

Annotated catalogue of the types of Triphoridae (Mollusca, Gastropoda) in the Natural History Museum of the United Kingdom, London

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<http://zoobank.org/0F66F482-B7AB-4A5C-A611-68EC01012D41>

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Abstract

Received 10 January 2019
Accepted 28 February 2019
Published 22 April 2019

Academic editor:
Matthias Glaubrecht

Key Words

Atlantic Ocean
Caribbean
Eastern Pacific
Indo-Pacific province
lectotype designation
Mediterranean Sea
South Africa
South Australia
taxonomy
type specimens

We revise the type specimens of 132 nominal species of worldwide Triphoridae stored in the Natural History Museum of the United Kingdom (NHMUK), London. We provide the species name in its original combination, followed by bibliographic details of the original description, the location of the known type material, the original description (and its translation when in Latin), a diagnosis and curatorial or nomenclatural notes. We illustrated most specimens in the type series in colour and with SEM imaging and we have added the original figure whenever possible. The specimens of *Triphoris alveolatus*, *T. granulatus*, *T. suturalis* and *T. verrucosus*, all A. Adams & Reeve, 1850, *T. pfeifferi* Crosse & Fischer, 1865 and *T. cucullatus* de Folin, 1867, previously considered type material, are not considered here belonging to the type series. Adams & Reeve's taxa should be considered *nomina dubia*. The name *Triphora insularum* is a manuscript name by H.E.J. Biggs who deposited “types” in the NHMUK but refrained from introducing the name due to the lack of apex of the studied material. We selected lectotypes for six species (*T. concors* Hinds, 1843, *T. maxillaris* Hinds, 1843, *T. fuscomaculata* E.A. Smith, 1904, *T. shepstonensis* E.A. Smith, 1906, *T. eupunctata* G.B. Sowerby III, 1907, and *T. rufula* Watson, 1886) to stabilize the nomenclature. Finally, we illustrate original specimens (although not types) of three species described by Turton, whose type material is lost.

Table of contents

Introduction.....	162
Methods.....	162
Abbreviations.....	163
Taxonomic index.....	163
Systematic list of taxa.....	165
Species described by A. Adams.....	165
Species described by A. Adams and L.E. Reeve.....	174
Species described by H.E.J. Biggs.....	179
Species described by J. Crosse and P. Fischer.....	180
Species described by L. de Folin.....	183
Species described by R.B. Hinds.....	184
Species described by J.G. Jeffreys.....	210
Species described by E.A. Kay.....	213

Species described by S. Kosuge	218
Species described by B.A. Marshall.....	236
Species described by J.C. Melvill	236
Species described by J.C. Melvill and R. Standen	243
Species described by W.H. Pease	245
Species described by E. Rolán and co-authors.....	254
Species described by E.A. Smith.....	254
Species described by G.B. Sowerby III.....	270
Species described by J.R. le B. Tomlin	280
Species described by W.H. Turton.....	283
Species described by J.C. Verco	285
Species described by R.B. Watson	297
Acknowledgements.....	306
References.....	306

Introduction

Triphoridae is one of the mega-diverse families of marine gastropods (Bouchet et al. 2002). In a single season in Vanuatu, an expedition organized by the Muséum National d'Histoire Naturelle, Paris, collected 259 species and 70% of them were estimated to be new to science (Albano et al. 2011). The study of the material collected during other MNHN expeditions and smaller collections from other sources in the Indo-Pacific province has led to the segregation of ca 670 morphospecies (P.G. Albano and P.A.J. Bakker, unpublished). At the same time, we censused approximately 450 names of Indo-Pacific triphorids which, however, show high redundancy and are strongly biased towards the most characterised species due to colour or other morphological features. Moreover, the family Triphoridae has already shown to host a wealth of cryptic diversity: in the Mediterranean Sea, a single name (*Triphora perversa*) had been used for two centuries before Philippe Bouchet started recognizing what is now known as more than 15 species (Bouchet and Guillemot 1978; Bouchet 1985). Consequently, we felt it mandatory to review thoroughly the type specimens of the already described species to polish taxa redundancy and fix the actual meaning of the introduced names, sometimes not or poorly illustrated. This endeavour started with the revision of the triphorid types in the Museum für Naturkunde in Berlin (Albano and Bakker 2016) and in the Naturhistorisches Museum in Vienna (Albano et al. 2017) and finds here a major step forward revising 132 species preserved in the Natural History Museum of the United Kingdom, London. Our final aim is to set the scene for major taxonomic work on the hundreds of species in the Indo-Pacific province which still await formal description.

Methods

We first compiled a list of type specimens expected at the Natural History Museum based on explicit statements in the original publications. When this information was not available, we looked for the known repositories of authors' collections or information on type material or collection

fate in biographic papers. PGA surveyed the collection of recognized types of Triphoridae at the NHMUK in October and December 2015. The general collection had been previously searched by BS during a visit conducted between 7 and 25 February 2000 specifically targeting Indo-Pacific taxa. The present catalogue was updated on December 31st, 2015 and includes all triphorid types encountered in the NHMUK, irrespective of their geographic origin.

The depth of treatment in this work depends on the age of the taxon (a proxy for the accuracy of descriptions and figures) and the amount of type material stored in the Museum or supposed to exist in other institutions. The species described before World War II and whose type material is stored exclusively in NHMUK are treated here in full detail. We give the species name in its original combination, followed by bibliographic details of the original description, the location of the known type material, the original description (and its translation when in Latin) and curatorial or nomenclatural notes. In some cases, the type series contains specimens clearly belonging to different species. Thus, we selected lectotypes to stabilize the nomenclature prioritizing specimens that were illustrated in the original description. Lectotype designation follows the provisions of Article 74 of the International Code of Zoological Nomenclature, 4th Edition. We also provide a diagnosis, focusing on the most significant diagnostic characters as discussed by Marshall (1983) and Albano et al. (2011). We followed a similar approach for old material whose other syntypes have not been located so far or are presumably lost (e.g. Turton). We illustrated most specimens in the type series in colour and with SEM imaging; whenever possible we have added the original figure.

A briefer treatment has been devoted to the species whose type material is known to be stored also in other institutions (e.g. Melvill, Tomlin, Verco). We list the available type material but refrained from selecting any lectotypes even if necessary because material that is more suitable may exist elsewhere. We provide comments where appropriate and fully illustrate the shells.

Species described after World War II were usually well described and illustrated in the original publications (e.g.

Kay, Kosuge, Marshall). Because plates were often in black and white, we illustrate here any type material we found, but do not provide original descriptions nor diagnoses. The Caribbean species described in the 1980s and 1990s (mostly by Rolán and co-authors) were at an even greater level, often with colour and SEM images. We do not treat them in detail, but provide inventory numbers, which were sometimes missing in the original publications.

Any citation to the International Code of Zoological Nomenclature (ICZN 1999) should be considered to its online version, which includes all recent amendments. Although it is already evident that a high degree of synonymy exists among Triphoridae, we refrain here from fully dealing with it, awaiting the study of type material in other museums to provide a single comprehensive work in this respect.

Colour photographs were taken with a Canon EOS 700D with Canon MP-E 65 mm macro lens mounted on a stand, with aperture 5.6, 100 ISO and slightly underexposed (−2/3). Images were taken at different focus levels and stacked with Helicon Focus 5.3. SEM images were taken with a Zeiss LEO 1455 VP without any coating. To avoid damage to specimens, they were not cleaned before imaging. All specimens were measured with a calliper.

Species are listed in the systematic part in alphabetic order by author name. A taxon list in alphabetical order is provided in Table 1.

Abbreviations

coll.	collection
AMS	Australian Museum, Sydney, Australia
BPBM	Bernice P. Bishop Museum, Hawaii, USA
CUMZ	Cambridge University, Museum of Zoology, Cambridge, UK
(text-)fig./figs	(text-)figure/figures
MCZ	Museum of Comparative Zoology, Harvard, USA
MNHN	Muséum national d'Histoire naturelle, Paris, France
MNZ	Museum of New Zealand, Wellington, NZ
MSIM	Museum of Science and Industry, Manchester, UK
NHMUK	Natural History Museum of the United Kingdom, London, UK
NMW	National Museum of Wales, UK
OUMNH	Oxford University Museum of Natural History, Oxford, UK
p	page
pl	plate
SAM	South Australian Museum, Adelaide, Australia
TZM	National Science Museum, Tokyo, Japan
USNM	United States National Museum, Smithsonian Institution, USA

Taxonomic index

Table 1. List of treated taxa in alphabetic order, with original name, author and date and page and figure in this paper.

Taxon	Author and date	Page	Figure
<i>abruptum</i> , <i>Cerithium</i> (<i>Bittium</i>)	Watson, 1880	297	113
<i>affinis</i> , <i>Triphoris</i>	Pease, 1861	245	72
<i>albicephala</i> , <i>Metaxia</i>	Kay, 1979	213	43
<i>albidus</i> , <i>Triphoris</i>	A. Adams, 1854	165	2
<i>alboguttata</i> , <i>Viriola</i>	Tomlin, 1926	280	99
<i>albovittata</i> var. <i>mamillata</i> , <i>Triphora</i>	Verco, 1909	291	109
<i>alexandri</i> , <i>Triphora</i>	Tomlin, 1931	291	100
<i>alternata</i> , <i>Triphoris</i>	Pease, 1861	246	73
<i>alveolatus</i> , <i>Triphoris</i>	A. Adams & Reeve, 1850	175	10
<i>angasi</i> , <i>Triphoris</i>	Crosse & Fischer, 1865	180	15
<i>apexcrassum</i> , <i>Cheirodonta</i>	Rolán & Fernández-Garcés, 1994	255	
<i>apicibulbus</i> , <i>Triphora</i>	Turton, 1932	285	102
<i>armillata</i> , <i>Triphora</i>	Verco, 1909	287	105
<i>aspera</i> , <i>Triforis</i>	Jeffreys, 1885	211	42
<i>asperrimus</i> , <i>Triphoris</i> (<i>Ino</i>)	Hinds, 1843	184	19
<i>atlantica</i> , <i>Triforis</i>	E.A. Smith, 1890	256	80
<i>atratus</i> , <i>Notosinister</i>	Kosuge, 1962	219	51
<i>bathyrhapha</i> , <i>Triforis</i>	E.A. Smith, 1890	256	81
<i>bigemma</i> , <i>Cerithium</i> (<i>Triforis</i>)	Watson, 1880	297	
<i>bilix</i> , <i>Triphoris</i> (<i>Ino</i>)	Hinds, 1843	185	20
<i>brunniccephala</i> , <i>Metaxia</i>	Kay, 1979	255	44
<i>bubistae</i> , <i>Marshallora</i>	Fernández-Garcés & Rolán, 1988	255	
<i>burnupi</i> , <i>Triphora</i>	E.A. Smith, 1910	256	82
<i>cana</i> , <i>Triphora</i>	Verco, 1909	288	107
<i>cancellatus</i> , <i>Triphoris</i> (<i>Ino</i>)	Hinds, 1843	185	21
<i>carmelae</i> , <i>Iniforis</i>	Rolán & Fernández-Garcés, 1993	255	
<i>carteretensis</i> , <i>Triphoris</i> (<i>Mastonia</i>)	Hinds, 1843	187	22
<i>castus</i> , <i>Triphoris</i> (<i>Mastonia</i>)	Hinds, 1843	188	23
<i>cerea</i> , <i>Trifora</i>	E.A. Smith, 1906	259	83
<i>chrysolitha</i> , <i>Triphora</i>	Kay, 1979	214	5
<i>cingulatus</i> , <i>Triphoris</i>	A. Adams, 1854	165	3
<i>cingulifera</i> , <i>Triphoris</i>	Pease, 1861	247	74
<i>clavata</i> , <i>Triphoris</i>	Pease, 1861	248	75
<i>clemens</i> , <i>Triphoris</i> (<i>Mastonia</i>)	Hinds, 1843	189	24
<i>coetiviensis</i> , <i>Triphora</i> (<i>Mastonia</i>)	Melvill, 1909	237	66
<i>collaris</i> , <i>Triphoris</i> (<i>Mastonia</i>)	Hinds, 1843	192	25
<i>concatenata</i> , <i>Trifora</i>	Melvill, 1904	239	67
<i>concors</i> , <i>Triphoris</i> (<i>Ino</i>)	Hinds, 1843	193	26
<i>conspersus</i> , <i>Triphoris</i>	E.A. Smith, 1875 ex A. Adams ms	261	84
<i>convexa</i> , <i>Trifora</i>	E.A. Smith, 1904	261	85
<i>corrugatus</i> , <i>Triphoris</i> (<i>Ino</i>)	Hinds, 1843	194	27

