Western Australia (18°40′ S, 117°13′ E, 396–398 m), an intermediate locality, which closely resembles both the holotype and our specimens. This shell is larger than the holotype (SL 40.7 mm), comparable in size to our specimens. Therefore, we consider *L. breviplicata* to be a broadly distributed species, found at depths of 195–609 m.

This species is well differentiated from its congeners by its spiral sculpture pattern, yet it closely resembles *L. kirai* (Powell, 1969), *Leucosyrtinx* sp. 26 and *Leucosyrinx* sp. 7 (see below for comparative remarks).

Distribution

From Andaman Is., to Western Australia and Solomon Is., 195–609 m.

Leucosyrinx sp. 26
Figs 20I, 27C–F

Material examined (sequenced)

PAPUA NEW GUINEA • 1 lv; New Ireland; 2°15′ S, 150°14′ E; depth 450–474 m; KAVIENG 2014, stn CP4446; MNHN-IM-2013-58381.

SOLOMON SEA • 1 lv; Vitiaz Strait; 6°01′ S, 147°35′ E; depth 618–626 m; PAPUA NIUGINI, stn CP3993; MNHN-IM-2013-19819 • 1 lv; SE of Tuam Is; 6°04′ S, 148°10′ E; depth 500–555 m; PAPUA NIUGINI, stn CP4008; MNHN-IM-2013-19918.

Description

Radula (Fig. 20I). Examined in MNHN-IM-2013-58381, typical of the genus. Marginal teeth duplex, ~240 μm in length (5.2% AL without canal).

DNA diagnosis (based on 3 *cox1* sequences)

'G' in site 229, 'T' in site 334, 'C' in site 427, 'C' in site 553.

Remarks

The species is extremely similar to *L. breviplicata*, being sympatric in the Solomon Sea at similar depths. The specimens of the same size are virtually identical in shell shape and sculpture pattern (compare Fig. 27C and Fig. 26G), although available specimens (maximal SL 26.4 mm) does not reach the size of the largest *L. breviplicata*. The phylogenetic tree nevertheless shows that the species are not closely related.

We abstain from the description of a new species due to insufficient material for the evaluation of the intraspecific variability.

Distribution

Solomon Sea, Papua New Guinea, 450–618 m.

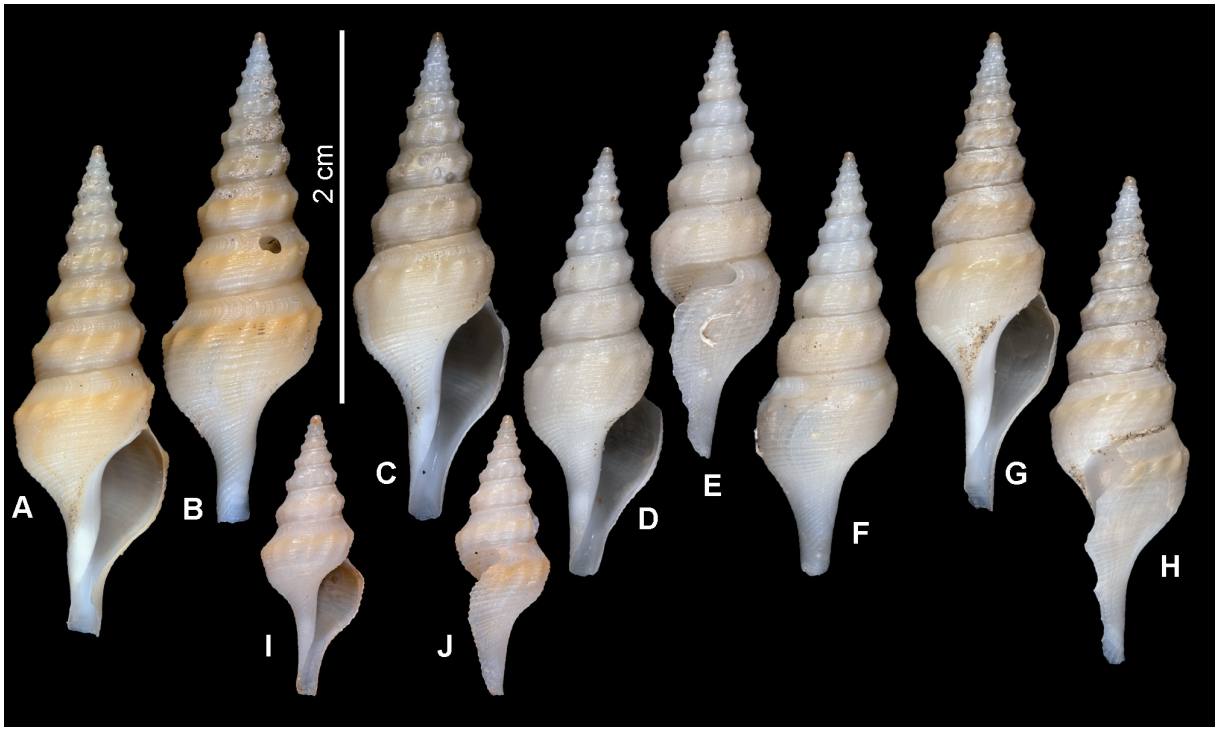

Fig. 27. A–B. *Leucosyrinx* sp. 7, MNHN-IM-2013-19933, Solomon Sea, 500–575 m, SL 26.5 mm. **C–F**. *Leucosyrinx* sp. 26. **C**. MNHN-IM-2013-19819, Solomon Sea, 618–626 m, SL 26.4 mm. **D–F**. MNHN-IM-2013-19918, Solomon Sea, 500–555 m, SL 23 mm. **G–H**. *Leucosyrinx* sp. 4, MNHN-IM-2013-19929, Solomon Sea, 500–555 m, SL 25.7 mm. **I–J**. *Leucosyrinx* sp. 6, MNHN-IM-2009-6036, Solomon Is., 314–410 m, SL 15.2 mm. All shells at the same scale.

Leucosyrinx sp. 7
Figs 2, 27A–B

Material examined (sequenced)

SOLOMON SEA • 1 lv; SE of Tuam Is; 6°04′ S, 148°12′ E; depth 500–575 m; PAPUA NIUGINI, stn CP4009; MNHN-IM-2013-19933.

Description

Radula (Fig. 2). Typical of the genus. Marginal teeth ~370 µm in length (5.2% AL without canal).

DNA diagnosis (based on 1 (!) *cox1* sequence)

'G' in site 52, 'G' in site 265, 'G' in site 569.

Remarks

This molecularly distinct species is represented by a single specimen in our material. Conchologically it is indistinguishable from some specimens of *L. breviplicata* and *Leucosyrinx* sp. 26. From the latter it also differs in the presence of a slightly darker spiral band on the shoulder. It co-occurs with *Leucosyrinx* sp. 26 in the Solomon Sea (collected at neighbouring stations with the difference of only two minutes of longitude). *Leucosyrinx* sp. 7 is sister species to *Leucosyrinx* sp. 26, but both species are separated in all the ASAP partitions.

Leucosyrinx sp. 4
Fig. 27G–H

Material examined (sequenced)

SOLOMON SEA • 1 lv; SE of Tuam Is; 6°04′ S, 148°12′ E; depth 500–575 m; PAPUA NIUGINI, stn CP4009; MNHN-IM-2013-19929 (sympatric with sp. 6)

DNA diagnosis (based on 1 (!) *cox1* sequence)

'C' in site 145, 'C' in site 151, 'C' in site 367, 'G' in site 403.

Remarks

This molecularly distinct species is represented in our material by a single specimen. It is conchologically nearly identical and sympatric to *Leucosyrinx* sp. 7. Nevertheless in *Leucosyrinx* sp. 4 the spiral cords are less distinct than in *Leucosyrinx* sp. 7, and the two species are phylogenetically not closely related.

Leucosyrinx sp. 6
Figs 27I–J, 29D–E

Material examined (sequenced)

SOLOMON ISLANDS • 1 lv; E of Malaita; 8°43′ N, 161°00′ E; depth 314–410 m; SALOMONBOA 3, stn CP2798; MNHN-IM-2009-6036.

Description

Radula (Fig. 29D–E). Comprising about 30 rows of teeth, 8 nascent. Marginal teeth duplex, ~255 µm in length (5.8% AL without canal). Major limb narrow lanceolate in dorsal view, strongly curved. Accessory limb about half of tooth width, ~0.75 of total tooth length, inserted into distinct deep socket on dorsal side of major limb.

Remarks

This molecularly distinct species is represented in our material by a single specimen. It is conchologically nearly identical to *Leucosyrinx* sp. 7, although significantly smaller (SL 15.2 mm).

Leucosyrinx lozoueti sp. nov.
urn:lsid:zoobank.org:act:1B0E60BD-7739-4FC1-A42C-A3919160655E
Figs 28A–G, 29A

Etymology

The species is named after Pierre Lozouet from MNHN, world known expert on Recent and fossil molluscs and responsible for the marine invertebrate collection of the MNHN.

Material examined

Holotype (sequenced)
NEW CALEDONIA • SW of Ile des Pins; 22°53′ S, 167°17′ E; depth 530–545 m; KANACONO, stn DW4666; MNHN-IM-2013-68662.

Other material (sequenced)
NEW CALEDONIA • 2 lv; same data as for holotype; MNHN-IM-2013-68075, MNHN-IM-2013-68076.

Description

Measurements (holotype). SL 9.2 mm, AL (with canal) 4.7 mm, AL (without canal) 3.3 mm, SW 3.4 mm.

Shell (holotype). Shell small, slender, fusiform, with high spire, very light tan, thin, glossy. Small paucispiral protoconch, of about 1.75 smooth, bulbous, light-brown whorls. Protoconch-teleoconch transition hardly discernible, marked by appearance of definitive sculpture. Slightly over 4.5 distinctly angular on shoulder teleoconch whorls, subsutural ramp evenly strongly concave on all whorls. Distinct impressed suture. 14–15 strong, slightly oblique, dense axial folds on and shortly below shoulder on last and penultimate whorls. Folds reach lower suture on teleoconch whorls, gradually diminish on last whorl towards aperture, although still present. Well-developed spiral sculpture of similar width, narrow, low, rounded, wavy cords over entire shell, including subsutural ramp. 5 slightly broader cords below suture on last whorl and 4 on penultimate one, about 30 wavy cords below shoulder on last whorl. Intervals between cords narrower than cords' width in most cases. Shell base weakly convex, slowly passing in medium long straight canal. Narrow-oval aperture well differentiated from canal. Columellar and parietal callus well-developed, of same color as remaining shell. Medium deep, subsutural, broadly arcuate anal sinus extends across subsutural ramp, confluent with large forward extension of outer lip.

Radula (Fig. 29A; examined in MNHN-IM-2013-68076). Comprising around 32 rows of teeth, 6 nascent. Marginal teeth duplex, ~130 μm in length (5.4% AL without canal). Major limb medium broad lanceolate in dorsal view, weakly curved. Accessory limb about half of tooth width, of the same width along entire length, ~0.7 of total tooth length, inserted into distinct socket on dorsal side of major limb.

DNA diagnosis (based on 3 *cox1* sequences)

'C' in site 142, 'G' in site 592, 'T' in site 625.

Remarks

The species is known from three specimens collected at the same station and exibits moderate variation in shell shape. From similar in size *L. nodulocordata* sp. nov. it is well differentiated by the spiral sculpture pattern, having much narrower and closer spaced cords.

This is the smallest species of *Leucosyrinx*, not reaching 10 mm in SL. The only anatomically studied specimen (MNHN-IM-2013-68076) appeared to be a female with a well-developed pallial gonoduct, suggesting that it reached sexual maturity.

Distribution

The species is known from the type locality.

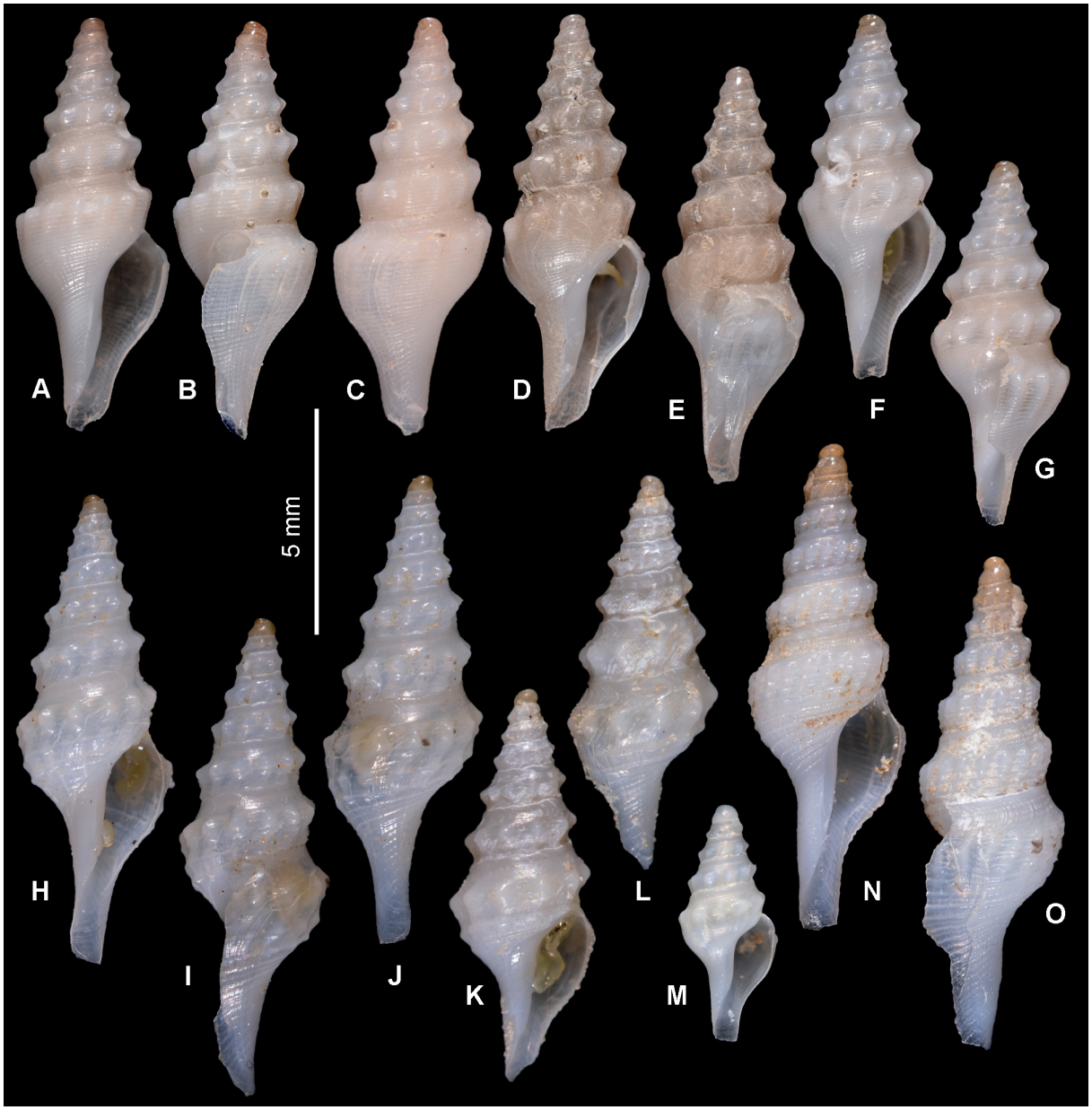

Fig. 28. A–G. *Leucosyrinx lozoueti* sp. nov. **A–C**. Holotype, MNHN-IM-2013-68662, SL 9.2 mm. **D–E**. MNHN-IM-2013-68075, New Caledonia, SW of Ile des Pins, 530–545 m, SL 9.2 mm. **F–G**. MNHN-IM-2013-68076, same locality, SL 8.1 mm. **H–L**. *Leucosyrinx nodulocordata* sp. nov. **H–J**. Holotype, MNHN-IM-2013-9752, SL 10.4 mm. **K–L**. MNHN-IM-2007-42471, Philippines, 356–396 m, SL 8.8 mm. **M**. *Leucosyrinx* sp. 9, MNHN-IM-2013-68714, New Caledonia, SW of Ile des Pins, 530–545 m, SL 5.7 mm. **N–O**. *Leucosyrinx* sp. 5, MNHN-IM-2009-17198, Papua New Guinea, 340–358 m, SL 10.8 mm. All shells at the same scale.

Leucosyrinx nodulocordata sp. nov.
urn:lsid:zoobank.org:act:69EE0101-26EA-479D-B457-91403D1CEFCC
Fig. 28H–L

Etymology

From Latin '*nodulus*' – 'little knot, swelling' and '*corda*' – 'rope, cord', referring to the nodules, present on major spiral cords on last whorl.

Material examined

Holotype (sequenced)
SOLOMON SEA • Dampier Strait; 5°36′ S, 146° 13′ E; depth 620–780 m; PAPUA NIUGINI, stn CP4013; MNHN-IM-2013-9752.

Additional material (sequenced)
PHILIPPINES • 1 lv; off Balicasag I., 9°30′ N, 123°42′ E; depth 356–396 m; PANGLAO 2005, stn CP2393; MNHN-IM-2007-42471.

Description

Measurements (holotype). SL 10.4 mm, AL (with canal) 5.4 mm, AL (without canal) 2.9 mm, SW 3.6 mm.

Shell (holotype). Shell small, slender, narrowly fusiform, with medium high spire, off-white, thin, translucent, fragile. Small paucispiral protoconch of about 1.5 smooth microshagreened yellow whorls. Protoconch-teleoconch transition marked by appearance of anal sinus and obtuse medial keel, corresponding to shoulder on later whorls. 6 distinctly angular teleoconch whorls on shoulder with evenly moderately concave subtural ramp on all whorls subsutural ramp. Distinct, shallowly impressed suture. 13 and 12 on last and penultimate whorls strong, slightly oblique axial folds, present on and below shoulder, reaching lower suture on teleoconch whorls. Spiral sculpture of few rather strong cords bellow shoulder, one immediately below shoulder, crossing axial folds, below two similar in strength narrow cords with intervals 4–5 times as broad as cords' width, forming oval nodules on intersections with lower parts of axial folds. Between cords axial folds not pronounced. Shell base and siphonal canal with 15 more closely spaced cords, with intervals 1–2 times cords' width. Cords' width same as of nodulated ones. Subsutural ramp smooth. Shell base weakly convex, slowly passing into long weakly curving canal. Narrow-oval aperture poorly differentiated from canal. Columellar and parietal callus thin, of same color as remaining shell. Medium deep, subsutural, broadly arcuate anal sinus extends across subsutural ramp, confluent with large forward extension of outer lip. Operculum narrow leaf-shaped, with terminal nucleus.

Radula (examined in MNHN-IM- 2007-42471). Typical of the genus. Marginal teeth duplex, ~150 μm in length (5.5% AL without canal).

DNA diagnosis (based on 2 *cox1* sequences)

'C' in site 205, 'A' in site 370, 'A' in site 565.

Remarks

Only two specimens of this species were available. The ASAP analysis suggests the presence of two independent sister PSHs included within *L. nodulocordata* sp. nov.; however, due to the strong similarity in shell morphology, we consider the molecular differences to be geographically related.

The second specimen lacks part of the canal, which makes the shell appear more stout. Additionally, only the upper subshoulder keel is nodulated, while the second keel is smooth.

This new species is unique due to the presence of nodulated spiral cords below the shoulder, a feature not found in any other species of *Leucosyrinx*. We are uncertain if the specimens are fully grown, as the larger specimen (holotype) consists of only six teleoconch whorls – a very low number for *Leucosyrinx*.

Distribution

Solomon Is. to Philippines, 356–620 m.

Leucosyrinx sp. 5
Figs 28N–O, 29B

Material examined (sequenced)

PAPUA NEW GUINEA • 1 lv; off Lancasay Is., 8°16′ S, 150°29′ E; depth 340–358 m; BIOPAPUA, stn CP3732; MNHN-IM-2009-17198.

Description

Radula (Fig. 29B). Comprising around 25 rows of teeth, 12 nascent. Marginal teeth duplex, ~120 µm in length (4% AL without canal). Major limb medium broad lanceolate in dorsal view, curved. Accessory limb over half of tooth width, ~0.75 of total tooth length, inserted into distinct socket on dorsal side of major limb.

DNA diagnosis (based on 1 (!) *cox1* sequence)

'C' in site 5, 'C' in site 360, 'T' in site 390, 'T' in site 417.

Remarks

This small (SL 10.8 mm) species is represented by a single, probably immature, specimen. It is somewhat similar to *L. nodulocordata* sp. nov. in the presence of nodules on spiral cords. The cords, nevertheless, are much more numerous and closer spaced below the shoulder on the last whorl. Besides, the shell is slenderer and the axial folds are much more numerous. The two species are phylogenetically not closely related.

Leucosyrinx sp. 9
Fig. 28M

Material examined (sequenced)

NEW CALEDONIA • 1 lv; SW of Ile des Pins; 22°53′ S, 167°17′ E; depth 530–545 m; KANACONO, stn DW4666; MNHN-IM-2013-68714.

DNA diagnosis (based on 1 (!) *cox1* sequence)

'G' in site 76, 'C' in site 325, 'A' in site 368.

Remarks

The molecularly distinct species is represented in our material by a single juvenile specimen of SL 5.7 mm. It was collected in the same haul as *L. lozoueti* sp. nov. and is rather similar to it, although phylogenetically not closely related.

Leucosyrinx archibenthalis Powell, 1969
Figs 29C, 30

Leucosyrinx (*Sibogasyrinx*) *archibenthalis* Powell, 1969: 344 (23-412), pl. 264 figs 6–7.

Sibogasyrinx archibenthalis – Kantor & Puillandre 2021: 35, fig. 3r–t.

Type material

Holotype

PHILIPPINES • Mindanao I., Iligan Bay, Tabu Point; 08°16′45″ N, 124°02′49″ E; depth 924 m; RV *Albatross*, stn 5513; USNM 238773.

Material examined (all sequenced)

BISMARCK SEA • 2 lv; W of Tarawai Is; 3°11′ S, 143°04′ E; depth 510–560 m; PAPUA NIUGINI, stn CP4069; MNHN-IM-2013-19304, MNHN-IM-2013-19308.

PAPUA NEW GUINEA • 1 lv; Manus I.; 2°14′ N, 147°16′ E; depth 611–618 m; BIOPAPUA, stn CP3690; MNHN-IM-2009-17060.

PHILIPPINES • 1 lv; Luzon I.; 15°52′ N, 121°49′ E; depth 506–542 m; AURORA 2007, stn CP2660; MNHN-IM-2009-13333 • 1 lv; Luzon I.; 16°00′ N, 121°51′ E; depth 431–442 m; AURORA 2007, stn CP2735; MNHN-IM-2009-13459.

SOLOMON ISLANDS • 1 lv; NW of Santa Isabel I.; 7°39′ S, 157°43′ E; depth 495–650 m; SALOMON 2, stn CP2213; MNHN-IM-2009-16808.

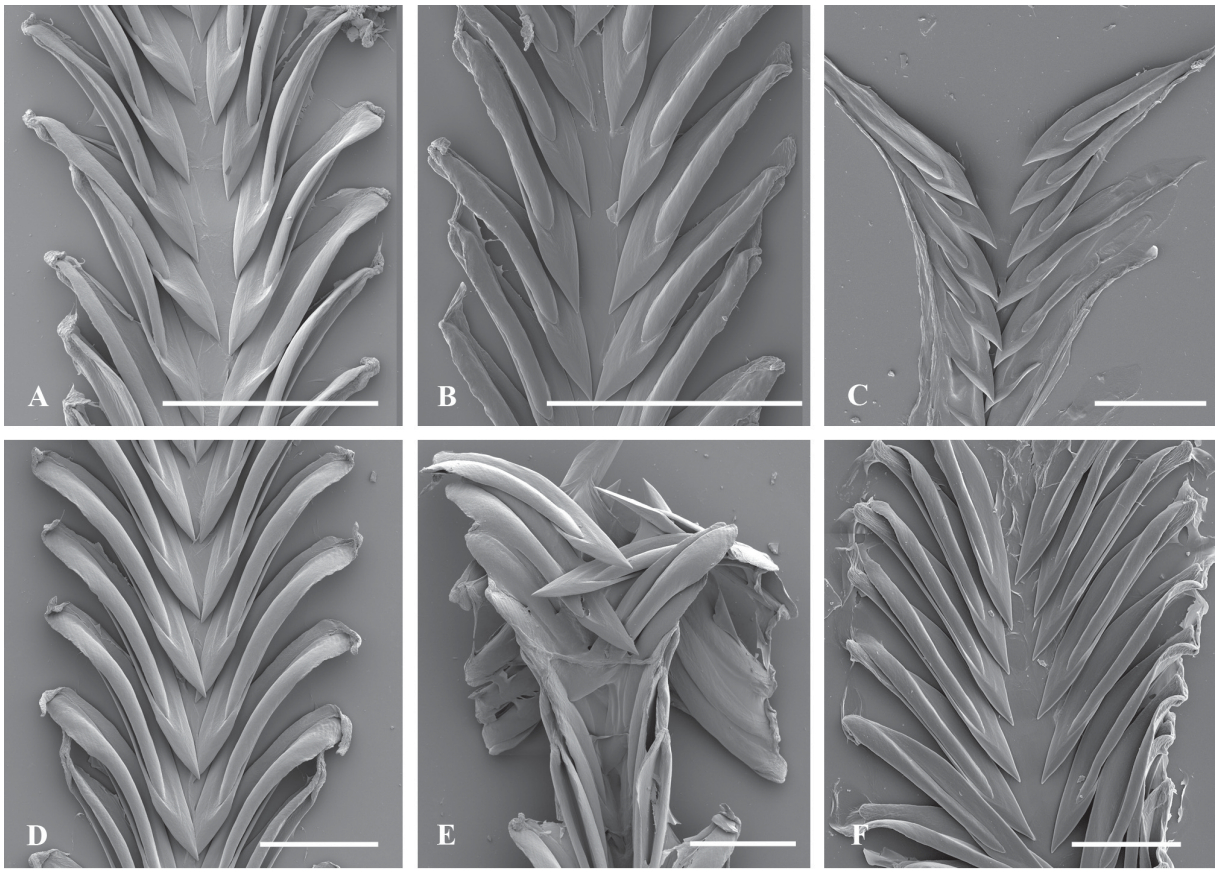

Fig. 29. Radulae of species of *Leucosyrinx* Dall, 1889. **A**. *L. lozoueti* sp. nov., MNHN-IM-2013-68076, SL 8.1 mm. **B**. *Leucosyrinx* sp. 5, MNHN-IM-2009-17198, SL 10.8 mm. **C**. *L. archibenthalis* Powell, 1969, MNHN-IM-2009-13333, SL 36.7 mm. **D–E**. *Leucosyrinx* sp. 6, MNHN-IM-2009-6036, SL 15.2 mm. **F**. *L. placaisae* sp. nov., MNHN-IM-2013-48112, SL 18.6 mm. Scale bars = 100 μm.

Description

Shell. Medium-sized, reaching nearly 45 mm, rather solid, fusiform, nearly biconical, with high spire, from greyish to light brownish. Paucispiral small glossy protoconch, of about 1.75 whorls. Teleoconch whorls very weakly angular on shoulder, with nearly flat subsutural ramp. Suture impressed. Distinct, oblique, axial folds on shoulder, 16–18 on penultimate whorl. Folds reach lower suture on upper whorls, can be limited to rounded knobs situated just above lower suture. Folds gradually weaken on later part of penultimate whorl and absent on last whorl in larger specimens. Well-developed spiral sculpture of similar width, narrow, low, rounded, slightly wavy cords, well pronounced over entire shell. Intervals between cords narrower than cords' width. On subsutural ramp cords broader and less sinuous than those below shoulder. Shell base weakly to medium convex gradually passing into medium-long straight canal. Narrow elongate-oval aperture, poorly differentiated from canal. Deep, subsutural, broadly arcuate anal sinus extends across subsutural ramp, confluent with large forward extension of outer lip.

Radula (Fig. 29C; examined in MNHN-IM-2009-13333). Comprising around 35 rows of teeth, 15 nascent. Marginal teeth duplex, ~220 µm in length (2.0% AL without canal). Major limb medium broad lanceolate in dorsal view, weakly curved. Accessory limb less than half of tooth width, of same width along entire length, ~0.8 of total tooth length, inserted into distinct deep ocket on dorsal side of major limb.

DNA diagnosis (based on 6 *cox1* sequences)

'C' in site 50, 'A' in site 88, 'G' in site 166, 'A' in site 304, 'G' in site 490.

Remarks

This species was previously known from the holotype collected off Mindanao, Philippines. Our specimens were collected from the Philippines and Papua New Guinea, albeit at shallower depths of 430–611 m compared to 924 m for the holotype. The holotype is slightly slenderer than our specimens, but this characteristic, as well as the degree of angulation of the shoulder, is subject to intraspecific variability, as confirmed by our sequenced specimens.

Previosuly, the species was assigned to *Sibogasyrinx*, including in the latest revision of the genus (Kantor & Puillandre 2021). Nevertheless, the holotype lacks the diagnostic character of *Sibogasyrinx* – the subsutural row of knobs – and therefore can not be attributed to the genus. The newly sequenced material as well as the radular morphology confirmed its position within *Leucosyrinx*.