Taxon	Author and date	Page	Figure
<i>cucullatus</i> , <i>Triphoris</i>	de Folin, 1867	183	17
<i>decollata</i> , <i>Cheirodonta</i>	Rolán & Fernández-Garcés, 1994	255	
<i>dolicha</i> , <i>Triforis</i>	Watson, 1880	299	114
<i>earlei</i> , <i>Triphora</i>	Kay, 1979	214	46
<i>elegans</i> , <i>Triphoris</i> (Ino)	Hinds, 1843	194	28
<i>espinosai</i> , <i>Metaxia</i>	Rolán & Fernández-Garcés, 1992	255	
<i>eupunctata</i> , <i>Triphora</i>	G.B. Sowerby III, 1907	270	92
<i>excelsior</i> , <i>Triforis</i> (Ino)	Melvill & Standen, 1899	243	70
<i>fallax</i> , <i>Viriola</i>	Kay, 1979	215	47
<i>festivus</i> , <i>Triphoris</i>	A. Adams, 1854	166	4
<i>flammulata</i> , <i>Triphoris</i>	Pease, 1861	251	76
<i>fucata</i> , <i>Triphoris</i>	Pease, 1861	251	77
<i>fuscescens</i> , <i>Trifora</i>	E.A. Smith, 1904	263	86
<i>fuscoapicata</i> , <i>Triphora</i>	G.B. Sowerby III, 1907	273	93
<i>fuscomaculata</i> , <i>Trifora</i>	E.A. Smith, 1904	265	87
<i>fuscozonata</i> , <i>Triphora</i>	G.B. Sowerby III, 1907	273	94
<i>gigas</i> , <i>Triphoris</i> (Ino)	Hinds, 1843	196	29
<i>gracilior</i> , <i>Triforis</i>	E.A. Smith, 1903	265	88
<i>granicostata</i> , <i>Inella</i>	Kosuge, 1962	222	52
<i>granulatus</i> , <i>Triphoris</i>	A. Adams & Reeve, 1850	175	11
<i>grayii</i> , <i>Triphoris</i> (Mastonia)	Hinds, 1843	197	30
<i>gutta</i> , <i>Marshallora</i>	Fernández-Garcés & Rolán, 1988	255	
<i>hebes</i> , <i>Cerithium</i> (Triforis)	Watson, 1880	301	115
<i>hemileuca</i> , <i>Triphora</i>	Tomlin, 1931	282	101
<i>hervieri</i> , <i>Notosinister</i>	Kosuge, 1962	223	53
<i>hinuhinu</i> , <i>Iniforis</i>	Kay, 1979	215	48
<i>hungerfordi</i> , <i>Triphora</i>	G.B. Sowerby III, 1914	276	95
<i>idoneus</i> , <i>Triforis</i>	Melvill & Standen, 1901	245	71
<i>immaculata</i> , <i>Iniforis</i>	Rolán & Fernández-Garcés, 1993	255	
<i>incerta</i> , <i>Metaxia</i>	Fernández-Garcés & Rolán, 1988	255	
<i>incisa</i> , <i>Triphoris</i>	Pease, 1861	251	78
<i>incolumis</i> , <i>Triphora</i>	Melvill, 1918	239	68
<i>inflata</i> , <i>Cerithium</i> (Triforis)	Watson, 1880	301	
<i>insularum</i> , <i>Triphora</i>	Biggs, ms	179	14
<i>interpres</i> , <i>Triphora</i>	Melvill, 1918	242	69
<i>isaotakii</i> , <i>Euthymella</i>	Kosuge, 1962	223	54
<i>iwaotakii</i> , <i>Notosinister</i>	Kosuge, 1963	225	55
<i>kawamurai</i> , <i>Notosinister</i>	Kosuge, 1962	226	56
<i>kermadecensis</i> , <i>Metaxia</i>	Marshall, 1977	236	65
<i>kurodai</i> , <i>Isotriphora</i>	Kosuge, 1962	227	57
<i>labiatus</i> , <i>Triphoris</i>	A. Adams, 1854	168	5
<i>laddi</i> , <i>Triphora</i>	Kay, 1979	216	49
<i>latilirata</i> , <i>Triphora</i>	Verco, 1909	291	108
<i>leucocephala</i> , <i>Euthymella</i>	Kosuge, 1963	229	58
<i>levukense</i> , <i>Cerithium</i> (Triforis)	Watson, 1880	303	116
<i>lilaeocinctus</i> , <i>Triforis</i>	E.A. Smith, 1903	267	89
<i>maculosus</i> <i>mcMichaeli</i> , <i>Cautor</i> (Cautor)	Kosuge, 1962	229	59
<i>mariaangelae</i> , <i>Marshallora</i>	Fernández-Garcés & Rolán, 1988	255	
<i>maxillaris</i> , <i>Triphoris</i> (Ino)	Hinds, 1843	198	31
<i>micans</i> , <i>Triphoris</i> (Ino)	Hinds, 1843	200	32
<i>millepunctatus</i> , <i>Notosinister</i>	Kosuge, 1962	229	60
<i>monilifer</i> , <i>Triphoris</i> (Mastonia)	Hinds, 1843	200	33
<i>nichupte</i> , <i>Marshallora</i>	Rolán & Cruz-Abrego, 1995	255	
<i>nigrofuscus</i> , <i>Triphoris</i>	A. Adams, 1854	170	6
<i>novapostrema</i> , <i>Triphora</i>	Verco, 1910	292	110
<i>osclausum</i> , <i>Triphora</i>	Rolán & Fernández-Garcés, 1995	255	
<i>pagodus</i> , <i>Triphoris</i> (Ino)	Hinds, 1843	201	34
<i>pelorcei</i> , <i>Iniforis</i>	Rolán & Fernández-Garcés, 2009	255	
<i>peifferi</i> , <i>Triphoris</i>	Crosse & Fischer, 1865	180	16
<i>picturatus</i> , <i>Triforis</i>	G.B. Sowerby III, 1901	276	96
<i>princeps</i> , <i>Triphora</i>	G.B. Sowerby III, 1904	277	97
<i>pseudothomae</i> , <i>Iniforis</i>	Rolán & Fernández-Garcés, 1993	255	
<i>pulchellus</i> , <i>Triphoris</i>	A. Adams, 1854	170	7
<i>pura</i> , <i>Triforis</i>	E.A. Smith, 1903	269	90
<i>retusa</i> , <i>Triphora</i>	Turton, 1932	285	103
<i>roseus</i> , <i>Triphoris</i> (Mastonia)	Hinds, 1843	203	35
<i>ruber</i> , <i>Triphoris</i> (Mastonia)	Hinds, 1843	203	36
<i>rufanensis</i> , <i>Triphora</i>	Turton, 1932	285	104
<i>rufotinctus</i> , <i>Notosinister</i>	Kosuge, 1963	230	61
<i>rufula</i> , <i>Triforis</i>	Watson, 1886	304	117
<i>scitulus</i> , <i>Triphoris</i>	A. Adams, 1854	172	8
<i>sculptus</i> , <i>Triphoris</i> (Ino)	Hinds, 1843	206	37
<i>shepstonensis</i> , <i>Trifora</i>	E.A. Smith, 1906	269	91
<i>smithi</i> , <i>Triphora</i>	G.B. Sowerby III, 1904	280	98
<i>spica</i> , <i>Triphora</i>	Verco, 1909	293	111
<i>spina</i> , <i>Triphora</i>	Verco, 1909	295	112
<i>squalida</i> , <i>Mastonia</i>	Kosuge, 1962	231	62
<i>subfenestra</i> , <i>Inella</i>	Kosuge, 1962	233	63
<i>suturalis</i> , <i>Triphoris</i>	A. Adams & Reeve, 1850	177	12
<i>taenialba</i> , <i>Isotriphora</i>	Rolán & Espinosa, 1994	255	
<i>tasmanica</i> var. <i>lilacina</i> var. <i>aureovincta</i> , <i>Triphora</i>	Verco, 1910	288	106
<i>tessellatus</i> , <i>Notosinister</i>	Kosuge, 1963	234	64
<i>thaanumi</i> , <i>Triphora</i>	Kay, 1979	217	50
<i>tristis</i> , <i>Triphoris</i> (Mastonia)	Hinds, 1843	206	38
<i>triticea</i> , <i>Triphoris</i>	Pease, 1861	251	79
<i>variegatus</i> , <i>Triphoris</i>	A. Adams, 1854	173	9
<i>verdensis</i> , <i>Monophorus</i>	Fernández-Garcés & Rolán, 1988	255	
<i>verrucosus</i> , <i>Triphoris</i>	A. Adams & Reeve, 1850	178	13
<i>vitreus</i> , <i>Triphoris</i> (Sychar)	Hinds, 1843	206	39
<i>vittatus</i> , <i>Triphoris</i> (Ino)	Hinds, 1843	208	40
<i>vilpinus</i> , <i>Triphoris</i> (Mastonia)	Hinds, 1843	208	41

Systematic list of taxa

Species described by A. Adams

Arthur Adams described ten species attributed to *Triphoridae*. He described nine species on the material of the Cuming collection (A. Adams 1854) which is stored in the NHMUK (Dance 1966). We found the type material of all of them. Although the nineteenth volume of the Proceedings of the Zoological Society of London reports 1851 on the frontispiece, its actual date of publication is 1854 (Sclater 1893). One of the nine species, *Triphoris vestalis* A. Adams, 1854, is a Cerithiopsidae (Rolán and Fernández-Garcés 2008).