The species resembles the specimens of *L. farhatorum* sp. nov. from Vanuatu (Fig. 4N–P), and they are sister species; however, *L. archibenthalis* differs in having a broader shell with a more angular shoulder.

Distribution

Philippines, Papua New Guinea, Bismarck Sea, 431–924 m.

Leucosyrinx placaisae sp. nov.
urn:lsid:zoobank.org:act:DB43FF29-2D14-4ECF-8D2D-8975A115C0EC
Figs 29F, 31A–F

Etymology

The species is named after Danielle Plaçais, a volunteer in the molluscan team of MNHN of many years.

Material examined

Holotype (sequenced)
INDIAN OCEAN • Walters Shoal; 33°55′ S, 44°03′ E; depth 1588–1714 m; MD208 (Walters Shoal), stn CP4914; MNHN-IM-2013-48114.

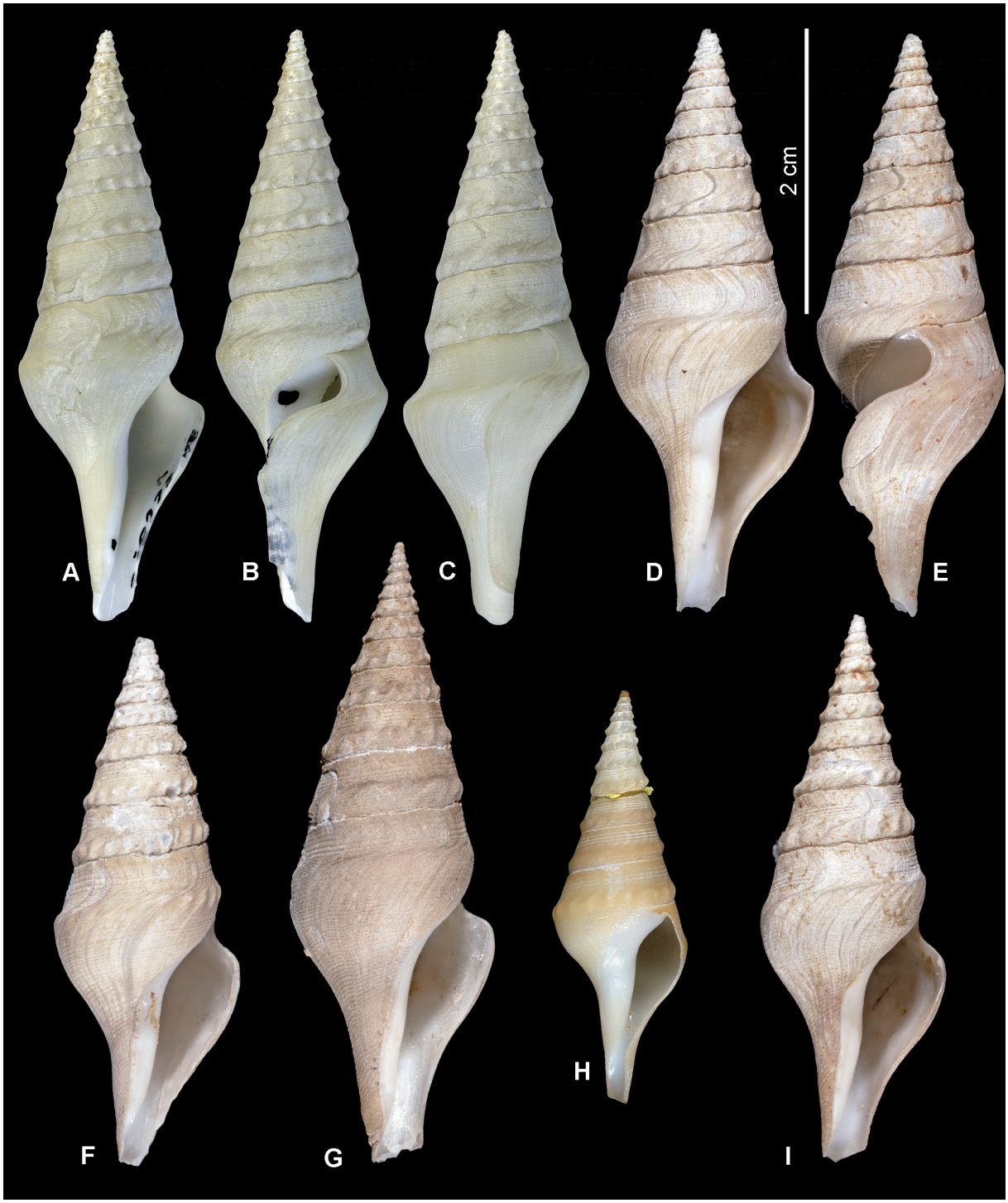

Fig. 30. *Leucosyrinx archibenthalis* Powell, 1969. **A–C**. Holotype, USNM 238773, SL 41.8 mm. **D–E**. MNHN-IM-2013-19304, Bismarck Sea, 510–560 m, SL 40.7 mm. **F**. MNHN-IM-2009-13333, Philippines, 506–542 m, SL 36.7 mm. **G**. MNHN-IM-2009-13459, Philippines, 431–442 m, SL 43.4 mm. **H**. MNHN-IM-2009-17060, Papua New Guinea, 611–618 m, SL 29 mm. **I**. MNHN-IM-2013-19308, Papua New Guinea, 510–560 m, SL 38.4 mm. All shells at the same scale.

Other material (sequenced)
INDIAN OCEAN • 1 lv; same data as for holotype; MNHN-IM-2013-48112.

Description

Measurements (holotype). SL 29.9 mm, AL (with canal) 15.7 mm, AL (without canal) 9.1 mm, SW 11.2 mm.

Shell (holotype). Shell medium-sized, slender, fusiform, with medium high spire, light yellow-orange, shell base and canal lighter colored. Protoconch missing. 6.5 remaining distinctly angular on shoulder teleoconch whorls, with subsutural ramp strongly concave on all whorls. Distinct, shallowly impressed suture. 15 strong, oblique axial folds on and below shoulder on last whorl and 12 on penultimate whorl. Folds fade on subsutural ramp, reach lower suture on teleoconch whorls, extend to last whorl periphery and upper shell base. Relatively distinct spiral sculpture of similar in width, slightly sinuous cords over entire shell surface, including subsutural ramp. Intervals between cords narrower than cords' width. 10 cords on subsutural ramp of last whorl. Shell base moderately convex, rapidly narrowing towards medium long weakly curving canal. Narrow-oval aperture, poorly differentiated from canal. Thin columellar and parietal callus of same color as remaining shell. Moderately deep, subsutural, broadly arcuate anal sinus extends across subsutural ramp, confluent with large forward extension of outer lip. Operculum oval leaf-shaped, with a terminal nucleus.

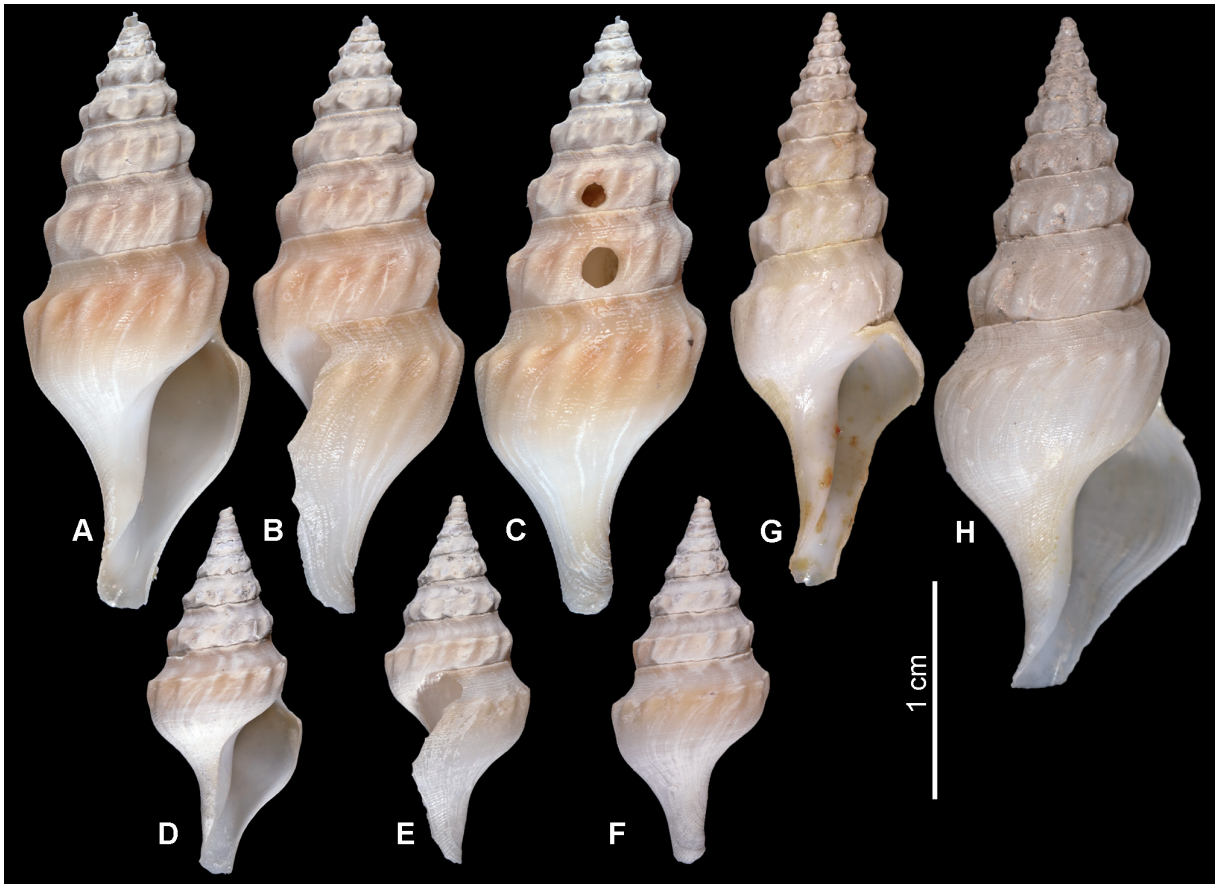

Fig. 31. A–F. *Leucosyrinx placaisae* sp. nov. **A–C**. Holotype, MNHN-IM-2013-48114, SL 29.9 mm; **D–F**. MNHN-IM-2013-48112, Walters shoal, 1588–1714 m., SL 18.6 mm. **G–H**. *Leucosyrinx* sp. 11, **G**. MNHN-IM-2007-38671, Society Is., 798-830 m, SL 26.3 mm. **H**. MNHN-IM-2007-38723, Society Is., 800 m, SL 30.8 mm. All shells at the same scale.

Radula (Fig. 29F; studied in MNHN-IM-2013-48112). Marginal teeth duplex, ~250 μm in length (4.6% of AL without canal). Major limb narrowly lanceolate, slightly curved. Accessory limb nearly twice as narrow, ~0.75 of total tooth length, inserted into shallow but distinct socket on dorsal side of major limb.

DNA diagnosis (based on 2 *cox1* sequences)

'C' in site 59, 'C' in site 250, 'T' in site 328.

Remarks

The species is represented in our material by two specimens only. The second specimen is smaller than the holotype (SL 18.6 mm), and differs in a relatively broader shell and paler coloration.

The species is most similar to *L. exulans*, differing in a lower spire as well as in a more angulated shoulder. The shell of the new species is also much paler than that of *L. exulans*. Both species are phylogenetically not closely related.

Distribution

The species is known from the type locality.

Leucosyrinx sp. 11
Fig. 31G–H

Material examined (sequenced)

SOCIETY ISLANDS • 1 lv; Bora Bora; 16°32′ S, 151°48′ E; 798–830 m; TARASOC, stn CP3419; MNHN-IM-2007-38671 • 1 lv; between Raiatea and Tahaa; 16°43′6″ S, 151°25′ E; 800 m; TARASOC, stn CP3439; MNHN-IM-2007-38723.

DNA diagnosis (based on 2 *cox1* sequences)

No sufficiently robust diagnosis for this species could be retrieved.

Remarks

The species is represented in our material by two rather different in shell outline medium-sized specimens (up to 30.8 mm) with nearly identical *cox1* sequences. This is the only presently known species of *Leucosyrinx* from French Polynesia.

Species of Leucosyrinx known only from empty shells

Below is an alphabetically arranged list of species known only from empty shells. The conchological characteristics of these species correspond to those of the molecularly delimited species of *Leucosyrinx*, allowing us to confidently attribute them to this genus.

Leucosyrinx aequatorialis Thiele, 1925
Fig. 32A

Leucosyrinx aequatorialis Thiele, 1925: 182(216), pl. 23(35) fig. 22.

Comitas aequatorialis – Powell 1969: 282 (23-294), pl. 224 fig. 3.

Type material

Holotype
INDIAN OCEAN • off East Africa; 1°48.2′ N, 45°42.5′ E; depth 1644 m; ZMB.

Remarks

The species is known only from the immature holotype (SL 13 mm).

The shell shape, sculpture pattern, and the shape of the subsutural anal sinus fit well within the variability observed in the species of *Leucosyrinx* as defined here. The lack of the nodules on the shoulder of the last whorl is a character found in different species of *Leucosyrinx*. Given that the anal sinus shape aligns more closely with species of *Leucosyrinx* than with *Comitas*, we propose transferring the species to the former genus.

Distribution

Known only from type locality.

Leucosyrinx anteridion (Watson, 1881) comb. nov.
Fig. 32B

Pleurotoma (*Surcula*) *anteridion* Watson, 1881: 399.

Pleurotoma (*Surcula*) *anteridion* – Watson 1886: 295, pl. 19 fig. 6.
Surcula anteridion – Thiele 1925: 188 (222), pl. 24(36) fig. 13.
Comitas anteridion – Powell 1969: 273 (23-285), pl. 219 fig. 5.

Type material

Holotype
SOUTH AFRICA • off Cape of Good Hope; 34°04′ S, 18°37′ E; depth 150 ftm (= 274 m); HMS *Challenger* stn 142; NHMUK, NHMUM 1887.2.9.977.

Remarks

The shell shape, sculpture pattern, and the shape of the subsutural anal sinus fit well within the variability observed in the species of *Leucosyrinx* as defined here. Given that the anal sinus shape aligns more closely with species of *Leucosyrinx* than with *Comitas*, we propose transferring the species to the former genus.

Distribution

Off South Africa, 270–420 m. The record of Thiele (1925) from New Amsterdam, South Indian Ocean requires confirmation.

Leucosyrinx arcana (E.A. Smith, 1899) comb. nov.
Fig. 32C

Pleurotoma (*Surcula*) *arcana* E.A. Smith, 1899: 239.

Pleurotoma (*Surcula*) *arcana* – Annandale & Stewart 1909: pl. 9 figs 6, 6a.
Comitas arcana – Powell 1969: 272 (23-284), pl. 219 figs 6–7, with query. — Tan & Islami 2021: 325, fig. 9a.

Type material

Syntypes
ANDAMAN ISLANDS • 1 spec.; off Andaman Is.; 13°17′15″ N, 93°10′ E; depth 185 ftm (= 340 m); ZSI, M 926/1 • 1 spec.; off Travancore coast; 9°29′34″ N, 75°38′ E; depth 360 ftm (= 660 m); ZSI, M 926/1.

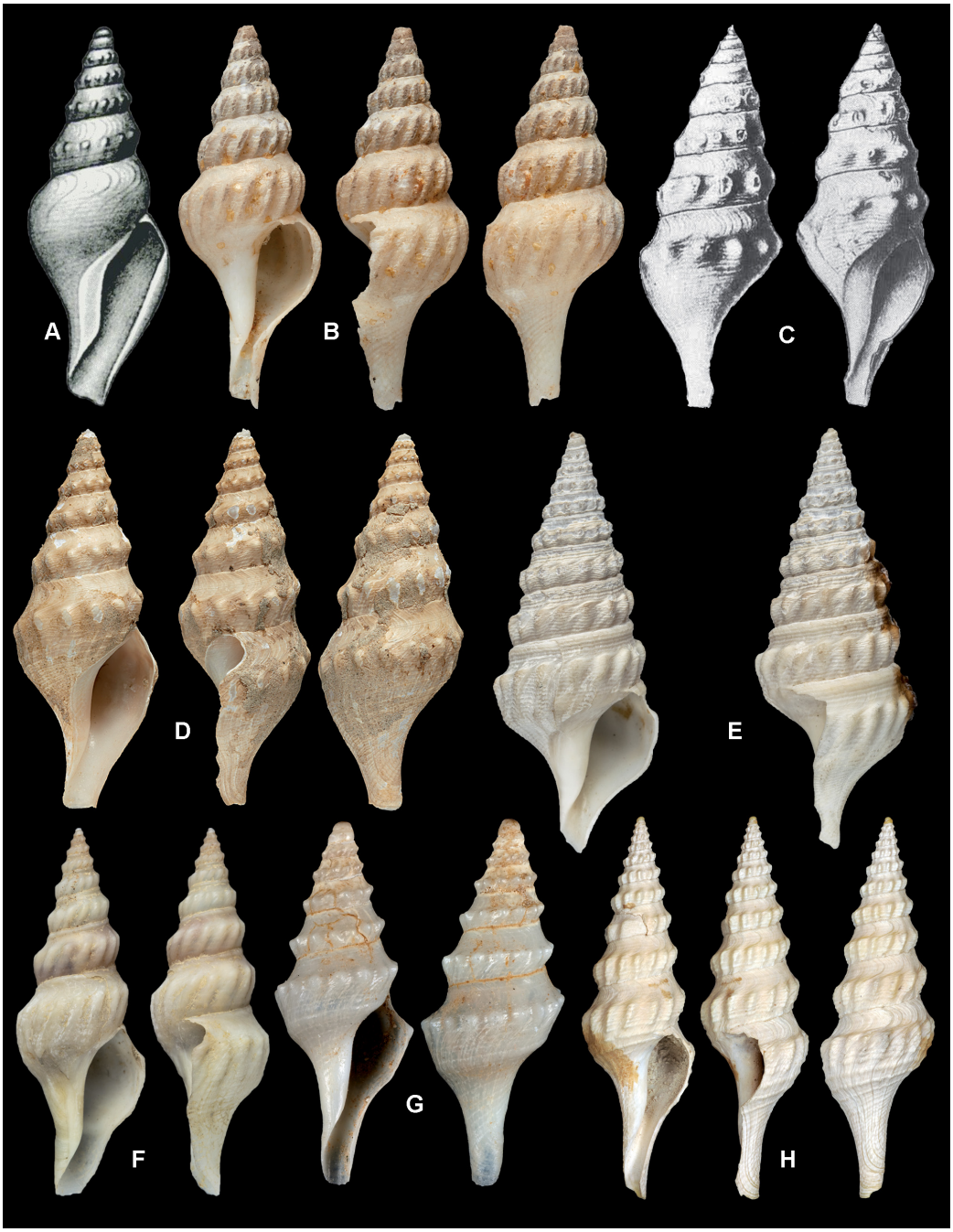

Fig. 32. Types of species of *Leucosyrinx* Dall, 1889 known only from empty shells. **A**. *L. aequatorialis* Thiele, 1925, holotype, SL 13 mm (from Thiele 1925). **B**. *L. anteridion* (Watson, 1881) comb. nov., holotype, SL 22.1 mm (images by Aimee McArdle, NHMUK Photographic Unit). **C**. *L. arcana* (E.A. Smith, 1899) comb. nov., syntype, ZSI, M 926/1, SL 25.0 mm (from Annandale & Stewart 1909: pl. 9 fig. 6–6a). **D**. *L. curviplicata* (Sysoev, 1996) comb nov., holotype NHMUK 1993092, SL 32. 4 mm (images by Aimee McArdle, NHMUK Photographic Unit). **E**. *L. eurina* (E.A. Smith, 1899) comb. nov., paratype NHMUK 1904-6-15-139, SL 39 mm (photo courtesy of NHMUK). **F**. *L. halicyria* (Melvill, 1904) comb. nov., holotype, NHMUK 1905-7-14-49, SL 32.0 mm. **G**. *L. julia* Thiele, 1925, syntype, ZMB Mol 109379, SL 10.6 mm (photo courtesy of Museum für Naturkunde). **H**. *L. pagodaeformis* (Schepman, 1913) comb. nov, figured syntype, NATURALIS, ZMA.MOLL.137728, SL 28.7 mm (photo courtesy of K. Hasegawa). Shells not to scale.

Remarks

Judging from the illustration in Annandale & Stewart (1909) the shell is rather similar to some of the molecularly confirmed species of *Leucosyrinx*, e.g., *L. quinetae* sp. nov. (Fig. 24) and some specimens of *L. luzonica* (Fig. 23). The position of the anal sinus, occupying the entire subsutural ramp, suggests the inclusion in *Leucosyrinx* rather than in *Comitas* and we transfer the species to *Leucosyrinx.*

Sysoev (1996: figs 46–47) illustrated two specimens from the Gulf of Oman and the Gulf of Aden, identified by him as *Comitas paupera* (see below), which are very similar to the type of *L. arcana* and probably belong to this species. These specimens were collected at significantly larger depths, 1890–2000 m. This assumption is based only on the shell characters and needs confirmation by anatomical and molecular data.

Distribution

From Gulf of Aden to Andaman Is. and Indonesia from 340 to 2000 m.

Leucosyrinx curviplicata (Sysoev, 1996) comb. nov.
Fig. 32D

Comitas curviplicata Sysoev, 1996: 10, fig. 29.

Type material

Holotype
INDIAN OCEAN • Gulf of Aden; depth 1270 m; John Murray Expedition, stn 184; NHMUK 1993092.

Paratype
INDIAN OCEAN • 1 spec., same data as for holotype; NHMUK 1993093.

Remarks

According to the subsutural position and shape of the anal sinus that occupies entire subsutural ramp, the species should be transferred to *Leucosyrinx.* It resembles *Leucosyrinx* sp. 20 (Fig. 11I), differing in the shorter spire.

Distribution

Type locality.

Leucosyrinx diomedea (Powell, 1969) comb. nov.
Fig. 23J–L

Comitas thisbe diomedea Powell, 1969: 277 (23-289), pl. 225 figs 3–4.

Type material

Holotype
SULAWESI • Celebes (Sulawesi), off Tg. Lamulul, Gulf of Boni; 04°53′45″ S, 121°29′ E; depth 540 ftm (= 987 m); *Albatross* stn 5650; USNM 239425.

Remarks

The species is known from two specimens, collected off Sulawesi, Indonesia. It is rather similar to *L. luzonica*, differing in the more gradual narrowing of the last whorl towards the canal. It may represent a form of *L. luzonica*, but due to very limited material on both species, we are taking a conservative approach and consider it a separate species. Conchologically, it is very different from *L. thisbe* (Fig. 17A–

E) in that its axial folds do not extend to the shell base, it has weaker spiral sculpture, lacks a subsutural fold, and has a slenderer shell. Therefore, we consider it a valid species.

Kosuge (1992: pl. 59 figs 6–7) illustrated a very slender specimen under this name, the identity of which cannot be determined with certainty based on the provided photograph. The radular drawing (Kosuge 1992: figs 17–21) shows duplex marginal teeth, which are typical of *Leucosyrinx*.

Distribution

Sulawesi to (?) western Australia, 496–987 m.

Leucosyrinx herilda (Dall, 1908)
Fig. 33F

Gemmula herilda Dall, 1908: 266.

Leucosyrinx herilda – McLean 1971b: sp. 1670.

Type material

Holotype
GULF OF PANAMA • depth 1672 ftm (= 3057 m); USNM 123091.

Remarks

The holotype of the species is a dead-collected incomplete shell (SL 18+ mm). Judging from the growth lines, the shape of the anal sinus corresponds to that of other species of *Leucosyrinx*. Therefore, we confirm its generic position in *Leucosyrinx*, as was suggested by McLean (1971b).

The species is very similar to *Leucosyrinx powelli* (Rehder & Ladd, 1973) collected at Agassiz Guyot in the central Pacific albeit at shallower depths (1581–1617 m). Both species can be conspecific, but due to the large distance between the type localities and large difference in depths, we presently consider them as two separate species.

Distribution

Type locality.

Leucosyrinx eurina (E.A. Smith, 1899) comb. nov.
Fig. 32E

Pleurotoma (*Surcula*) *eurina* E.A. Smith, 1899: 239.

Pleurotoma (*Surcula*) *eurina* – Annandale & Stewart 1909: pl. 9 figs 4, 4a.
Comitas eurina – Powell 1969: 268 (23-280), pl. 217 figs 4–5. — Tan & Islami 2021: 325, fig. 9b.

Type material

Holotype
INDIAN OCEAN • Travancore coast; depth 430 ftm (= 790 m); *Investigator*, stn 232; ZSI, M 647/1.

Paratype
INDIAN OCEAN • 1 spec.; same data as for holotype; NHMUK 1904.6.15.139.

Remarks

The shell of *L. eurina* is unusual for the genus due to the distinct subsutural spiral fold, a feature somewhat similar to what is observed in our sequenced specimen of *L. thisbe* (Fig. 17C–E). On the other hand, the anal sinus is subsutural and occupies entire subsutural ramp, thus suggesting the transfer of the species from *Comitas* to *Leucosyrinx.*

Distribution

From off southern India to Indonesia, 790–940 m.

Leucosyrinx granuloplicata (Kosuge, 1992) comb. nov.
Fig. 12G

Comitas granuloplicata Kosuge, 1992: 166, pl. 58 fig. 9.

Type material

Holotype

WESTERN AUSTRALIA • off Port Hedland; 17°58′ S, 118°25′ E; depth 376 m; WAM S14436.

Remarks

The species was described based on two specimens. However, only the holotype, which is a dead-collected and heavily worn shell lacking the protoconch and upper teleoconch whorls, with a shell length of 35.3 mm, was illustrated. The shell morphology, including the shape and position of the subsutural anal sinus extending across the subsutural ramp, allows for confident placement in the genus *Leucosyrinx*. For differences from *L. claviforma*, see the Remarks section of that species.

Distribution

Western Australia, 376–494 m.

Leucosyrinx halicyria (Melvill, 1904) comb. nov.
Fig. 32F

Pleurotoma (*Surcula*) *halicyria* Melvill, 1904: 164–165, pl. 10 fig. 16.

Comitas halicyria – Powell 1969: 286 (23-298), pl. 220 fig. 4, with query.
Pleurotoma (*Surcula*) *halicyria* – Kantor *et al*. 2022: fig. 12b.

Type material

Holotype

INDIAN OCEAN • 1 spec., SL 32.0 mm; Gulf of Oman; 24°49′ N, 56°56′ E, 225 ftm (= 411 m), NHMUK 1905-7-14-49.

Remarks

The species is known only from the holotype. There are no sequenced species of *Leucosyrinx* that resemble *L. halicyria.* We attribute it to the genus with some doubts, but remove it from *Comitas* on the basis of the shape and position of the subsutural anal sinus, occupying the entire subsutural ramp, like in other *Leucosyrinx* spp.

Distribution

Type locality.

Leucosyrinx julia Thiele, 1925
Fig. 32G

Leucosyrinx julia Thiele, 1925: 202 (236), pl. 24(36) fig. 24.

Leucosyrinx julia – Powell 1969: 338 (23-402), pl. 257 figs 4–5.

Type material

Syntypes
EAST AFRICA • 4 specs; off Brawa; 1°40′ S, 41°47′ E; depth 693 m; *Valdivia*, stn 251; ZMB Mol 109379.

Remarks

The largest type specimen has a SL of 10.6 mm, appears to be adult, and was illustrated by Thiele (1925). Conchologically, it possesses all the characteristics of *Leucosyrinx*. The original illustration shows a strongly angular shell base, although it is somewhat more obtuse in the actual specimen. In shell outline and size, it resembles *L. lozoueti* sp. nov., which, however, has a different spiral sculpture with much finer, uniformly spaced cords. Powell (1969) attributed several specimens to this species with shell lengths up to 53 mm, collected by the John Murray expedition in the Gulf of Aden at a depth of 1040 m.

Distribution

East Africa to Gulf of Aden, 693–1040 m.

Leucosyrinx kirai (Powell, 1969) comb. nov.
Fig. 26L

Comitas kirai Powell, 1969: 279 (23-291), pl. 223 figs 4–6.

Comitas kirai – Kira 1972: 101, pl. 36 fig. 7. — Hasegawa *et al.* 2000: 633, pl. 315 fig. 71. — Higo *et al.* 2001: pl. 102 fig. g3535 (holotype).

Type material

Holotype
JAPAN • Kii; ANSP 232552.

Remarks

The species is very similar both in shell shape and particularly in spiral sculpture to *L. breviplicata*. It is unusually small for *Comitas* (attaining 40 mm) and in general shell characters matches those of species of *Leucosyrinx*, including the subsutural position of the anal sinus that occupies the entire subsutural ramp. We conditionally transfer it to *Leucosyrinx*, pending data on the radular morphology. Although by shell characters it can be synonymized with *L. breviplicata*, it inhabits much shallower depths (50–400 m – Hasegawa *et al.* 2000: 633). In the absence of sequenced material from Japan, we consider it a distinct species.