The tenth species, *Triphoris macandraeae* A. Adams, 1856 is a Newtoniellidae and is not discussed further. In the NHMUK, two worn specimens are present and labelled as “possible type material” but do not bear original labels. Two nicely preserved specimens of *T. macandraeae* with original labels are in the R. MacAndrew collection in the Museum of Zoology of the University of Cambridge (catalogue number I.100200, Fig. 1).

Triphoris albidus A. Adams, 1854

Figure 2

Triphoris albidus Adams 1854: 278, not illustrated.

Type locality. Honduras.

Type material. Syntypes: NHMUK 196563 and 196564: 1 specimen each, Honduras (coll. H. Cuming).

Original description. *T. testâ subulato-pyramidali, albidâ, nitidâ; anfractibus planulatis, subimbricatis, granosocla-thratis, granis oblongis, serie granorum inferiore prominulâ, anfractu ultimo basi fulvo; canali brevi, subrecurso.*

Hab. Honduras (Dyson). Mus. Cuming.

A solid, white, shining, pyramidal species, with oblong granules disposed in three series on each whorl.

Translation of the Latin text. Whitish and clean shell with a pyramidal-subulate shell; flat-sided whorls, subimbricated, clathrated with oblong granules whose inferior series is slightly prominent, base of the last whorl reddish; short anterior siphonal canal slightly curved.

Diagnosis. Syntypes are 9.6 and 8.1 mm high. Shell conical, with rather flat sides. Teleoconch of ca 12 whorls. Three spiral cords are present, the second weaker at the beginning but visible since the early teleoconch. Such cords are large, flat, adorned by elongated and coalescent granules, which become more distinct on the peristome. Base with three additional granulated cords. Apex not present in the type specimens. Colour whitish with brown base.

Remarks. The syntypes lack the apex, but Rolán and Fernández-Garcés (1995) illustrated a morphologically

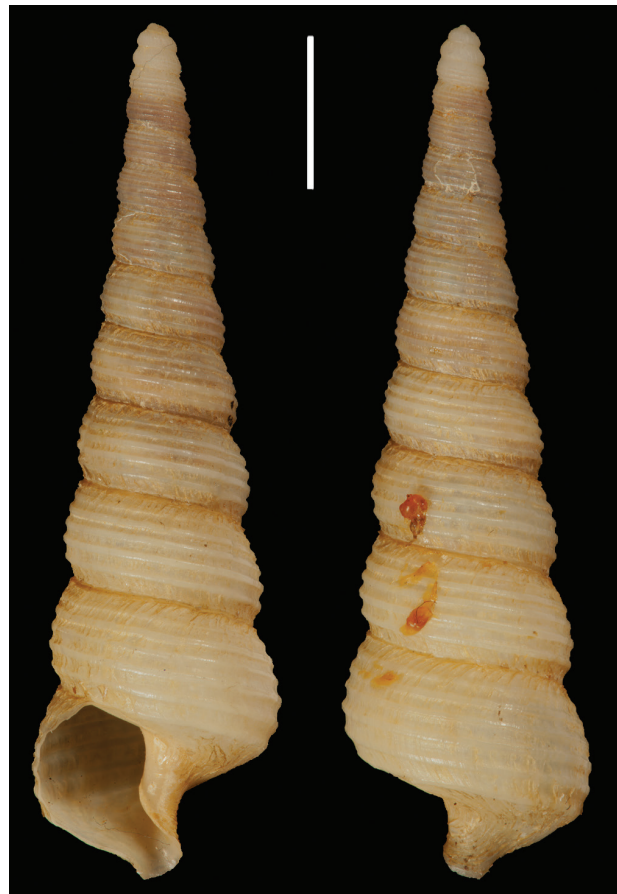


Figure 1. *Triphoris macandraeae* A. Adams, 1856. Syntype CUMZ I.100200. Photo courtesy M. Lowe. Scale bar: 5 mm.

similar specimen with a multispiral protoconch, sculptured by two spiral keels and axial riblets.

Triphoris cingulatus A. Adams, 1854

Figure 3

Triphoris cingulatus Adams 1854: 279, not illustrated.

Type locality. Red Sea.

Type material. Syntypes: NHMUK 196567: 1 specimen, Red Sea (coll. H. Cuming); NHMUK 196568/1–3: 3 specimens, Red Sea (coll. H. Cuming).

Additional material. NHMUK 1878.1.28.452: 1 specimen (coll. H. Adams).

Original description. *T. testâ elongato-pyramidali, cinereâ; anfractibus sexdecim ad octodecim, spiraliter tricingulatis, cingulâ medianâ minore, interstitiis carinarum longitudinaliter valde striates.*

Hab. Red Sea (Rüppell). Mus. Cuming.

An ashy-grey species, with three smooth keels on each whorl, and the interstices strongly striated: somewhat similar to the *T. corrugatus* of Hinds.



Figure 2. *Triphoris albidus* A. Adams, 1851, Honduras, coll. H. Cuming. **A, B** Syntype NHMUK 196563: front (A), side (B). **C–G** Syntype NHMUK 196564: front (C, D), side (E), back (F), aperture (G). **H** Original labels. Scale bars: A–F: 1 mm; G: 0.5 mm.

Translation of the Latin text. Elongate-pyramidal shell, ash-gray; sixteen to eighteen whorls with three spiral cords whose intermediate is smaller, interstices among carinas strongly axially striated.

Diagnosis. Syntypes ranging in size from 9.6 to 14.4 mm. A slender conical shell with flat sides. Teleoconch of 15–20 whorls, with two strong smooth spiral cords and a weakly granulated third in between, which appears as a fine thread in the early teleoconch. Fine threads are visible between the cords. No complete peristome is present among the studied material, but the specimen from the H. Adams collection shows additional smooth spiral cords (Fig. 3K). Siphonal canal well developed. The base bears one strong weakly granulated additional spiral cord, followed by a weak thread. Another weak thread runs from the columella on the siphonal canal. The protoconch is present in a single paratype (Fig. 3J); it is poorly preserved but clearly multispiral, possibly with two spiral keels on the lower whorls. Spiral cords greyish, with brown interspaces, protoconch and base.

Remarks. A label accompanying lot NHMUK 1878.1.28.452 specifies that this is not a type specimen “fide Dance, 1965”. Indeed, this specimen comes from the H. Adams collection and, thus, is not from the original series of the Cuming collection.

Triphoris festivus A. Adams, 1854

Figure 4

Triphoris festivus Adams 1854: 278, not illustrated.

Type locality. Port Lincoln, Australia.

Type material. Lectotype: NHMUK 196559, designated by Marshall (1983) (coll. H. Cuming). Paralectotype: NHMUK 196560: 1 specimen, Port Lincoln, Australia (coll. H. Cuming).

Original description. *T. testâ pyramidalis, basi planâ fuscâ, albidâ, fasciis fuscis interruptis, transversis, ornâtâ;*

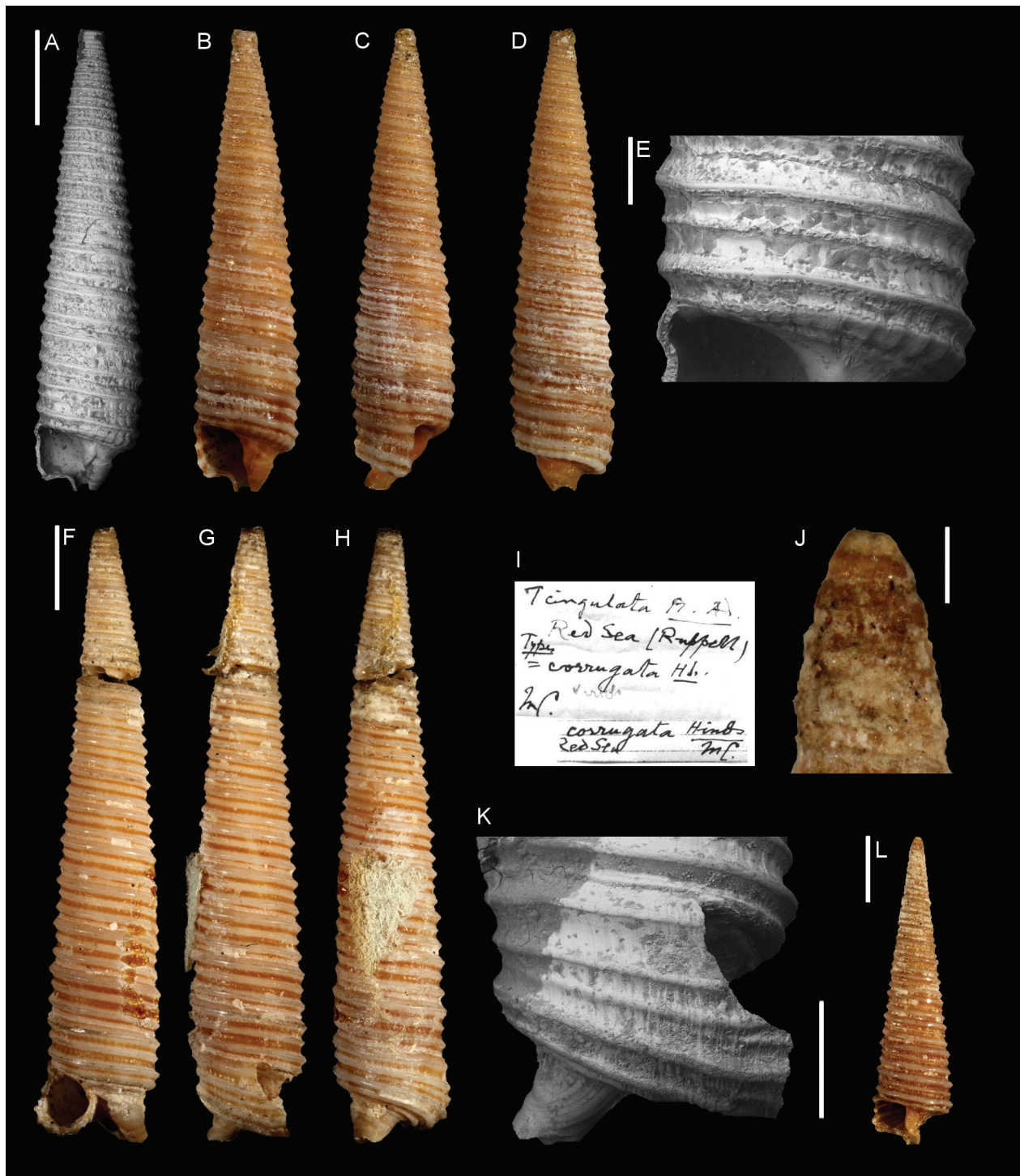


Figure 3. *Triphoris cingulatus* A. Adams, 1854. A–E Syntype NHMUK 196567, Red Sea, coll. H. Cuming: front (A, B), side (C), back (D), last whorl (E). F–H, K Specimen ex coll. H. Adams, NHMUK 1878.1.28.452: front (F), side (G), back (H), peristome (K). I Original label. J, L Syntype NHMUK 196568/1, Red Sea, coll. H. Cuming: protoconch (J), front (L). Scale bars: A–D, F–H: 2 mm; E: 0.5 mm; J: 0.1 mm; K, L: 1 mm.

anfractibus planis, cingulis duabus granorum instructis; interstitiis valde punctatis.

Hab. Port Lincoln. Mus. Cuming.

A small prettily-marked species, with two rows of granules on each whorl, and the interstices deeply punctured.

Translation of the Latin text. Pyramidal shell with a flat dark base, whitish with dark interrupted spiral bands; flat whorls with two rows of granules; interstices deeply punctured.

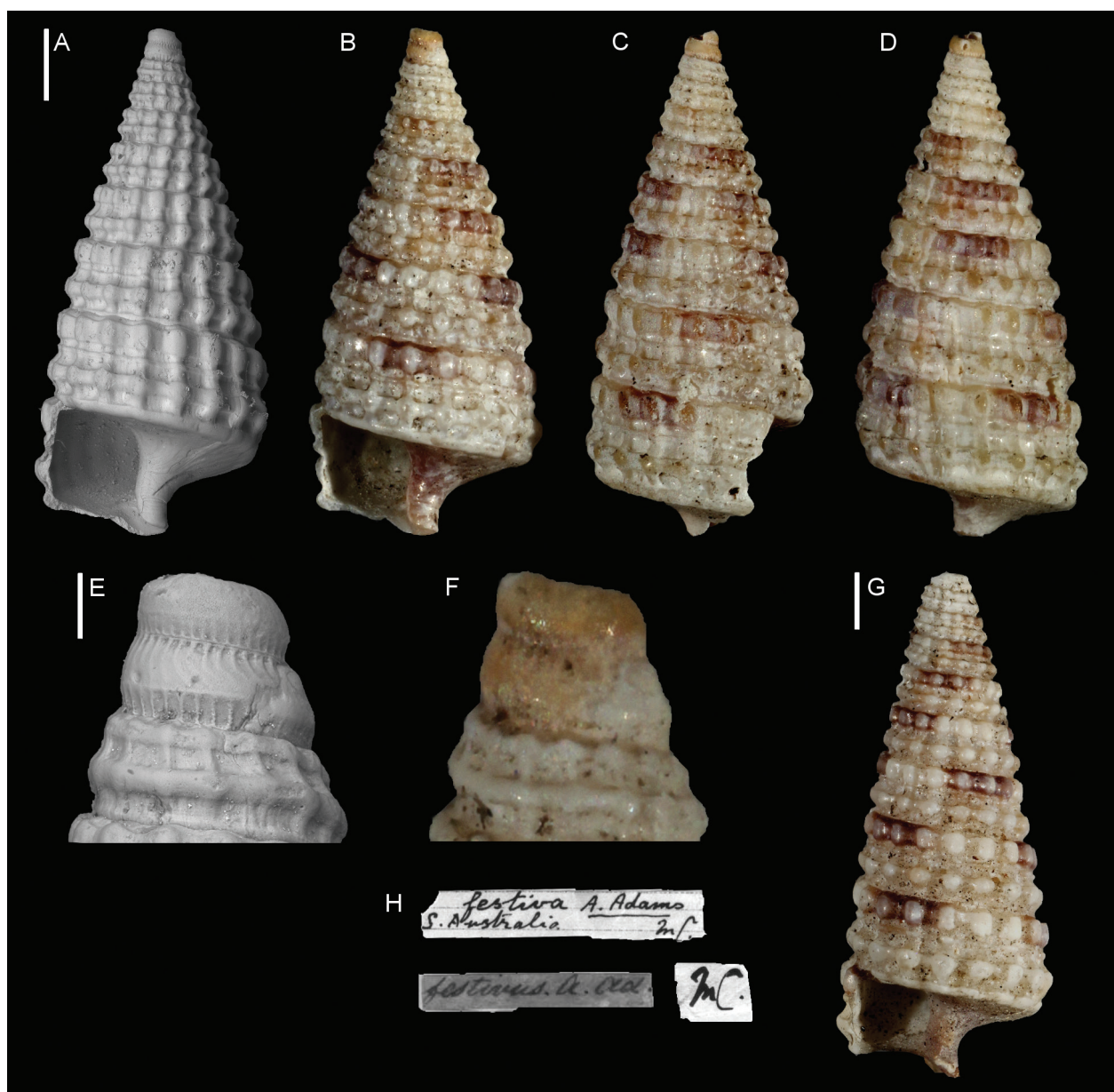


Figure 4. *Triphoris festivus* A. Adams, 1851, Port Lincoln, S. Australia, coll. H. Cumming. A–F Lectotype NHMUK 196559: front (A–B), side (C), back (D), protoconch (E–F). G Paralectotype, NHMUK 196560: front (G). H Original labels. Scale bars: A–D, G: 0.5 mm; E, F: 0.1 mm.

Diagnosis. Lectotype and paralectotype 3.2 mm and 4.4 mm high, respectively, but both specimens are subadults without a fully developed last whorl. Shell conical with flat sides. Type specimens of eight whorls, an underestimate due to their subadult stage. Each whorl bears two main spiral cords with well-defined tubercles; from the sixth whorl, a fine cord runs between them. Orthocline axial ribs are present and strong. The peristome, the sinuses, the siphonal canal and the base are missing in both type specimens. The lectotype bears the last whorl and half of the protoconch which is clearly multispiral, adorned by two spiral keels and brownish in colour. The teleoconch has a white background. Beginning on the third whorl, brown blotches are present on the first spiral cord.

Remarks. In the same box, a third vial is present with a small worn specimen which is not this species, as already noted by Peter Dance in a handwritten annotation in 1965. The lectotype inventory number 16559 in Marshall (1983) is a mistyping.

Triphoris labiatus A. Adams, 1854

Figure 5

Triphoris labiatus Adams 1854: 279, not illustrated.

Type locality. Sydney, Australia.

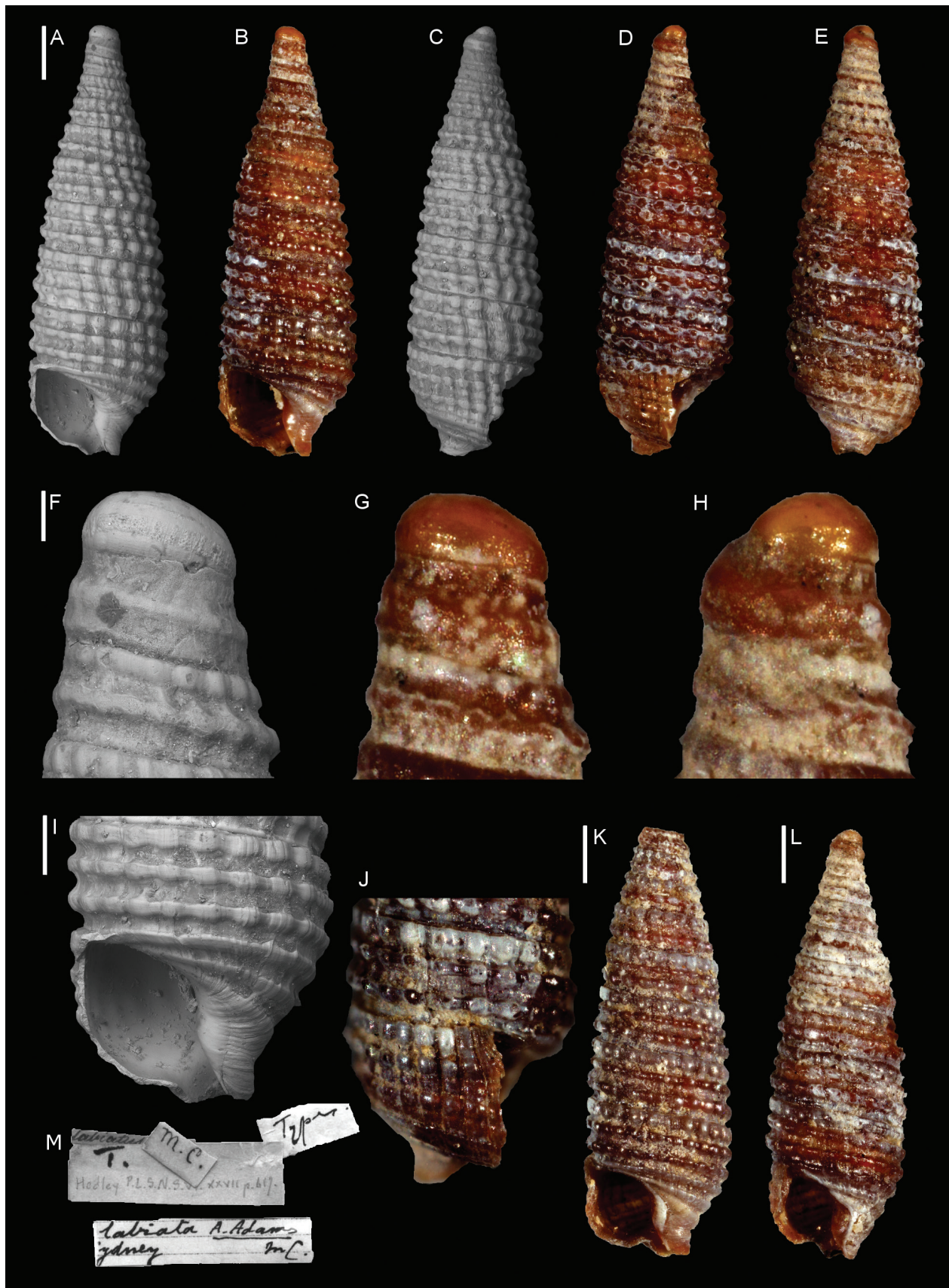


Figure 5. *Triphoris labiatus* A. Adams, 1851, Sydney, Australia, coll. H. Cuming. A–I Lectotype NHMUK 196569: front (A, B), side (C, D), back (E), protoconch (F–H), aperture (I). J–L Paralectotypes, NHMUK 196570/1–2: paralectotype 1 peristome (J) and front (K), paralectotype 2 (L). M Original labels. Scale bars: A–E, K–L: 0.5 mm; F–H: 0.1 mm; I: 0.3 mm.

Type material. Lectotype: NHMUK 196569, designated by Marshall (1983) (coll. H. Cuming). Paralectotypes: NHMUK 196570/1–2: 2 specimens, Sydney, Australia (coll. H. Cuming).