Tan & Islami (2021: fig. 9c) illustrated a specimen from Indonesia as *Comitas kirai*. The identification of the specimen is not straightforward. The shell is much darker, as illustrated in other publications, and the spiral cords on the last whorl are very closely spaced. It may represent a separate species.

Distribution

Japan, 50–400 m, ?Indonesia.

Leucosyrinx melvilli (Schepman, 1913) comb. nov.
Fig. 17I–J

Surcula melvilli Schepman, 1913: 422, pl. 27 fig. 7.

Comitas melvilli – Powell 1969: 269 (23-281), pl. 217 figs 6–7. — Sysoev 1997: 347.

Type material

Syntypes
TIMOR SEA • 2 specs; 10°48.6′ S, 123°23.1′ E; depth 918 m; *Siboga*, stn 300; NATURALIS, ZMA.MOLL.174487, ZMA.MOLL.137982 (Fig. 17I–J) • 1 spec.; near Kei Is.; 5°53.8′ S, 132°48.8′ E; depth 560 m; *Siboga*, stn 262; NATURALIS, ZMA.MOLL.137981.

Remarks

Schepman (1913) did not designate the holotype, and mentioned three specimens in the original description. Nevertheless, Schepman specified that "The specimen from stn 262 is a smaller, much worn shell, of somewhat doubtful character" (560 m, near Kei Is., 5°53.8′ S, 132°48.8′ E, *Siboga* stn 262). It should be considered that Schepman expressly excluded it from the type series (Art. 72.4.1 of ICZN). He provided the measurements for a single specimen (SL 62 mm), which was also illustrated on pl. 27 fig. 7. The same specimen is illustrated herein.

The shell shape, sculpture pattern, and the shape of the subsutural anal sinus fit well within the variability observed in the species of *Leucosyrinx* as defined here. This species exhibits similarities to *Leucosyrinx jeedara* from Australia, albeit with notable differences in size (up to 62 mm versus 31 mm), a lower last whorl, a taller spire, and a cream coloration. Given that the anal sinus shape aligns more closely with species of *Leucosyrinx* than with *Comitas*, we propose transferring the species to the former genus.

Distribution

Timor Sea, 918 m.

Leucosyrinx pagodaeformis (Schepman, 1913) comb. nov.
Fig. 32H

Drillia pagodaeformis Schepman, 1913: 45 (409), pl. 26 fig. 5a–b.

Comitas pagodaeformis – Powell 1969: 271 (23-283), pl. 219 figs 1–2. — Kosuge 1992: 167, pl. 59 figs 4–5.

Type material

Syntypes
INDONESIA • 1 spec.; Halmahera Sea; 0°59.1′ S, 129°28.8′ E; depth 411 m; NATURALIS • 1 spec.; near Kei Is.; 5°26.6′ S, 132°32.5′ E; depth 397 m; NATURALIS.

Remarks

The figured syntype (Fig. 32H, SL 28.7 mm) demonstrates all conchological characteristics of *Leucosyrinx*, including a subsutural anal sinus occupying the entire subsutural ramp. Therefore, the species is transferred to *Leucosyrinx.* It is most similar to *L. breviplicata*, differing in the more broadly-spaced spiral cords on the shell periphery.

Distribution

Indonesia to NW Australia, 300–411 m.

Leucosyrinx palawanica (Powell, 1969) comb. nov.
Fig. 33A

Comitas aequatorialis palawanica Powell, 1969: 282 (23-294), pl. 225 figs 5–6.

Type material

Holotype
PHILIPPINES • Palawan Passage; 10°46′40″ N, 118°29′ E; depth 515 ftm (= 941 m); *Albatross*, stn 5350; USNM 237910.

Remarks

The species is known from a single holotype with SL of 43.5 mm. The shell sculpture pattern and the shape of the subsutural anal sinus fit well within the variability observed in species of *Leucosyrinx* as defined here. Therefore, we transfer the species to *Leucosyrinx*. Originally, it was described as a subspecies of *L. aequatorialis* Thiele, 1925, but differs markedly in size (43.5 mm vs 13 mm). Additionally, in *L. aequatorialis*, the last whorl lacks axial ribs and a shoulder carina, while the carina is well-developed in *L. palawanica*. Therefore, we consider it a separate species.

Distribution

Type locality.

Leucosyrinx paupera (Watson, 1881) comb. nov.
Fig. 33B–D

Pleurotoma (*Drillia*) *paupera* Watson, 1881: 411.

Pleurotoma (*Typhlomangelia*) *paupera* – Watson 1886: 317, pl. 25 fig. 3.
Turricula paupera – Powell 1969: 244 (23-238), pl. 202.
Comitas paupera – Sysoev 1996 (part.): 8, figs 42, 45, 48 (non figs 43 = Borsoniidae gen. sp., 44, 46–47 = *Leucosyrinx arcana*).

Type material

Lectotype
INDONESIA • Arafura Sea, Aru I., 5°41′ S, 134°04′30″ E; depth 800 ftm (= 1463 m); HMS *Challenger*, stn 191; NHMUK 1887.2.9.1009.

Paralectotypes
INDONESIA • 2 specs; same data as for lectotype: NHMUK 1887.2.9.1010, 1887.2.9.1011.

Remarks

As evident from the synonymy, determining the generic position of this species is not straightforward. The type series likely comprises three species. The lectotype (Fig. 32B) was probably first designated by Powell (1969: 244) in the table of measurements. Although the specimen with the SL of 40.1 mm is significantly damaged, we tentatively attribute it to *Leucosyrinx* based on the general shell shape, sculpture, and position of the anal sinus. The paralectotype NHMUK 1887.2.9.1010 (Fig. 33C, SL 33.3 mm) differs from the lectotype by having much less pronounced axial sculpture, the presence of dendritic spiral threads, and a lower position of the shallow anal sinus, which extends below the limits of the subsutural ramp. Additionally, it shows traces of an obtuse columellar fold, and the inside of the aperture is orange. In our opinion, this specimen may belong to the family Borsoniidae. Finally, the paralectotype NHMUK 1887.2.9.1011 (Fig. 33D, SL 18.5 mm) may be a juvenile specimen of *Leucosyrinx arcana*.

Fig. 33. Types of species of *Leucosyrinx* Dall, 1889 known only from empty shells. **A**. *L. palawanica* (Powell, 1969) comb. nov., holotype USMNM 237910, SL 43.5 mm. **B–D**. *L. paupera* (Watson, 1881) comb. nov. **B**. Lectotype, NHMUK 1887.2.9.1009, SL 40.1 mm. **C**. Paralectotype NHMUK 1887-2-9-1010, SL 33.3 mm (= Borsoniidae, genus and species uncertain). **D**. Paralectotype NHMUK 1887-2-9-1011, SL 18.5 mm (= *L. arcana)*. **E**. *L. undosa* (Schepman, 1913) comb. nov., holotype, NATURALIS, ZMA.MOLL.136841, SL 29.5 mm (photo courtesy of K. Hasegawa). **F**. *L. erilda* (Dall, 1908), holotype, USNM 123091, SL 18 mm (photo courtesy of USNM). **G**. *L. powelli* (Rehder & Ladd, 1973), holotype, USNM 703267, SL 13.0 mm (photo courtesy of USNM). **H**. *L. suratensis* (Thiele, 1925), holotype, ZMB Moll 60072, SL 16.6 mm (photo courtesy of Museum für Naturkunde). Shells not to scale.

Distribution

Indonesia, Gulf of Aden, and Gulf of Oman, 1463–2000 m.

Leucosyrinx powelli (Rehder & Ladd, 1973)
Fig. 33G

Comitas powelli Rehder & Ladd, 1973: 45, pl. 3 figs 11–12.

Type material

Holotype
PACIFIC OCEAN • Agassiz Guyot; 17°58.5′ N, 178°14.2′ E; depth 865–884 ftm (= 1581–1617 m); USNM 703267.

Remarks

The holotype is the only known specimen, with SL 13.0 mm. Although the outer lip of the aperture is broken, judging from the growth lines, the shape of the anal sinus corresponds to that of other species of *Leucosyrinx* as defined here. The species is very similar if different from *Leucosyrinx herilda* (Dall, 1908) (see Remarks to *L. herilda*).

Distribution

Type locality.

Leucosyrinx turrita Sysoev, 1990

Leucosyrinx turritus Sysoev, 1990: 247, pl. 2 figs 3–4.

Type material

Holotype
PACIFIC OCEAN • Sala-y-Gomes Ridge; 25°59.8′ S, 100°40′ W; depth 330–350 m; ZMMU Lc-5733.

Remarks

The species was described based on four empty shells, the largest (holotype) with SL 30.0 mm. In general shell characters, including the position of the anal sinus, the species is referable to *Leucosyrinx.*

Distribution

Type locality.

Leucosyrinx suratensis (Thiele, 1925)
Fig. 33H

Surcula suratensis Thiele, 1925: 180 (214), pl. 23(35) fig. 19.

Surcula coreanica (Adams & Reeve, 1848) (not of Adams & Reeve 1850) – von Martens 1904: 80, pl. 2 fig. 3.
? *Leucosyrinx suratensis* – Powell 1969: 340 (23-404), pl. 259 figs 1–2.

Type material

Holotype
INDONESIA • off north Sumatra; 5°23′ N, 94°48′ E; depth 1024 m; ZMB Moll 60072.

Remarks

The holotype measures 16.6 mm in shell length and exhibits significant shell breakage followed by subsequent repair, resulting in an exaggeratedly deep anal sinus. Von Martens (1904) illustrated only the lateral view of the shell. The remaining intact whorls demonstrate the characteristic shape of the anal sinus typical of *Leucosyrinx*, and, overall, the shell morphology aligns with the variability seen within the genus.

Leucosyrinx suratensis resembles several species of *Leucosyrinx*, particularly *L. floraecharlottae* sp. nov. and *L. ringevali* sp. nov. However, it differs in having more pronounced spiral cords on the subsutural ramp and a stouter shell with a more rapidly constricting shell base.

Distribution

Type locality.

Leucosyrinx undosa (Schepman, 1913) comb. nov.
Fig. 33E

Surcula undosa Schepman, 1913: 61 (425), pl. 27 fig. 13a–b.

Comitas undosa – Powell 1969: 282 (23-294), pl. 227 figs 3–4.
Paracomitas undosa – Shuto 1970a: 170, pl. 11 figs 8–9.

Type material

Holotype
INDONESIA • Flores Sea; 7°24′ S, 118°15.2′ E; depth 794 m; NATURALIS, ZMA.MOLL.136841.

Remarks

In general shell characters, including the position of the anal sinus, the species is referable to *Leucosyrinx*. Shuto (1970a) transferred it to *Paracomitas* Powell, 1942. In our opinion this is unjustified. The genus *Paracomitas* is characterized and differentiated from *Leucosyrinx* and *Comitas* by a protoconch of 2.5 sharply carinated whorls. The protoconch is missing in the holotype of *S. undosa*, the only known specimen of the species. Therefore, pending additional data, we consider it a species of *Leucosyrinx*.

Distribution

Type locality.

Doubtful species, attributed herein to Leucosyrinx

The following species are conditionally attributed to *Leucosyrinx* pending further anatomical data and the collection of additional material. We are taking a conservative approach and will retain the species' current generic position unless there are significant reasons to transfer them.

"*Leucosyrinx*" *caecilia* Thiele, 1925
Fig. 34A

Leucosyrinx caecilia Thiele, 1925: 202 (236), pl. 24 (36) fig. 23.

Leucosyrinx caecilia – Powell 1969: 337 (23-401), pl. 257 fig. 2.

Type material

Holotype

TANZANIA • Dar-es-Salaam: 6°34′ S, 39°35′ E; depth 404 m; ZMB Mol 109385.

Remarks

The single known specimen is the juvenile holotype, with SL of 7.5 mm. The anal sinus is typical of *Leucosyrinx*, but the shoulder is accentuated by two distinct and broad spiral cords that appear wavy on poorly pronounced axial folds. This type of sculpture is not found in other species of the genus, but it is unclear whether these features are characteristics of the juvenile shell or of the species as a whole. We tentatively retain the species within *Leucosyrinx*, though with some reservations.

Distribution

Type locality.

"*Leucosyrinx*" *canyonensis* (Dell, 1956)

Fig. 34B

Antimelatoma canyonensis Dell, 1956: 142, fig. 196.

Leucosyrinx canyonensis – Powell 1979: 230, fig. 53: 3. — Spencer *et al.* 2011.

Type material

Holotype

NEW ZEALAND • South I., off east Otago; depth 260–350 ftm (= 475–640 m); MNZ, M.009262.

Remarks

The species is characterized by a small shell (SL 9.3 mm in the holotype) with strong spiral cords and a distinct crenulated shoulder carina. It is rather different from known species of *Leucosyrinx*, but in the absence of any data on anatomy, we retain it in *Leucosyrinx* with strong doubts.

Distribution

Type locality.

"*Leucosyrinx*" *erna* Thiele, 1925

Fig. 34C

Leucosyrinx erna Thiele, 1925: 201 (235), pl. 24 (36) fig. 22.

Leucosyrinx erna – Powell 1969: 337 (23-401), pl. 257 fig. 1.

Type material

Syntypes

TANZANIA • 3 specs; Zanzibar Channel; 5°27′ S, 39°19′ E; depth 463 m; ZMB Mol 109384.

Remarks

The species is known from three dead-collected and immature shells (maximal SL 7.8 mm). It is characterized by strong and very closely spaced spiral cords below shoulder that was not found in other species of *Leucosyrinx*, although somewhat similar but broader cords are also found in *L. nodulocordata* sp. nov. In the absence of any data on anatomy, we retain it in *Leucosyrinx* with strong doubts.

Fig. 34. A–F. Doubtful species of *Leucosyrinx* Dall, 1889. **A**. "*Leucosyrinx*" *caecilia* Thiele, 1925, holotype, ZMB Mol 109385, SL 7.5 mm (photo courtesy of Museum für Naturkunde). **B**. "*Leucosyrinx*" *canyonensis* (Dell, 1956), holotype, MNZ, M.009262, SL 9.3 mm (photo from the website of MNZ, https://collections.tepapa.govt.nz/object/151638). **C**. "*Leucosyrinx*" *erna* Thiele, 1925, syntype, ZMB Mol 109384, SL 7.8 mm (photo courtesy of Museum für Naturkunde). **D–F**. "*Leucosyrinx*" *sansibarica* Thiele, 1925. **D**. Original drawing (Thiele 1925: pl. 24 (36) fig. 1), ? ZMB, SL 45 mm. **E**. Syntype, ZMB Mol 60089, Gulf of Aden, SL 42.6 mm (photo courtesy of Museum für Naturkunde). **F**. Syntype, ZMB Mol 109387, Gulf of Aden, SL 34.5 mm (= *Comispira*) (photo courtesy of Museum für Naturkunde). **G–H**. Types of species excluded from *Leucosyrinx* and *Comitas* H.J. Finlay, 1926. **G**. *Rhodopetoma amycus* (Dall, 1919) comb. nov., holotype, USNM 226163, SL 21.5 mm (photo courtesy of USNM). **H**. *Burchia clionella* (Dall, 1908), syntype, USNM 123125, SL 35.2 mm (photo courtesy of USNM).