Original description. *T. testâ subulato-pyramidalis, nigro-fuscâ, in medio tumidâ, spirâ apice obtuso; anfractibus 10, planulatis, triseriatim granuloso-carinatis, suturis concavo-impressis; labro reflexo, dilatato, albido; canali brevi, subrecurvo.*

Hab. Sydney, under stones, low water (Mr. Strange). *Mus.* Cuming.

A small, nearly black shell, with the outer lip dirty white or pale fuscous.

Translation of the Latin text. Subulate-pyramidal shell, nearly black, swollen in the middle, obtuse apex; ten whorls nearly flat with three granulated carinas, suture concave; reflexed, swollen, whitish lip; short anterior slightly bent siphon.

Diagnosis. Lectotype 4 mm high. Cyrtocoid profile with flat sides. Teleoconch of nine whorls, with three spiral cords; the second cord appears on the third whorl between the other two and is initially faint but becomes as strong as the others on the penultimate whorl. Axial sculpture between the cords weak. Paralectotype A has a complete peristome (Fig. 5J) showing no posterior sinus and additional spiral cords. The base has three weakly sculptured cords. The protoconch is paucispiral, of one whorl and a poorly distinct transition to teleoconch; the protoconchs in the type series are worn, but the lectotype one apparently bears several fine spiral threads. Shell brown, with the tubercles of the first spiral row lighter or grey.

Remarks. The protoconch of the specimen illustrated by Marshall (1983: fig. 32C) has two whorls which bear two strong keels, while the lectotype has a single whorl and fine threads are clearly visible above the suture (Fig. 5F).

Triphoris nigrofuscus A. Adams, 1854

Figure 6

Triphoris nigrofuscus Adams 1854: 278, not illustrated.

Type locality. Sydney, Australia.

Type material. Lectotype: NHMUK 196557, designated by Marshall (1983) (coll. H. Cuming). Paralectotypes: NHMUK 196558: 1 specimen, Sydney, Australia (coll. H. Cuming).

Original description. *T. testâ pyramidalis, nigro-fuscâ; anfractibus planis, triseriatim graulatis, granulis aequalibus, confertis, anfractuum suturis impressis, basi convexâ.*

Hab. Sydney, low water, under stones (Mr. Strange).

A black-brown species, with three rows of regular, equal sized granules on each whorl.

Translation of the Latin text. Pyramidal shell, dark brown; flat whorls with three rows of equal sized dense granules, whorls with impressed sutures, convex base.

Diagnosis. Lectotype 6.7 mm high. Shell conical with rather flat whorls. Teleoconch of ten whorls, with three strong spiral cords forming nodules at the intersection with the orthocline axial ribs. Such cords are visible starting on the first whorl. A suprasutural smooth cord is visible in the lower half of the shell. Axial riblets are visible between main ribs on the last whorls. No type specimen bears a complete peristome to allow observation. Siphonal canal short; base with two smooth spiral cords. Paucispiral protoconch of two whorls, bearing two strong spiral keels and equally strong spaced axial ribs. Background teleoconch colour brown, with lighter to pearly grey tubercles. Protoconch brown.

Triphoris pulchellus A. Adams, 1854

Figure 7

Triphoris pulchellus Adams 1854: 278, not illustrated.

Type locality. Not reported.

Type material. Syntypes: NHMUK 196556: 1 specimen, unknown locality (coll. H. Cuming).

Original description. *T. testâ subulato-pyramidalis, in medio tumidâ fuscâ, serie moniliformi albo ornatâ; anfractibus convexiusculis, triseriatim granuloso-carinatis; granorum serie inferiore prominulâ, superiore multo minore; aperturâ rotundatâ, constrictâ; canali brevi, recurvo.*

Hab. —? *Mus.* Cuming.

A handsome brown species with a white series of bead-like granules at the lower part of each whorl.

Translation of the Latin text. Subulate-pyramidal shell, tumid in the middle, brown with a white series of bead-like granules; whorls a little convex, with three rows of granulated carinas; granules of the lower row prominent, those of the upper much less prominent; aperture rounded, contracted, anterior siphonal canal short, bent.

Diagnosis. Syntype 5.8 mm high. Shell conical with flat whorls. Teleoconch of 12 whorls, with three spiral cords forming nodules at the intersection with slightly prosocline axial ribs. The second spiral cord appears at mid-shell height and is very narrow. Between major spiral cords, numerous fine threads are visible. A narrow, smooth, suprasutural cord is visible. Peristome not fully

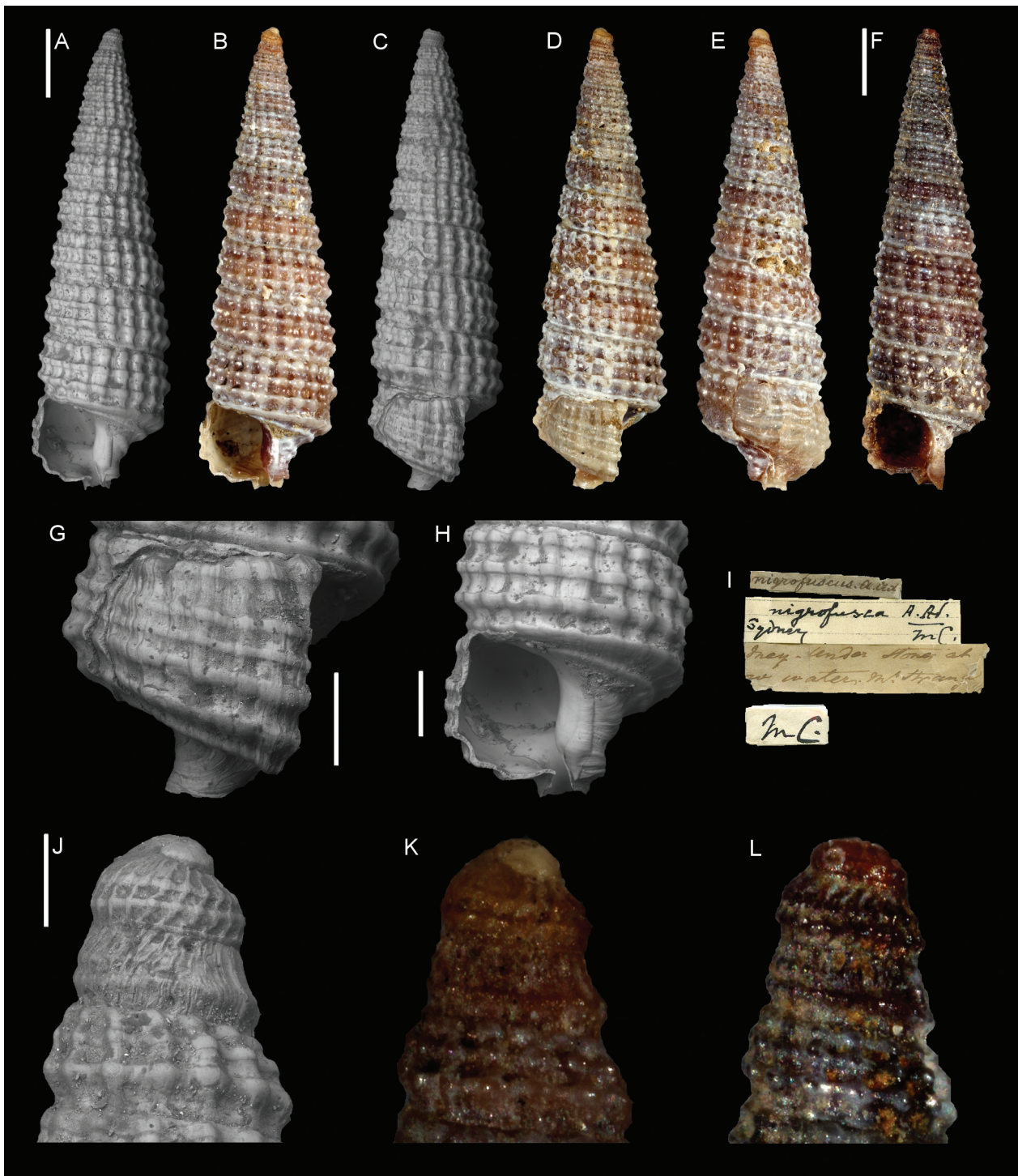


Figure 6. *Triphoris nigrofusus* A. Adams, 1851, Sydney, Australia, coll. H. Cuming. A–E, G, H, J, K Lectotype NHMUK 196557: front (A, B), side (C, D), back (E), peristome (G), aperture (H), protoconch (J, K). F, L Paralectotype, NHMUK 196558: front (F), protoconch (L). I Original labels. Scale bars: A–F: 1 mm; G, H: 0.5 mm; J–L: 0.2 mm.

grown on the holotype, but bears at least an additional spiral cord between the second and the third. Siphonal canal short. The base bears two additional smooth spiral cords. Protoconch not present in the holotype, but remains of its last whorl suggest a multispiral protoconch. Teleoconch brown, first teleoconch whorl and spiral cord whitish.

Remarks. It has been considered a Caribbean species and a synonym of *Similiphora intermedia* (C.B. Adams, 1850) by Rolán and Fernández-Garcés (2008). However, the species illustrated as *S. intermedia* by Rolán and Fernández-Garcés (1995) is very different in sculpture and colour. The range of origin of this species remains uncertain.

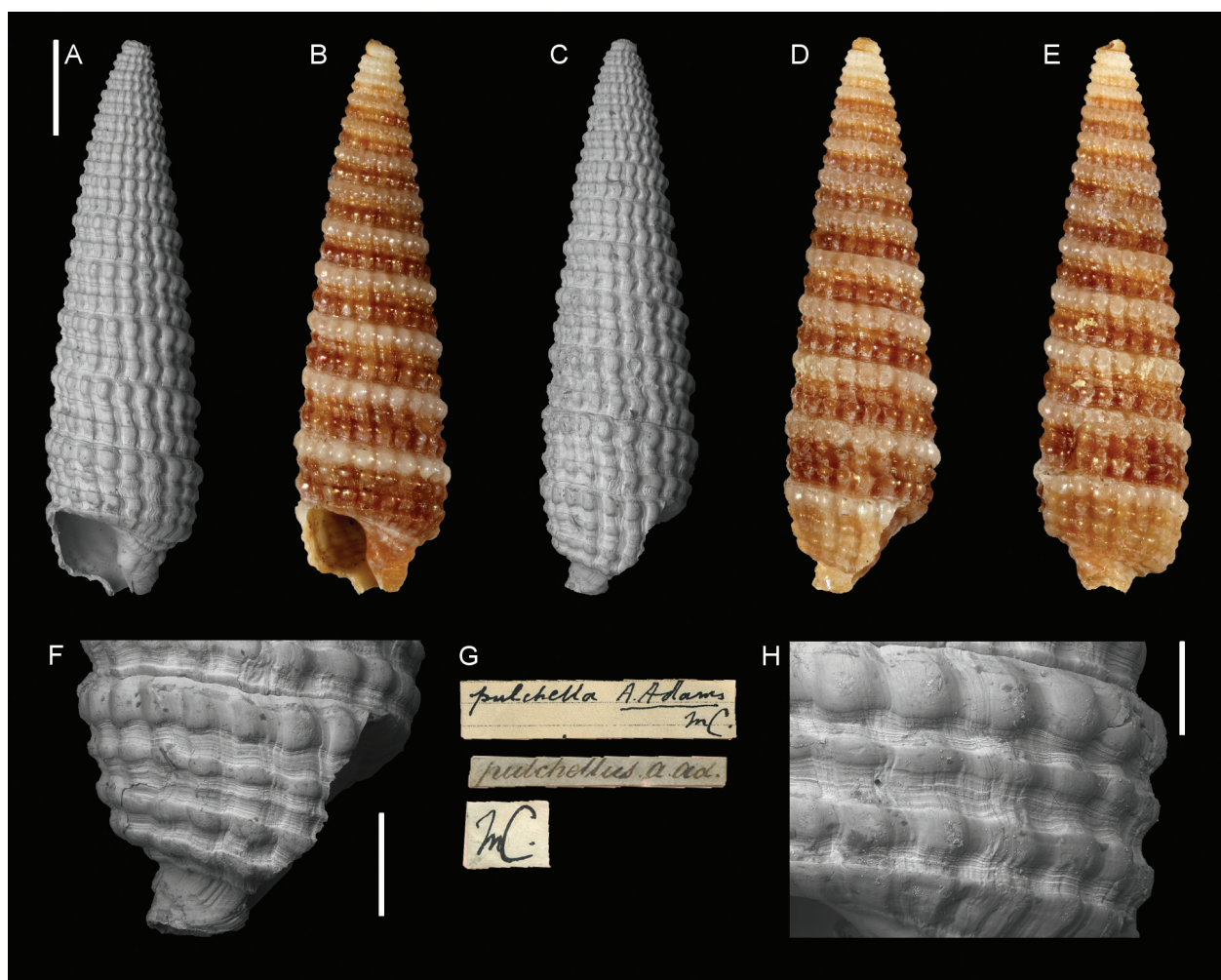


Figure 7. *Triphoris pulchellus* A. Adams, 1851, unknown locality, coll. H. Cuming. **A–F, H** Syntype NHMUK 196556: front (**A**, **B**), side (**C**, **D**), back (**E**), peristome (**F**), microsculpture (**H**). **G** Original labels. Scale bars: **A–E**: 1 mm; **F**: 0.5 mm; **H**: 0.3 mm.

Triphoris scitulus A. Adams, 1854

Figure 8

Triphoris scitulus Adams 1854: 278, not illustrated.

Type locality. Port Lincoln, Australia.

Type material. Lectotype: NHMUK 196561, designated by Marshall (1983) (coll. H. Cuming). Paralectotypes: NHMUK 196562/1–2: 2 specimens, Port Lincoln, Australia (coll. H. Cuming).

Original description. *T. testâ subulato-pyramidali, albidâ, nitidâ, subpellucidâ, suturis rufo-tinctis; anfractibus convexiusculis, cingulis tribus nodorum ornatis, cingulâ medianâ majore moniliformi, nodorum interstitiis fuscis, anfractu ultimo basi fusco; canali brevi, aperto.*

Hab. Port Lincoln. Mus. Cuming.

A semipellucid, white and brown species, with the middle row of nodules very prominent.

Translation of the Latin text. Subulate-pyramidal shell, light-coloured, near transparent, reddish sutures; whorls a little convex, with three nodulose spiral cords whose moniliform median is larger, brown interspaces among nodules, the last whorl with brown base; open anterior short siphonal canal.

Diagnosis. Lectotype 4.9 mm high. Shell conical, with flat sides. Teleoconch of 12 whorls with three spiral cords with strong nodules at the intersection with prosocline axial ribs. The second cord appears at mid shell height and is very narrow. The third cord is more prominent than the others and gives the shell a distinct profile. A smooth suprasutural cord is visible, as fine axial threads between the main ribs. Peristome with a shallow posterior sinus and no additional spiral cords. Siphonal canal short. The base has one additional smooth cord. Multispiral protoconch of three whorls; the first with numerous fine granules, whereas the following two are smooth with the exception of a series of elongated supra- and subsutural granules. Teleoconch and protoconch hyaline, with brown base.

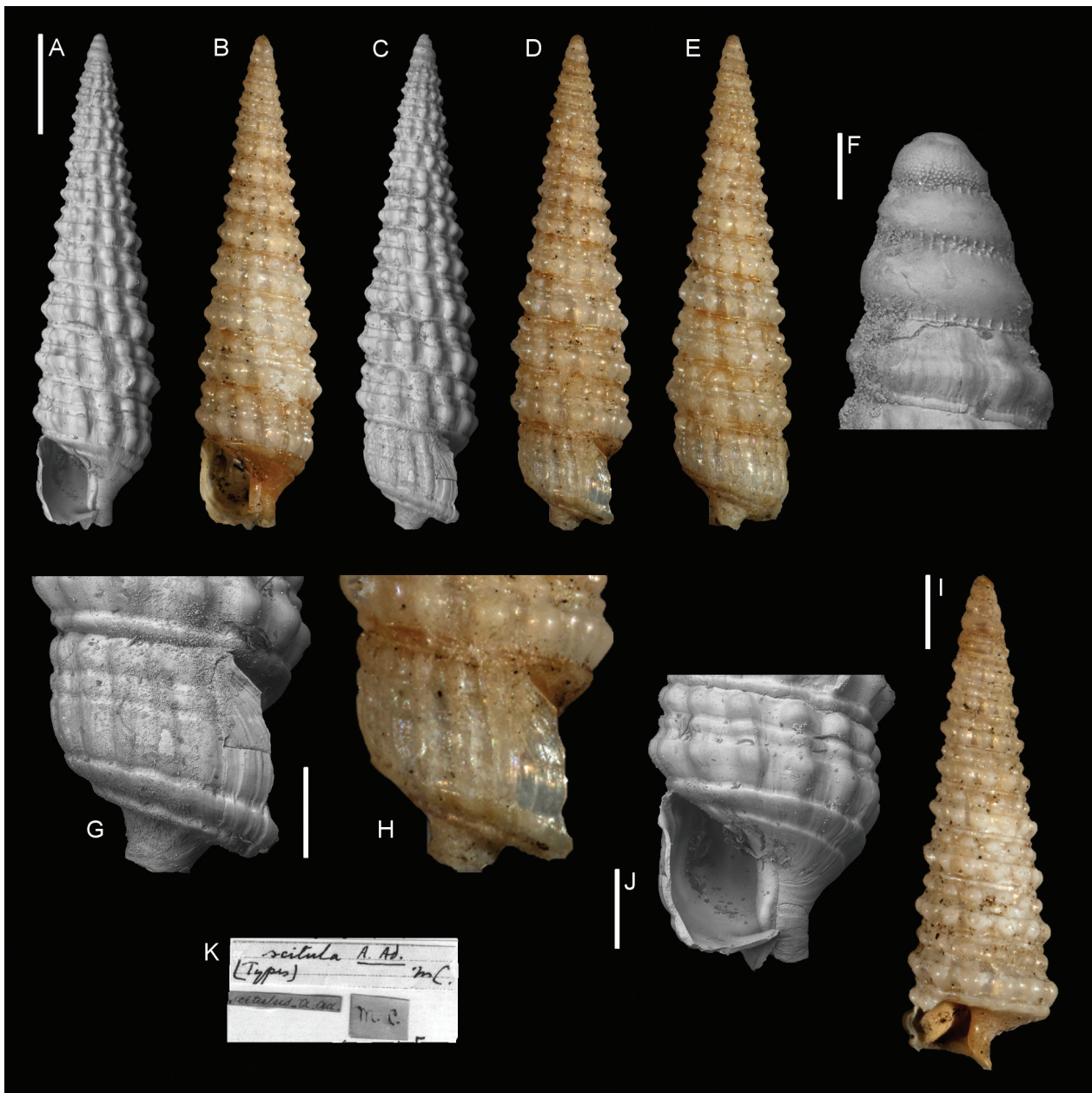


Figure 8. *Triphoris scitulus* A. Adams, 1851, Port Lincoln, S. Australia, coll. H. Cuming. **A–H, J** Lectotype NHMUK 196561: front (**A, B**), side (**C, D**), back (**E**), protoconch (**F**), peristome (**G, H**), aperture (**J**). **I** Paralectotype, NHMUK 196562/1: front (**I**). **K** Original labels. Scale bars: **A–E**: 1 mm; **F**: 0.1 mm; **G–H, J**: 0.4 mm; **I**: 0.5 mm.

Remarks. *Triphoris pfeifferi* Crosse & Fischer, 1865 should be considered a junior synonym (see p. 180) as already suggested by Marshall (1983).

Triphoris variegatus A. Adams, 1854

Figure 9

Triphoris variegatus Adams 1854: 277–278, not illustrated.

Type locality. “St. John’s”, British Virgin Islands.

Type material. Syntypes: NHMUK 196554: 1 specimen, and NHMUK 196555/1–4: 4 specimens, both St. John’s, West Indies, British Virgin Islands (coll. H. Cuming).

Original description. *T. testâ subulato-pyramidali, in medio tumidâ, albâ, maculis triangularibus rufo-fuscis variegatâ; anfractibus planulatis, triseriatim granulates, granis aequalibus, interstitiis punctatis, suturis impressis; canali brevi, apertâ.*

Hab. St. John’s. Mus. Cuming.

A large variegated species, somewhat resembling in general appearance *T. ornatus*, Desh.