Distribution

Type locality.

"*Leucosyrinx*" *sansibarica* Thiele, 1925
Fig. 34D–F

Leucosyrinx sansibarica Thiele, 1925: 181 (215), pl. 24 (36) fig. 1.

Brachytoma griffithii (not Gray, 1833) – von Martens 1904: 84. — Thiele 1904: 173, pl. 9 fig. 73.
Leucosyrinx sansibarica – Powell 1969: 340 (23-404), pl. 258 fig. 5.

Type material

Syntypes
EAST AFRICA • 2 specs; Pembakanal; 5°24′ S, 39°19′ E; depth 818 m; *Valdivia*, stn 246 (2 dead); ZMB?.

GULF OF ADEN • 2 specs; 13°2′ N, 46°41′ E; depth 1469 m; *Valdivia*, stn 271; ZMB Mol 60089, ZMB Mol 109387.

Remarks

The species was established for *Brachytoma griffithii* sensu von Martens (1904), not Gray, 1833. Von Martens (1904) cited material from two *Valdivia* stations: station 246 (Pemba Channel, off Zanzibar) and station 271 in the Gulf of Aden. Two dead specimens were collected at the first station, while several live specimens were collected at station 271. Thiele (1904: 173, pl. 9 fig. 73) illustrated the radula of the species without indicating the exact specimen, describing a radula typical of *Comispira* with a large central formation. Von Martens (1904) proposed a variety, *gracilior*, for specimens from off Zanzibar. When Thiele (1925) renamed the species *Leucosyrinx sansibarica*, he did not designate a holotype or a type series, nor did he provide a formal description, but from the specific epithet, it can be inferred he referred to the specimens from station 246. His illustration aligns with var. *gracilior* as described by von Martens, 1904 ("Martens distinguished a *var. gracilior*, which I have illustrated in Figure 1."—my translation).

We were unable to examine the specimens from the station 246, but the specimens from the station 271 in the Gulf of Aden are not conspecific. While one specimen represents the typical *Leucosyrinx* (ZMB Mol 60089, Fig. 34E), the other, with a row of subsutural knobs, belongs to *Comispira* (ZMB Mol 109387, Fig. 34F), rather similar to *C. obtusigemmata* (see below). The specimen illustrated by Thiele (1925) (Fig. 34D) is generally similar to the specimen of *Leucosyrinx* from the Gulf of Aden (Fig. 34E), differing mainly in its slenderer shell (a variable intraspecific character in *Leucosyrinx*) and a much shallower anal sinus. It should be noted that in several of Thiele's (1925) line drawings, the illustrated anal sinus does not match the actual sinus in the same specimen. We therefore consider *L. sansibarica* as belonging to the genus, although a final decision requires examining the illustrated specimen (currently unavailable) and designating a lectotype.

Distribution

Tanzania to Gulf of Aden, 818–1469 m.

Species excluded from Leucosyrinx and Comitas

As demonstrated here, previously to the current work, there was no clear distinction between *Leucosyrinx* and *Comitas*. Numerous species of *Leucosyrinx* were erroneously attributed to *Comitas* by Powell

(1969) and are reallocated in this work. The following Indo-Pacific species were previously attributed to either *Leucosyrinx* or *Comitas*, but we are excluding them on different grounds. The species are listed in alphabetical order by their specific epithet. The species that we consider as belonging to *Comitas* are not treated here.

Rhodopetoma amycus (Dall, 1919) comb. nov.
Fig. 34G

Antiplanes amycus Dall, 1919: 36, pl. 11 fig. 5.
Leucosyrinx kantori McLean, 1995: 81 (replacement name for *Antiplanes amycus* Dall, 1919), invalid.

Type material

Holotype
UNITED STATES OF AMERICA • SL 21.5 mm; California, West of Monterey Bay; 36.7167° N, 122.2° W; depth 1063 m; USS *Albatross*, stn 3670; USNM 226163.

Remarks

Dall (1919) described two species with the epithet *amycus* – *Antiplanes amycus* (p. 36, pl. 11 fig. 5) and *Leucosyrinx amycus* (p. 5, pl. 3 fig. 7). McLean (1995) transferred *Antiplanes amycus* to *Leucosyrinx* and proposed a replacement name, *Leucosyrinx kantori*, to avoid secondary homonymy. Examination of the type specimen of *Antiplanes amycus* (USNM 226163) revealed that the anal sinus is situated in the lower part of the subsutural ramp and also occupies part of the shoulder, a feature not found in any species of *Leucosyrinx*. Therefore, this species should be excluded from *Leucosyrinx*, and according to Article 59.4 of the ICZN, the name *Antiplanes amycus* Dall, 1919 should be reinstated as valid. Based on conchological characters, we transfer the species to the genus *Rhodopetoma* Bartsch, 1944 (family Pseudomelatomidae). *Rhodopetoma* is very similar to *Antiplanes*, differing mainly in the presence of variously developed axial folds. The name *Leucosyrinx kantori* thus becomes invalid. *Leucosyrinx amycus* Dall, 1919 is considered a junior subjective synonym of *Aforia goodei* (Dall, 1890) (McLean 1971b).

Distribution

Type locality.

Spergo? chuni (von Martens, 1901) comb. nov.
Fig. 35A

Pleurotoma (*Pseudomata* [sic]) *chuni* von Martens, 1901: 19.

Comitas chuni – Powell 1969: 274 (23-286), pl. 221 fig. 1.

Type material

Holotype
INDONESIA • west coast of Sumatra; 1°48′ N, 96°53′ E; depth 1143 m; ZMB Moll 60091.

Remarks

This large species (with SL 98.9 mm in the holotype), along with *Spergo sibogae* Schepman, 1913, was attributed to *Comitas* by Powell (1969) without much discussion. He simply mentioned that "Both species fit reasonably well into the genus *Comitas*" (p. 274 (23-286)). At the same time, Powell noted that "The figure of this species, which was referred to *Pontiothauma* by von Martens (1904), suggests, by the growth lines, a rather deep turriculid-style sinus, quite foreign to that of *Pontiothauma*, which

has at most a very weak sutural sinus." The type of *Pleurotoma chuni* is rather similar to *Spergo* Dall, 1895, particularly to *Spergo sibogae*, although its anal sinus is slightly deeper than in the mentioned species (Criscione *et al*. 2021: fig. 11f). Nevertheless, the shape of the sinus is quite different from those of *Leucosyrinx* and *Comitas*. The position of *S. sibogae* within *Spergo* was confirmed by a multilocus molecular analysis (Criscione *et al*. 2021). Based on the similarity between the shells of *Pleurotoma chuni* and *Spergo sibogae*, we reallocate the former species to *Spergo* (Raphitomidae) with some reservations.

Distribution

Type locality.

Burchia clionella (Dall, 1908)
Fig. 34H

Leucosyrinx? *clionella* Dall, 1908: 270, pl. 14 fig. 3.

Crassispira (*Burchia*) *clionella* – Powell 1966: 78.
"*Leucosyrinx*" *clionella* – McLean 1971a: 120, fig. 36.

Type material

Syntypes?
PACIFIC OCEAN • 1 spec.; Gulf of Panama; depth 511 ftm (= 934 m); USNM 97069 • 1 spec.; Ecuador, off Manta; depth 401 ftm (= 733 m); USNM 123125.

Remarks

The shell differs significantly from any species of *Leucosyrinx* due to its very short siphonal canal and the anal sinus being situated in the lower part of the subsutural ramp. McLean (1971a) illustrated the species' radula, but due to the small size of the photograph, little can be discerned, except that it consists solely of duplex marginal teeth. Powell (1966) attributed the species to *Burchia* Bartsch, 1944 (Pseudomelatomidae), and we concur with this classification.

Distribution

Type locality.

Lora equatorialis Dall, 1919 (Pseudomelatomidae, genus assignment uncertain)
Fig. 35B

Lora equatorialis Dall, 1919: 44, pl. 13 fig. 2.

? *Leucosyrinx equatorialis* – McLean 1971a: 120, fig. 38.

Type material

Syntypes
PACIFIC OCEAN • 3 specs; coast of Ecuador to Patagonia; depth 122–407 ftm; USNM 97092, 97070, 697384.

Remarks

The small shell (13.5 mm in shell length, according to the original description) is characterized by a very short siphonal canal, strong axial ribs extending from the subsutural ramp to the siphonal canal, and an extremely shallow, barely discernible anal sinus. These features exclude the species from *Leucosyrinx*.

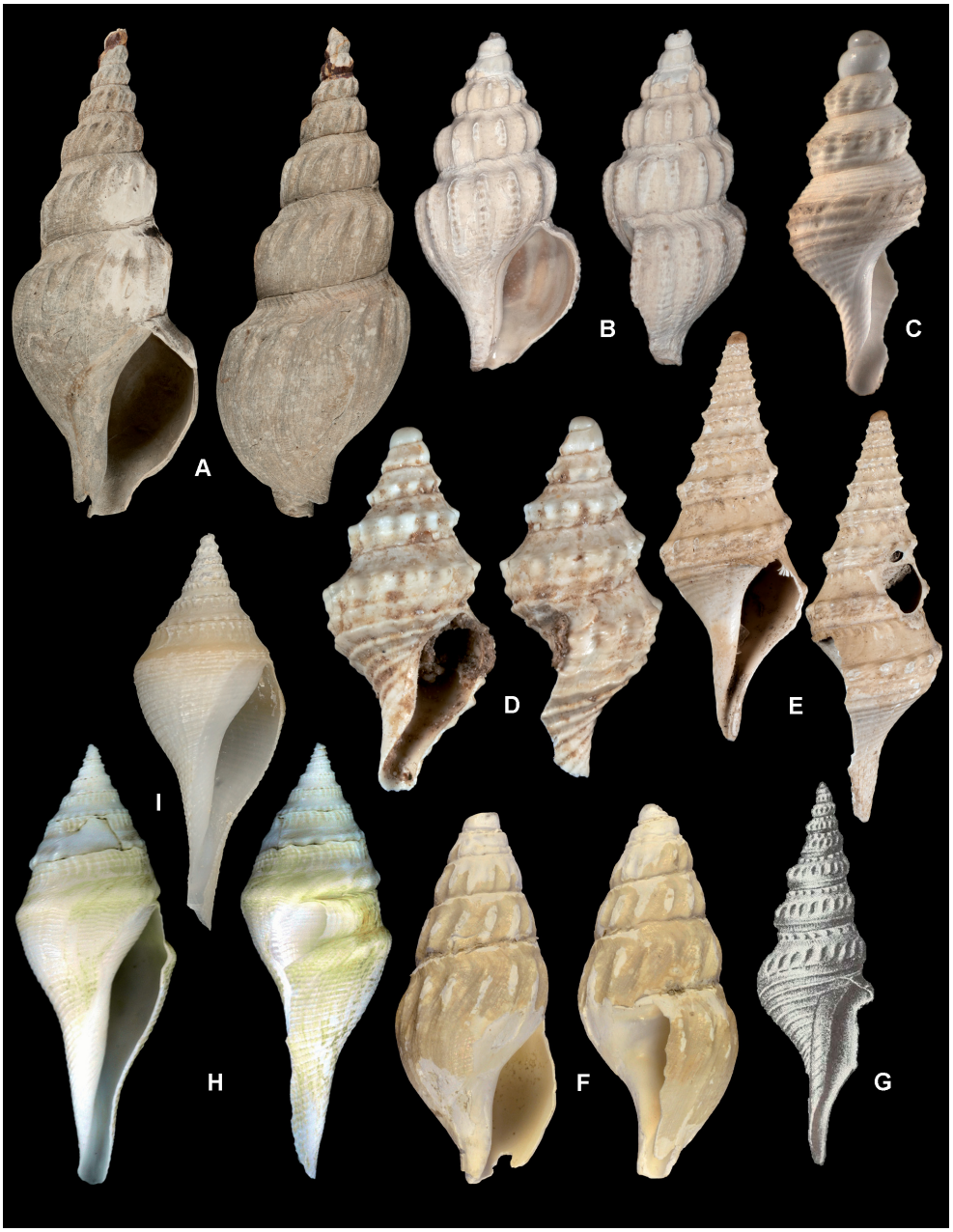

Fig. 35. Species excluded from *Leucosyrinx* Dall, 1889 and *Comitas* H.J. Finlay, 1926. **A**. *Spergo? chuni* (von Martens, 1901), holotype, ZMB Moll 60091, SL 98.9 mm (photo courtesy of Museum für Naturkunde). **B**. *Lora equatorialis* Dall, 1919 (Pseudomelatomidae, genus assignment uncertain), syntype, USNM 97092, SL 13.5 mm (photo courtesy of USNM). **C**. *Antimelatoma eremita* (Murdoch & Suter, 1906), holotype, MNZ, M.001718 (from the website of MNZ, https://collections.tepapa.govt.nz/object/151599). **D**. *Leucosyrinx elsa* Thiele, 1925 (family and genus assignment uncertain), syntype, ZMB Mol 109383, SL 4.7 mm (photo courtesy of Museum für Naturkunde). **E**. *Comispira erica* (Thiele, 1925) comb. nov., syntype, ZMB Mol 109382, SL 20.1 mm (photo courtesy of Museum für Naturkunde). **F**. *Pleurotomella esilda* Dall, 1908 (family and genus assignment uncertain), holotype, USNM 123126, SL 22.8 mm (photo courtesy of USNM). **G**. *Comispira exstructa* (von Martens, 1904) comb. nov., holotype, SL 24 mm (from von Martens 1904). **H–I**. *Sibogasyrinx lancea* (Y.-C. Lee, 2001) comb. nov. **H**. Holotype, NMNS-3704001, SL 46.9 mm (photo courtesy of Kun-Hsuan Lee). **I**. MNHN-IM-2009-13465, Philippines (sequenced specimen). Shells not to scale.

McLean (1971a: fig. 38) illustrated the radula of a specimen from the type series (USNM 97070), but due to the small size of the photograph, little can be discerned beyond the presence of duplex marginal teeth. This suggests that the species likely belongs to the family Pseudomelatomidae, though we are currently unable to determine its exact generic position.

Distribution

Type locality.