Translation of the Latin text. Subulate-pyramidal shell, swollen in the middle, white, variegated with triangular dark red spots; flat-sided whorls, three series of equal-sized granules, punctate interstices, impressed sutures; open anterior short siphonal canal

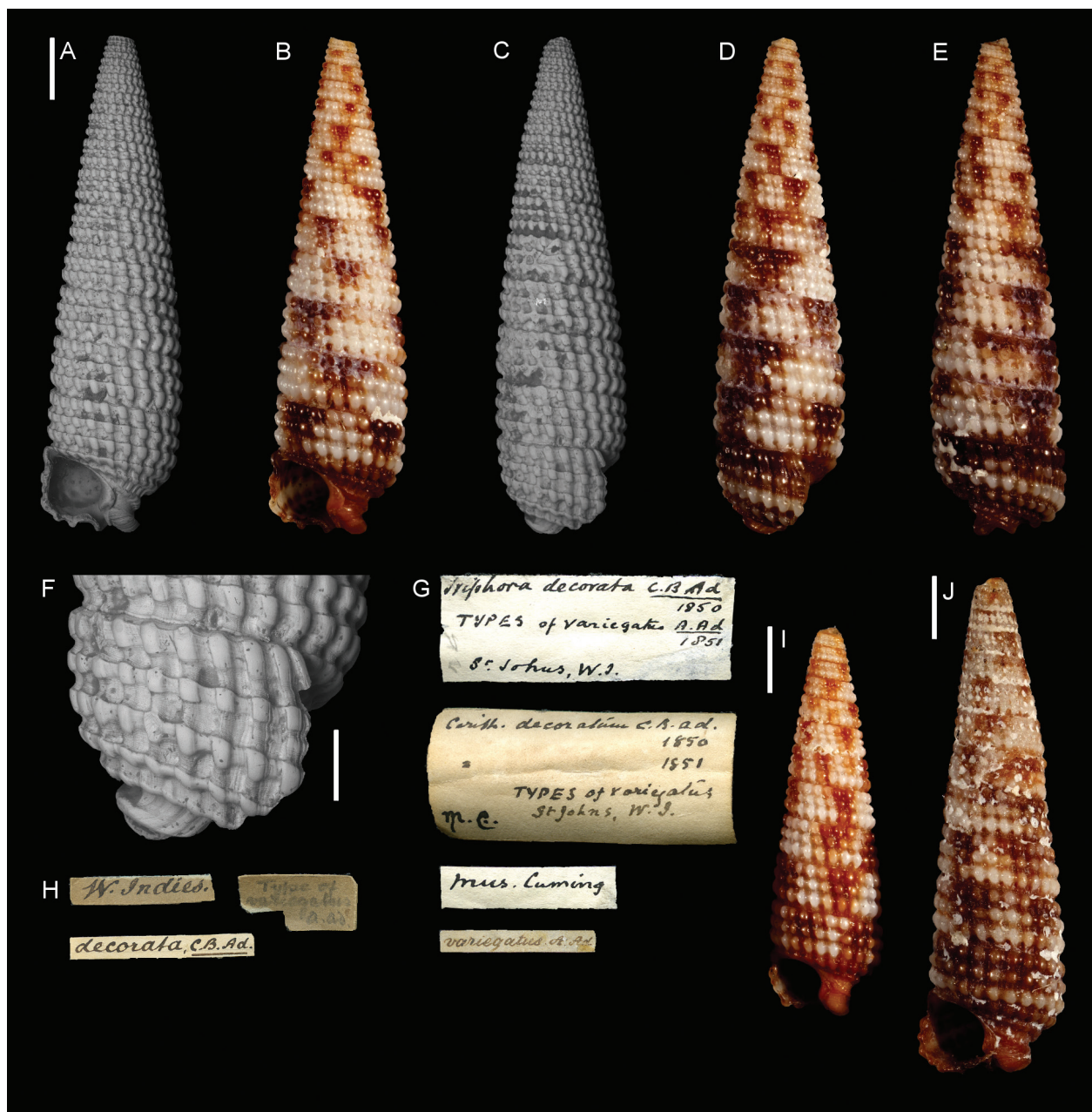


Figure 9. *Triphoris variegatus* A. Adams, 1851, St. John's, West Indies, coll. H. Cuming. A–F Syntype NHMUK 196554: front (A, B), side (C, D), back (E), peristome (F). G, H Original labels. I, J Syntypes NHMUK 196555/1–4. Scale bars: A–E, I, J: 1 mm; F: 0.5 mm.

Diagnosis. Syntype height ranging from 5.9 to 7.9 mm. Shell conical with flat sides. Teleoconch of 12 whorls with three equally strong spiral cords which bear tubercles at the intersection with slightly prosocline axial ribs. The second cord starts at the fifth whorl in the lectotype and is initially narrow. Numerous fine spiral threads are present between the main cords. The peristome bears an initial additional spiral cord between the second and the third, very faint. Siphonal canal short. The base bears three additional granulated cords. Protonch absent in the type series. Teleoconch white with large brown blotches, base brown.

Species described by A. Adams and L.E. Reeve

Arthur Adams and Lovell Reeve (1850) described eight species of Triphoridae based on the material acquired during the voyage of the ship “Samarang”. The relevant results were published between 1848 and 1850, but the pages on Triphoridae were published in 1850 (Sherborn 1922; Trew 1992). A ninth species, *Triphoris dextroversus*, is a Cerithiopsidae because of its dextral coiling and sculpture and is indeed the type species of the genus *Seila* A. Adams, 1861.

Edward Belcher was the commander of the “Samarang” and his collection was auctioned in 1877 (Tomlin

1941). The Reverend Lombe-Taylor and Hugh Cuming were among the buyers and both collections eventually ended up in the NHMUK. In its type collection, we found material of *T. alveolatus*, *T. granulatus*, *T. suturalis*, and *T. verrucosus*, although we have serious doubts that any of these specimens are syntypes. No specimens of *T. gemmulatus*, *T. nodiferus*, *T. pyramidalis*, and *T. speciosus* were found in the type collection; the general collection should be further inspected in this respect.

A note of caution must be added for the type localities. The term “China Sea” has been proved to be inaccurate in multiple cases (Carpenter 1857; Hertlein and Strong 1947, 1950; Petit 2007; Herbert 2013) and should be treated with caution for the triphorids as well.

Triphoris alveolatus Adams & Reeve, 1850

Figure 10

Triphoris alveolatus Adams and Reeve 1850: 45, pl. 11, fig. 30a, b.

Type locality. “China Sea”.

Type material. Not found, see remarks.

Original description. *Triph. testâ elongato-pyramidali, anfractibus viginti ad quatuor et viginti, planulatis, spiraliter triseriatim liratis, lillarum interstitiis clathratis; intus extusque fuscâ.*

HAB. *China Sea.*

The whorls of this species are flattened and deeply latticed throughout. The aperture is incomplete.

Translation of the Latin text. Triphorid with an elongated-pyramidal shell of 20 to 24 plain whorls, three latticed spiral rows; brown in colour.

Hab. China Sea

Remarks. The two specimens preserved in the NHMUK (196515 and 196516) and belonging to the Cuming collection cannot be considered syntypes. The original description, as well as the original figure (Fig. 10G), describe a specimen with an incomplete aperture, in contrast to the specimen illustrated in Figure 10A–C. Moreover, the original description refers to a shell with 20 whorls, while both specimens found have 9–12 teleoconch whorls; specimen in Figure 10D has also a large paucispiral protoconch in contrast to the elongated and pointed profile of the original figure which suggests a multispiral protoconch. At present, *T. alveolatus* should be considered a *nomen dubium*.

Triphoris granulatus Adams & Reeve, 1850

Figure 11

Triphoris granulatus Adams and Reeve 1850: 46, pl. 11, fig. 33a, b.

Type locality. “China Sea”.

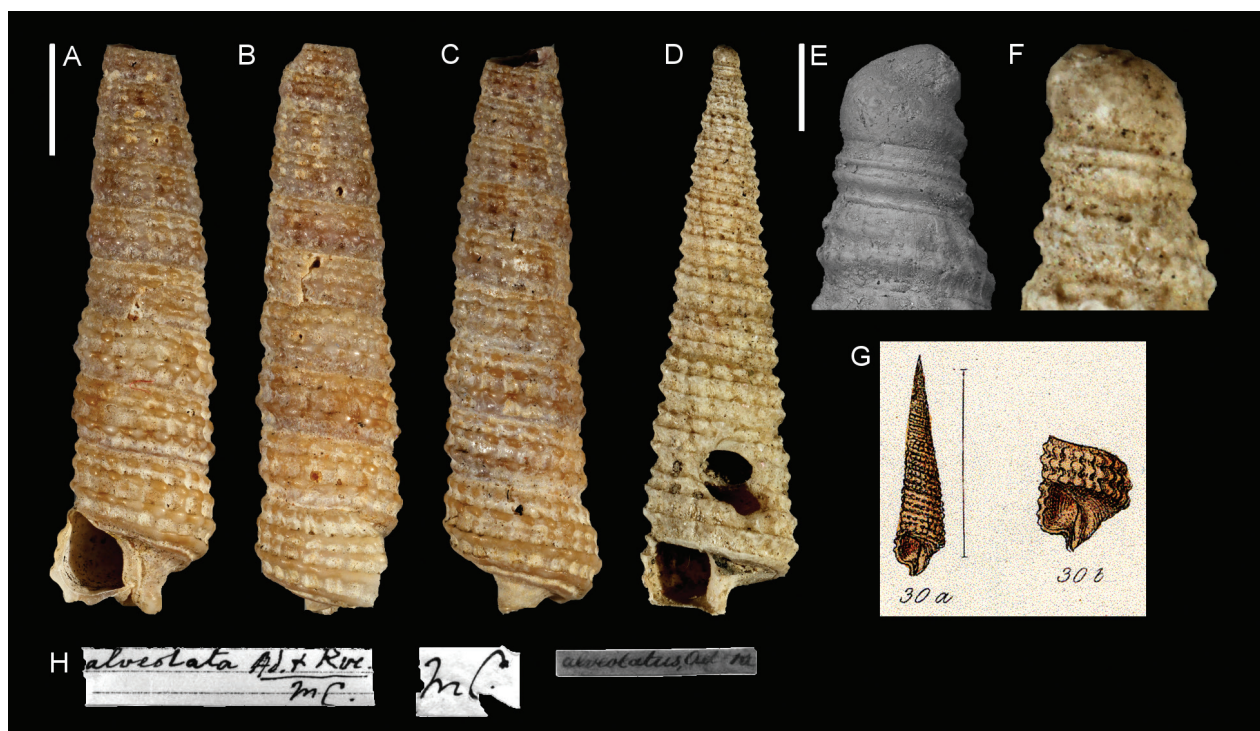


Figure 10. *Triphora* sp. (labelled as *T. alveolatus* Adams & Reeve, 1850). A–C, H NHMUK 196515, China Sea, coll. H. Cuming: front (A), side (B), back (C), labels (H). D–F NHMUK 196516: front (D), protoconch (E, F). G Original figures. Scale bars: A–D: 2 mm; E, F: 0.3 mm.