Antimelatoma eremita (Murdoch & Suter, 1906)
Fig. 35C

Pleurotoma (*Leucosyrinx*) *eremita* Murdoch & Suter, 1906: 287, pl. 22 figs 18–19.

Type material

Holotype
NEW ZEALAND • off Great Barrier I., North I.; depth 110 ftm (= 201 m); MNZ, M.001718.

Remarks

In its shell characters this small species (SL of the holotype 5.8 mm) is very different from *Leucosyrinx*, but fits well the morphology of the genus *Antimelatoma* Powell, 1942 (family Psudomelatomidae). It is identified as *Antimelatoma* in the collections of Museum of New Zealand Te Papa Tongarewa and we follow here this generic assignment.

Distribution

Type locality.

Leucosyrinx elsa Thiele, 1925 (family and genus assignment uncertain)
Fig. 35D

Leucosyrinx elsa Thiele, 1925: 201(235), pl. 24(36) fig. 21.

Leucosyrinx elsa – Powell 1969: 337 (23-401), pl. 257 fig. 3.

Type material

Syntypes
TANZANIA • 1 spec.; Zanzibar Channel; 5°27′ S, 39°18′ E; depth 463 m; Valdivia, stn 245; ZMB Mol 109383 • 25 specs; Dar Es Salaam; Valdivia, stn 242; ZMB Mol 109383.

Remarks

The species is known only from numerous empty juvenile shells (SL up to 5.8 mm) from two stations off Tanzania. The spiral sculpture on the last whorl is dominated by several strong cords below the shoulder crossing axial folds extending in some specimens to the shell base and thus isolating two or sometimes three rows of strong nodules (more pronounced than in the figured herein syntype). This type of sculpture is not found in any species of *Leucosyrinx*, and we exclude the species from the genus. Current taxonomic position is unknown.

Distribution

East Africa, Tanzania, 463 m.

Comispira erica (Thiele, 1925) comb. nov.
Fig. 35E

Leucosyrinx erica Thiele, 1925: 236, pl. 36 (24) fig. 25.

Comitas erica – Powell 1969: 284 (23-296), pl. 226 fig. 2. — Sysoev 1996: 8, fig. 41.

Type material

Syntypes
SUMATRA • 3 specs; off Siberut I., 0°39′ S, 98°52′ E; depth 750 m; ZMB Mol 109382.

Remarks

The type series consists of 3 shells, one complete (SL 20.1 mm), one juvenile and one broken.

The species is characterized by a subsutural row of rounded knobs. This is not found in any species of *Leucosyrinx*, but on the contrary present in all species of *Sibogasyrinx* and *Comispira*. Based on the spiral sculpture pattern we conditionally attribute the species to *Comispira.*

Distribution

Zanzibar, Maldive Is. and Sumatra, 750–797 m.

Pleurotomella esilda Dall, 1908 (family and genus assignment uncertain)
Fig. 35F

Pleurotomella (*Pleurotomella*) *esilda* Dall, 1908: 282.

Leucosyrinx esilda – McLean 1971b: sp. 1668, with query.

Type material

Holotype
PACIFIC OCEAN • Gulf of Panama; depth 730 ftm (= 1335 m); USNM 123126.

Remarks

The species is based on a single, heavily broken, dead-collected shell (22.8 mm in shell length). It differs significantly from species of *Leucosyrinx* as defined here, exhibiting a very short siphonal canal, strong and long axial ribs extending to the poorly defined subsutural ramp, and an anal sinus situated close to the shoulder. On these grounds, we exclude the species from *Leucosyrinx*, but we are currently unable to determine its generic position.

Distribution

Type locality.

Comispira exstructa (von Martens, 1904) comb. nov.
Fig. 35G

Surcula exstructa von Martens, 1904: 81, pl. 1 fig. 4.

Surcula exstructa – Thiele 1925: 181(215), pl. 23(35) fig. 21.
Comitas exstructa – Powell 1969: 283 (23-295), pl. 226 fig. 1

Type material

Holotype

INDIAN OCEAN • Nicobar Is.; 7°48′ N, 93°07′ E; depth 805 m; whereabouts unknown.

Remarks

This species is based on a single strongly damaged holotype (SL 24 mm). The original drawing and the details of the sculpture provided by Thiele (1925) show a subsutural row of rounded knobs. These are not found in any species of *Leucosyrinx*, but are, conversely, present in all species of *Sibogasyrinx* and *Comispira*. Based on the broadly-spaced and rather strong spiral cords, we attribute the species to *Comispira*.

Distribution

Type locality.

Sibogasyrinx lancea (Y.-C. Lee, 2001) comb. nov.
Fig. 35H–I

Leucosyrinx lancea Y.-C. Lee, 2001: 8, fig. 2a–d.

Type material

Holotype

TAIWAN • off Pratas I.; depth 430–610 m; dredged by shrimp trawlers; NMNS-3704001.

Material examined (sequenced)

PHILIPPINES • 1 lv; Luzon I.; 15°53′ N, 121°54′ E; depth 518–538 m; AURORA 2007, stn CP2750; MNHN-IM-2009-13465.

Remarks

The species is characterized by a subsutural row of rounded knobs. This is not found in any species of *Leucosyrinx*, but is, conversely, present in all species of *Sibogasyrinx* and *Comispira*. Moreover, a very similar specimen (MNHN-IM-2009-13465 – Fig. 35E), collected off Luzon, Philippines, at similar depths (518–538 m) was recently sequenced and a partial *cox1* sequence confidently places it in *Sibogasyrinx.* Therefore, we transfer it to *Sibogasyrinx.*

Distribution

Taiwan to Philippines, 430–518 m.

Comispira obtusigemmata (Schepman, 1913) comb. nov.
Fig. 36A

Surcula obtusigemmata Schepman, 1913: 60(424), pl. 27 fig. 12a–b.

Comitas obtusigemmata – Powell 1969: 284 (23-296), pl. 227 figs 1–2. — Sysoev 1997: 347.

Type material

Syntypes

INDONESIA • 1 spec.; Makassar Strait; 4°22.1′ S, 118°16.9′ E; depth 2029 m; Siboga Expedition stn 76; NATURALIS, ZMA.MOLL.137985 • 1 spec.; channel between Makjan and Halmahera; 0°23.8′ N, 127°29′ E; depth 472 m; Siboga Expedition stn 137; NATURALIS, ZMA.MOLL.137983 • 1 spec.;

Arafura Sea; 5°46.7′ S, 139°00′ E; depth 1788 m; Siboga Expedition stn 271; NATURALIS, ZMA. MOLL.137984.

Remarks

The species is characterized by a subsutural row of rounded knobs. This is not found in any species of *Leucosyrinx* or *Comitas*, but on the contrary present in all species of *Sibogasyrinx* and *Comispira*. In shell shape and sculpture the species is quite similar to *Comispira mai* (Li & Li, 2008) (Kantor *et al.* 2018: fig. 2a–c), differing in a slightly shorter shell and larger knobs on the shell periphery. Therefore, we transfer *Surcula obtusigemmata* to *Comispira.*

Conchologically, the species is very similar to *Comispira subsuturalis* (von Martens, 1901) and both species can be conspecific. Presently, we recognize both species as valid due to significant distance between collecting sites – East Africa for *C. subsuturalis* and Indonesia for *C. obtusigemmata*.

Schepman (1913) cited erroneously the longitude of stn 76 as 180°16.9′ E. The coordinates provided here corresponding to the Macassar Strait were taken from Tydeman (1902).

Distribution

Indonesia, 472–1788 m.

Mangelia opulenta Thiele, 1925

Mangelia opulenta Thiele, 1925: 306(340), pl. 28(40) fig. 4.

Comitas opulenta – Bozzetti 1993: 1.

Type locality

Padang, Sumatra.

Remarks

The species described and illustrated by Thiele (1925) definitely belongs to Mangeliidae P. Fischer, 1883. Bozzetti (1993) without any discussion and undoubtedly erroneously attributed the species to *Comitas*. Therefore, we reinstate herein the original binomen of the species, although the generic position of the species requires clarification

Distribution

Type locality.

Sibogasyrinx pikei (Dell, 1963) comb. nov.
Fig. 36B

Waitara pikei Dell, 1963: 215, textfigs 3–4.

Leucosyrinx pikei – Powell 1969: 339(23-403), pl. 258 figs 3–4; 1979: 230, pl. 47 fig. 8.

Type material

Holotype

NEW ZEALAND • 18 miles N, 30° E of Poor Knights Is.; depth 256–267 fathoms (= 468–488 m); 20 Nov. 1962; MNZ, M.016273.

Fig. 36. Species excluded from *Leucosyrinx* Dall, 1889 and *Comitas* H.J. Finlay, 1926. **A**. *Comispira obtusigemmata* (Schepman, 1913) comb. nov., syntype, NATURALIS, ZMA.MOLL.137984, SL 22.5 mm (photo courtesy of K. Hasegawa). **B**. *Sibogasyrinx pikei* (Dell, 1963) comb. nov., holotype, MNZ, M.016273, SL 35.5 mm (from the website of MNZ, https://collections.tepapa.govt.nz/object/150983). **C**. *Comispira saudesae* (Cossigniani, 2018) comb. nov., paratype, SL 30, 28.9 mm, collection of Jean Pierre Vezzaro (photos courtesy of T. Cossigniani). **D**. *Comispira saudesae*, MNHN-IM-2009-18998, Philippines, SL 22.8 mm (sequenced specimen). **E–F**. *Comispira subsuturalis* (von Martens, 1901) comb. nov. **E**. Syntype, SL 16.1 mm. **F**. Syntype, SL 22.1 mm (photo courtesy of Museum für Naturkunde). **G**. *Sibogasyrinx suluensis* (Powell, 1969) comb. nov., holotype, USNM 238399, SL 21.0 mm (photo courtesy of USNM). **H**. *Sibogasyrinx variabilis* (Schepman, 1913) comb. nov., lectotype, NATURALIS, ZMA.MOLL.136887, SL 18.5 mm (photo courtesy of K. Hasegawa). Shells not to scale.

Remarks

The species was originally described based on two specimens, and no new specimens have been reported in the literature since its original description. In 1969, Powell transferred the species to the genus *Leucosyrinx*. However, the shell is characterized by the presence of a subsutural row of weak but distinct nodules – a feature never found in *Leucosyrinx*, but present in *Sibogasyrinx* and *Comispira*. In its slender shell with relatively weak uniform spiral sculpture the species is more similar to *Sibogasyrinx*. Therefore, we currently attribute the species, with some reservation, to *Sibogasyrinx*; this needs confirmation through examination of the radula or molecular data.

Distribution

Type locality.

Comispira saudesae (Cossigniani, 2018) comb. nov.
Fig. 36C–D

Comitas saudesae Cossigniani, 2018: 30.

Type material

Holotype
TAIWAN • Nord-East Taiwan; depth 300–500 m; MMM.

Material examined (sequenced)

PHILIPPINES • 2 lv; Luzon I.; 15°20′ N, 121°37′ E; depth 593–600 m; AURORA 2007, stn CP2729; MNHN-IM-2009-18997, MNHN-IM-2009-18998.

Material examined (not sequenced)

PHILIPPINES • 1 lv; off Panglao I., 9°36′ N, 123°42′ E; depth 609–673 m; PANGLAO 2005, stn CP2396; MNHN-IM-2009-13387

Remarks

The species is characterized by a subsutural row of rounded knobs, which are more prominent in the paratypes. This feature is not found in any species of *Leucosyrinx* or *Comitas*, but is consistently present in all species of *Sibogasyrinx* and *Comispira*. Our specimens closely resemble the type series, particularly the paratypes. Although unpublished, molecular data place the species within *Comispira*. Our findings extend the known range of the species from Taiwan to the Philippines.

Distribution

Philippines to Taiwan, 300–600 m.

Comispira subsuturalis (von Martens, 1901) comb. nov.
Fig. 36E–F

Pleurotoma (*Brachytoma*) *subsuturalis* von Martens, 1901: 16.

Brachytoma subsuturalis – von Martens 1904: 85, pl. 1 fig. 7.
Comitas subsuturalis – Powell 1969: 285 (23-297), pl. 226 figs 3–4. — Sysoev 1996: 7, figs 31–40. — Hasegawa 2005: 169, fig. 11e-f.

Type material

Syntypes

INDIAN OCEAN • 2 specs; East Africa; 1°49′ N, 45°29′ E; depth 1134 m; ZMB Mol 60088.

Remarks

Powell (1966: fig. 52) illustrated the radula of a specimen from the John Murray expedition, which features a large central formation typical of Cochlespiridae, but absent in *Comitas* and *Leucosyrinx*. The shell of this species has a row of subsutural nodules, a feature not found in any species of *Leucosyrinx* or *Comitas*, but present in all species of *Sibogasyrinx* and *Comispira*. The shell shape and sculpture closely resemble those of *Comispira*, leading us to transfer the species to that genus.

Distribution

This species is very broadly distributed, ranging from East Africa through the Indian Ocean to Japan, at depths of 494–1789 meters. This exceptionally wide distribution and high variability (Sysoev 1996) may indicate that we are dealing with a complex of species.

Sibogasyrinx suluensis (Powell, 1969) comb. nov.
Fig. 36G

Comitas suluensis Powell, 1969: 280 (23-292), pl. 223 fig. 7

Type material

Holotype

Philippines • Sulu Archipelago, off Cagayan I.; depth 508 ftm (= 929 m); USNM 238399.

Remarks

The shell of this species has a row of subsutural nodules, a feature not found in any species of *Leucosyrinx* or *Comitas*, but present in all species of *Sibogasyrinx* and *Comispira*. In shell outline the species is more similar to *Sibogasyrinx* spp. than to any *Comispira*, therefore we allocate it to *Sibogasyrinx.*

Distribution

Type locality.

Turris saldanhae Barnard, 1958 (Pseudomelatomidae, genus assignment uncertain)

Turris saldanhae Barnard, 1958: 109, figs 3f, 7.

Comitas saldanhae – Powell 1966: 15, fig. b7; 1969: 267 (23-279), pl. 205 fig. 1, with query. — Nolf 2011: 1–2, pls 1–2.

Type material

Holotype

SOUTH AFRICA • Saldanha Bay, off Baboon Point; depth 31 ftm (= 57 m); SAM A1738.

Remarks

The shell of the species possesses an anal sinus, which occupies part of the subsutural ramp, similar to species of *Comitas*. Nervertheless, the radula, as illustrated by Barnard (1958: fig. 3f), consists of duplex marginal teeth, with the accessory limb of the marginal tooth inserted into a rather deep and broad socket on the major limb. This tooth structure is very different from the radulae of *Comitas* that have been

examined (Fig. 3F). Although we cannot determine the exact generic position of the species, the radula type suggests it belongs to the family Pseudomelatomidae.

Distribution

South Africa, Namibia, 55–1280 m.

Sibogasyrinx variabilis (Schepman, 1913) comb. nov.
Fig. 36H

Surcula variabilis Schepman, 1913 (part.): 61(425), pl. 28 fig. 1a.

Comitas variabilis – Powell 1969: 281 (23-293), pl. 224 fig. 1.
Schepmania variabilis – Shuto 1970b: 38, pl. 3 figs 1–3.
Shutonia variabilis – Van der Bijl 1993: 146 (new generic name for *Schepmania* Shuto, 1970, non *Schepmania* Haas, 1913).

Type material

Lectotype
INDONESIA • Ceram Sea; 2°40′ S, 128°37.5′ E; depth 835 m; ZMA 136887.

Remarks

The type series consisted of 12 specimens collected from the same station. Later, Shuto (1970b) observed that the series actually included three different species and described two of them based on the syntypes, *Makiyamaia sibogae* Shuto, 1970, and *Lucerapex schepmani* Shuto, 1970. Shuto applied the name *Schepmania* gen. nov. *variabilis* to three specimens. However, the genus was later renamed as *Shutonia* due to homonymy (van der Bijl 1993).

Examination of the photograph of the largest specimen (illustrated by Schepman 1913: pl. 28 fig. 1a) revealed that it possesses a subsutural row of nodules, more prominent on the upper whorls, which is characteristic of *Sibogasyrinx* and *Comispira* but not of other genera of Conoidea. Therefore, we transfer the species to *Sibogasyrinx*, rendering *Shutonia* a junior synonym.

Distribution

Type locality.

Discussion

Diversity of *Leucosyrinx*

The molecular phylogenetic analysis revealed the existence of 62 SSHs in our material collected from the Indo-Pacific. We were able to assign existing names to 12 of them. The remaining 50 SSHs represent new species, of which we have described 24, leaving 26 unnamed (*Leucosyrinx* sp. 1 to *Leucosyrinx* sp. 26). We did not name these 26 SSHs primarily because 20 were represented by a singleton, and the others by a very limited number of specimens (two specimens for four SSHs and three specimens for two SSHs). The SSHs represented by two or more specimens were either morphologically indistinguishable from other species, or comprised heterogeneous material, or lacked well-preserved specimens necessary for species descriptions.

We refined morphological characteristics of Leucosyrinx, and were able to confidently attribute 18 previously named Pacific species to that genus, and four more species were attributed to the genus conditionally. This brings the total number of species of *Leucosyrinx* in the Indo-Pacific to 84, 58 of

which are named. Additionally, there are several species of *Leucosyrinx* in the Atlantic, including the type species of the genus, *L. verrillii*. The total number of described and accepted species positions the genus as the third most diverse within the family Pseudomelatomidae, following *Crassispira* Swainson, 1840 (with 118 accepted recent species according to MolluscaBase 2024) and *Inquisitor* Hedley, 1918 (with 74 species). When considering the total number of SSHs (86, including Atlantic species), *Leucosyrinx* ranks as the second most species-rich genus. Additionally, the monophyly of *Crassispira* has not been tested with molecular data; the genus is morphologically very heterogeneous, and it is possible that, in its current scope, it is paraphyletic. The next speciouse genus is *Otitoma* Jousseaume, 1898 with only 33 accepted Recent species.

Eighteen species that were previously attributed to *Leucosyrinx* or *Comitas* before this study have been reassigned to other genera based on refined morphological characteristics of the shell.

Species of *Leucosyrinx* are generally rare. Among the material we sequenced, 22 SSHs are represented by a single specimen, an additional 14 SSHs by two specimens, and only four SSHs by more than 10 specimens. An exception is *Leucosyrinx bolognai*, which is represented in our material by 45 specimens, though only three were recently collected and successfully sequenced. Similarly, 10 out of the 18 previously described species, absent in our material, are known only from the holotype, while the remaining species are represented by 2–3 specimens.

This rarity can be partially explained by the relatively deep-water habitat of *Leucosyrinx*, confined to the upper bathyal zone, making material collection difficult. The shallowest depth recorded is 195 m (*L. breviplicata*), while the deepest is 3014 m (*L. exulans*). When considering the shallower depths of the range for each species, 18 species were collected at depths shallower than 500 m, 33 at depths between 500–1000 m, and 8 at depths greater than 1000 m.

Morphological variability and application of the names

In general, *Leucosyrinx* is characterized by a shell that is highly variable in shape and size, ranging from small (adult size less than 10 mm) to very large, up to 90 mm in length. The shell varies from narrow fusiform (Fig. 21I–O) to broadly oval (Fig. 24). Apart from size and outline, the shell of *Leucosyrinx* is relatively poor in diagnostic features. A distinct color pattern is absent, and with few exceptions, the spiral sculpture is very similar among species, consisting of rather uniform, weak spiral cords. Exceptions include *L. breviplicata*, with its broadly-spaced and relatively strong spiral cords (Fig. 26), and *L. nodulocordata* sp. nov., which has fewer spiral cords below the shoulder, forming nodules (Fig. 28H–L). The intraspecific variability within molecularly defined species can be high (e.g., in *L. breviplicata* – Fig. 26) and, in some cases, exceeds interspecific variability. For example, *Leucosyrinx* sp. 26 and *Leucosyrinx* sp. 7 (Fig. 27C–H) are very similar to *L. breviplicata*, with no clear morphological differences from the latter species. This situation is exacerbated by the rarity of the majority of species, making it impossible to evaluate their variability comprehensively.

Molecular analyses, in addition to delimiting PSHs and inferring phylogenetic relationships, often proves indispensable for post hoc refinement and correction of morphological diagnoses in an integrative taxonomy approach. This enables the reassessment of the taxonomic position of even non-sequenced specimens. In this study, by analyzing the morphology of a large number of sequenced species of *Leucosyrinx* and comparing them with sequenced species of similar genera, such as *Sibogasyrinx*, *Comispira*, and *Comitas*, we were able to identify taxonomically important characters and refine the diagnosis of *Leucosyrinx*. For instance, the shape and position of the anal sinus, which spans across the entire subsutural ramp but does not extend below the shoulder, distinguishes *Leucosyrinx* from *Comitas*. Although Powell (1966, 1969) recognized the importance of the anal sinus shape, he did not consistently use this character, leading to the erroneous transfer of many species of *Leucosyrinx* to *Comitas*. Another

example is the subsutural row of knobs, present in all species of *Sibogasyrinx* and *Comispira* but absent in *Leucosyrinx* and *Comitas*. Similarly, Powell (1969) recognized this character's importance and even established a separate "subsuturally gemmate series" of species of *Comitas* but clearly underestimated its taxonomic significance. Correspondingly, when describing *Leucosyrinx* (*Sibogasyrinx*), he mentioned the presence of "comma-like subsutural crenulations" in the type species, *S. pyramidalis* (Schepman, 1913), but also attributed to the same subgenus a second species, *L. archibenthalis*, which lacks subsutural knobs and is here attributed to *Leucosyrinx* proper. This misclassification was followed by other researchers, such as Sysoev (1996), who attributed species with subsutural knobs to *Comitas*.

All but two previously described species of *Leucosyrinx* discussed here were described based solely on shell characteristics. Consequently, applying available names to SSHs can only be done through shell comparisons. However, we have demonstrated that, in many cases, intraspecific variability can exceed interspecific differences. Additionally, many species of *Leucosyrinx*/*Comitas* were described from remote areas that are currently inaccessible due to legal restrictions (e.g., Andaman Is., Sri Lanka, and Gulf of Oman). Therefore, sequencing specimens from the type localities is hardly achievable. Even when material is collected near the type locality, more than one species may be present, complicating the application of a name. This is evident in the conchologically similar species from the Philippines and adjacent areas, such as *L. luzonica*, *L. quinetae*, and *Leucosyrinx* sp. 19 (see remarks on the description of *L. luzonica*).

As a result of the above considerations, in some cases, existing names can only be conditionally applied to molecularly defined SSHs. Nevertheless, we have adopted a conservative approach, attempting to apply as many existing names as possible to the defined SSHs. We consider this a necessary measure to avoid creating potential synonyms. In the future, when extracting DNA from holotype shells becomes routine (Walton *et al*. 2023), any potential mistake can be easily corrected. The situation with *Leucosyrinx* once again emphasizes the necessity of molecular data to support description of new species in taxonomically challenging groups. Even species that seem distinct at the moment may later prove to be a part of a group of cryptic species, as has been demonstrated multiple times in different groups of Conoidea (e.g., in the genera *Gemmuloborsonia* Shuto, 1989 and *Lophiotoma* Casey, 1904 – Puillandre *et al*. 2010, 2017).

Radular morphology

The radula was examined in 40 sequenced species of *Leucosyrinx*. With the absence of a central formation, the radular morphology is fairly uniform within the genus. The variability in the shape of the marginal teeth primarily concerns their slenderness (i.e., the ratio between the maximal tooth width and its length) and the degree of curvature of the major limb of the tooth. Currently, we cannot use these characters for morphological diagnostics of the species, as they are difficult to quantify – the visible tooth shape significantly depends on the angle at which it is observed. A more variable characteristic is the relative tooth length, which is the ratio between tooth length and aperture length. This ratio varies from 1.6–1.8% in *L. farhatorum* to 6.6% in *L. luzonica*. We did not observe a correlation between relative tooth length and shell length, as both the shortest and longest teeth were recorded in species of similar size (with maximum shell lengths of 42.7 mm and 42 mm, respectively). It is possible that differences in tooth length may reflect differences in diet, although this cannot be confirmed at the moment, as the diet of species of *Leucosyrinx* remains unknown.

While radular morphology cannot currently be used for species discrimination, it remains an invaluable tool when combined with certain shell characteristics, such as the shape of the anal sinus and the pattern of the axial sculpture, for distinguishing *Leucosyrinx* from conchologically similar related genera like *Comitas*, *Antarctospira*, and *Sibogasyrinx*.

Table 1. The recorded absolute and relative species richness of *Leucosyrinx* Dall, 1889 in different studied areas.

Region	No. of spp	No. of hauls	No. of hauls/no. spp.
Philippines	10	148	14.8
PNG–Solomon Islands	30	684	22.8
Madagascar, Mozambique	7	176	25,1
South China Sea	2	54	27
Walters Shoal	1	44	44
Vanuatu	3	144	48
New Caledonia–Coral Sea	14	768	54.8
Society Islands	2	204	102

Distribution patterns

Leucosyrinx is a broadly distributed genus found in both the Indo-Pacific and Atlantic Oceans. In the Atlantic, molecular data confirm its distribution, ranging from North Carolina (*L. verrillii*) to Argentina (*L. argentina* Sánchez & Pastorino, 2024). In the Indo-Pacific, the genus spans both oceans, from the Galapagos Is. in the east, through the Eastern, Central, and Western Indo-Pacific, to Mozambique and Madagascar in the west, southern Australia and Tasmania in the south, and Japan in the north. Our review is based almost exclusively on material collected during oceanographic cruises organized by MNHN, and therefore largely reflects the museum's current efforts (molecular-grade deep-water material of *Leucosyrinx* was first collected in 2005 during the PANGLAO 2005 expedition in the Philippines) rather than the actual distribution pattern of the genus.

The number of recorded species (SSH) varies greatly by region, from 30 in Papua New Guinea and the Solomon Is. to a single species in the Walters Shoal in the Indian Ocean (Table 1). To determine whether these numbers reflect the actual diversity of the genus in each region or are influenced by sampling activities, we counted the total number of bottom operations during cruises that yielded specimens of *Leucosyrinx* for each selected region in the depth range where specimens of *Leucosyrinx* were recorded. We then divided the number of operations by the number of recorded species. A lower value indicates higher recorded diversity. Interestingly, the Philippines, with only 10 recorded species, is by far the richest region (Table 1), with approximately 15 operations per recorded species, while Papua New Guinea and the Solomon Is., with 30 recorded species, rank as the second richest region (22.8 operations per recorded species). New Caledonia and the Coral Sea, with 14 recorded species, are penultimate among the analyzed regions (54.8 operations per species).

This analysis is preliminary, as many regions of the Indo-Pacific have not been recently sampled, and no molecular-grade material is available for these areas.

In general, the observed distribution of species of *Leucosyrinx*, as confirmed by molecular data, is characterized by rather narrow ranges. Typically, a species inhabits a single archipelago, with the exception of Papua New Guinea, the Bismarck Archipelago, and the Solomon Is., which share many common species. Only four species extend their range from Papua New Guinea and the Solomon Is. to the Philippines (*L. schepmani* sp. nov., *L. margaritae*, *L. nodulocordata* sp. nov., *L. archibenthalis*), two to New Caledonia (*L. bourgeoisae* sp. nov., *L. modicae* sp. nov.) and one species is distributed from the Philippines to the South China Sea (*L. luzonica*). Finally, one species, represented by only two specimens,

has been recorded in both Madagascar and Papua New Guinea (*Leucosyrinx* sp. 18). We suspect broader distribution in some previously described species, but it has not yet been confirmed by molecular data. Generally, the small paucispiral protoconch, with less than two whorls in all species of *Leucosyrinx* examined in this respect, suggests direct development and thus limited dispersal abilities. However, it is also possible that the narrow ranges observed are to some extent an artifact of the limited material at our disposal. However, it is noticeable that the overall pattern of species distributions and rarity in *Leucosyrinx* is in stark contrast with the very broad distribution ranges demonstrated in other conoidean lineages, the turrid genus *Cryptogemma* Dall, 1918 (Zaharias *et al*. 2020), and raphitomid genera, such as *Theta* A.H. Clarke, 1959 (Sánchez & Pastorino 2020; Criscione *et al*. 2021). Nevertheless it should be emphasized that the mentioned genera are characterized by planctotrophic larvae and, correspondingly, higher dispersal abilities. The very broad geographic distribution of *Leucosyrinx* in combination with i) narrow species distribution ranges ii) general rarity, indicate that we may be still very far from exhaustive sampling of the *Leucosyrinx* worldwide diversity. This rarity pattern establishes the genus *Leucosyrinx* as a major reservoir of undescribed deep-sea diversity at the genus level. Further seafloor sampling, especially in the currently weakly covered areas are likely to continue discover new species, for many years from now.

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Supplementary files

Suppl. file 1. Bayesian phylogenetic tree obtained with the *cox1* dataset. Posterior probabilities (> 0.80) are shown for each node. https://doi.org/10.5852/ejt.2025.999.2945.13295

Suppl. file 2. ASAP partitions of sequenced specimens, the best partition (rank 1) is second from the right. https://doi.org/10.5852/ejt.2025.999.2945.13297

Suppl. file 3. List of examined material included in molecular phylogenetic analysis. GB = GenBank. https://doi.org/10.5852/ejt.2025.999.2945.13299