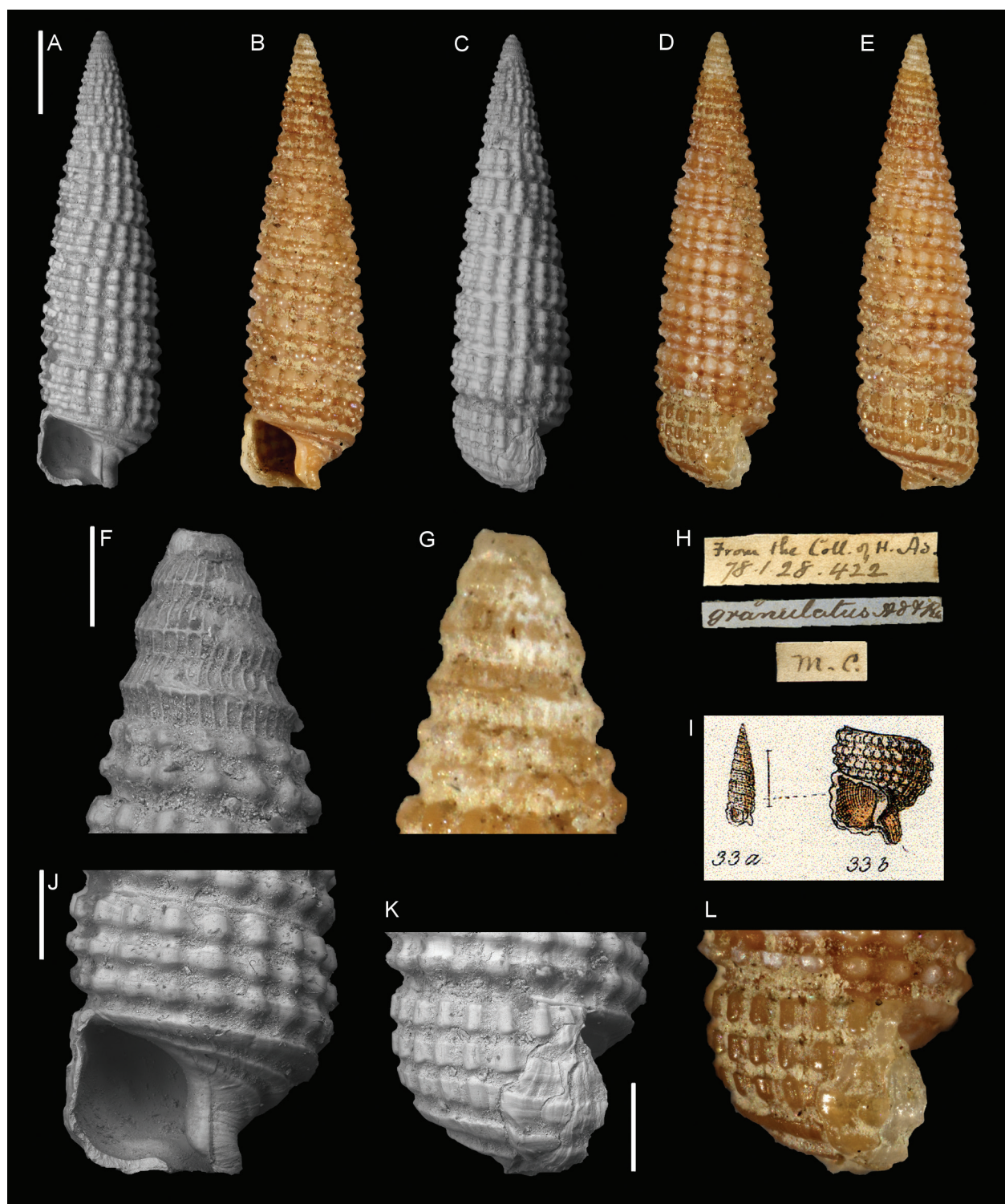


Figure 11. *Triphora* sp. (labelled as *Triphoris granulatus* Adams & Reeve, 1850). A–H, J–L NHMUK 1878.1.28.422, China Sea, coll. H. Adams in coll. H. Cuming: front (A, B), side (C, D), back (E), protoconch (F, G), original labels (H), aperture (J), peristome (K, L). I Original figures. Scale bars: A–E: 1 mm; F, G: 0.2 mm; J–L: 0.5 mm.

Type material. Not found, see remarks.

Original description. *Triph. testâ turritâ, medio subcylindraceâ, anfractibus duodecim ad quatuordecim, trise-*

riatim granulatis, granulis regularibus confertis, anfractuum suturis subimpressis; sordidè albâ.

HAB. China Sea.

Distinguished by its short, cylindrical form, and by the precise arrangement of the granules with which it is sculptured.

Translation of the Latin text. A turreted subcylindrical triphorid with twelve to fourteen triseriate whorls with regular granules and subimpressed sutures; dirty white.

Hab. China Sea

Remarks. We found one specimen from the Cuming collection (NHMUK 1878.1.28.422). Its label specifies that it comes from the collection of H. Adams. This specimen has slightly fewer whorls (11) than stated in the original description (12–14), but has the fourth to sixth spiral cords (clearly visible on the base) completely smooth, while the original figure (Adams and Reeve 1850: pl. 11, fig. 33b) clearly shows that cord four and five bear well-defined granules. Therefore, we doubt that this specimen belongs to the type series and suggest that *T. granulatus* should be considered a *nomen dubium*.

Triphoris suturalis Adams & Reeve, 1850

Figure 12

Triphoris suturalis Adams and Reeve 1850: 45, pl. 11, fig. 29a, b.

Type locality. “China Sea”.

Type material. Not found, see remarks.

Original description. *Triph. testâ turrîtâ, anfractibus duodecim ad tredecim, eximie triseriatim granuloso-carinulatis, suturis concavo-impressis, laevigatis; pellucido-albâ.*

HAB. China Sea.

The aperture of this delicately grain-keeled species, which is characterized by its hollow sutures, is incomplete.

Translation of the Latin text. Turreted triphorid with twelve to thirteen triseriate whorls well developed with carinated granules, and concave-impressed smooth sutures; clear-white.

Hab. China Sea

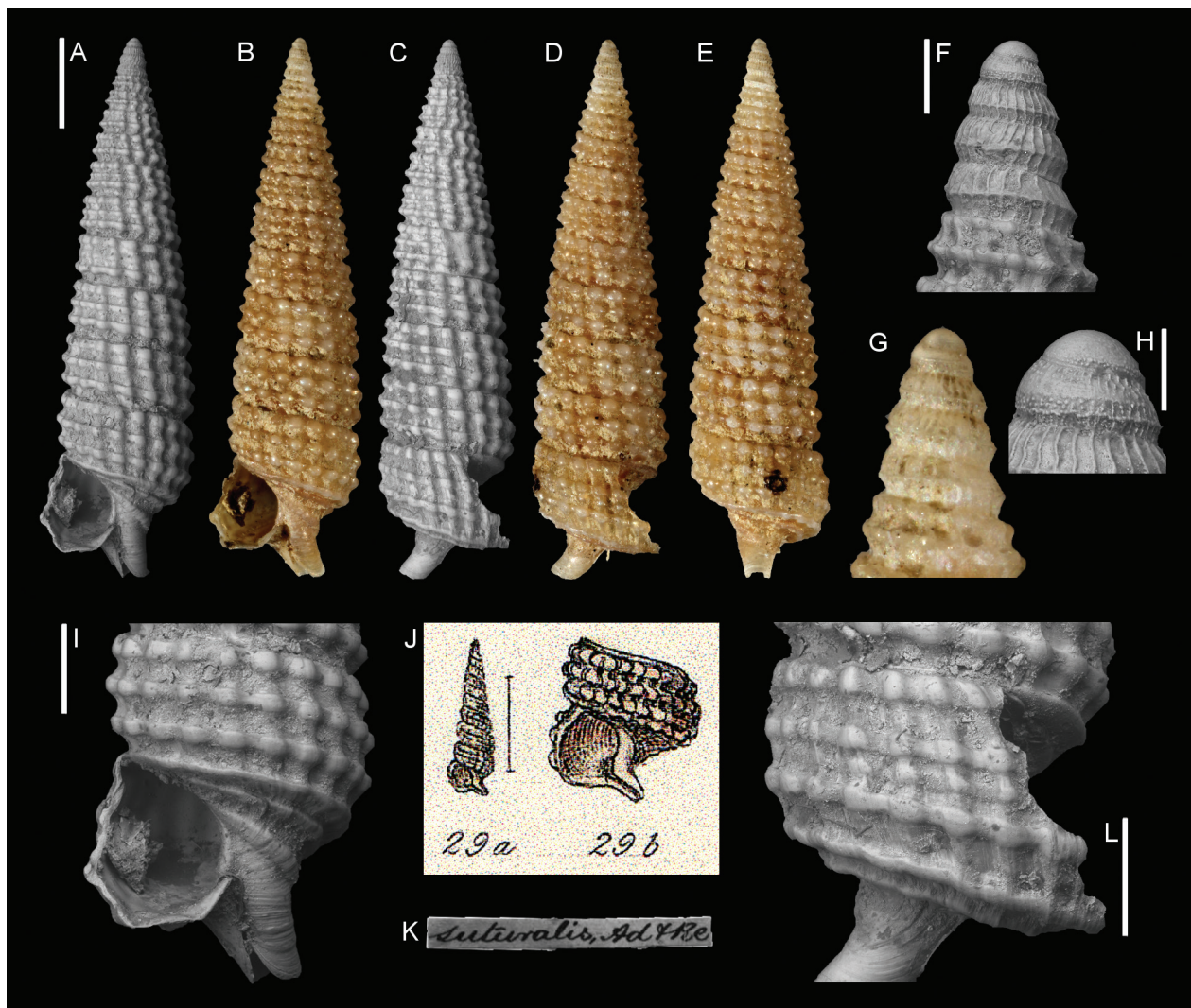


Figure 12. *Triphora* sp. (labelled as *Triphoris suturalis* Adams & Reeve, 1850), China Sea, coll. H. Cuming. A–I, K, L NHMUK 196513: front (A, B), side (C, D), back (E), protoconch (F, G), nucleus (H), aperture (I), original label (K), peristome (L). J Original figures. Scale bars: A–E: 1 mm; F, G: 0.2 mm; H: 0.1 mm; I, L: 0.5 mm.

Remarks. The specimen preserved in the type collection of NHMUK (196513) has 10 whorls instead of the 12 to 13 stated in the original description. Adams and Reeve also highlighted that the studied specimen had an incomplete aperture and particularly hollow sutures. The specimen in NHMUK has an incomplete peristome and impressed sutures, although not unusually hollow for many triphorids. We refrain from considering these specimens as syntypes until further evidence is available. At present, *T. suturalis* should be considered a *nomen dubium*.

***Triphoris verrucosus* Adams & Reeve, 1850**

Figure 13

Triphoris verrucosus Adams and Reeve 1850: 45, pl. 11, fig. 32a, b.

Type locality. “China Sea”.

Type material. Not found, see remarks.

Original description. *Triph. testâ gracillimo-subulatâ, anfractibus octodecim ad viginti, granoso-clathratis, granis transversè oblongis; sordidè albâ.*

HAB. China Sea.

A slender species, latticed throughout with transversely oblong granules.

Translation of the Latin text. Very slender subulate triphorid with eighteen to twenty granular-latticed whorls with transversely oblong granules; dirty white.

Hab. China Sea

Remarks. One specimen was found in the type collection of the NHMUK (1878.1.28.483) but we doubt it is a syntype. The original description states that the species has 18 to 20 whorls, while the specimen found has only eight.

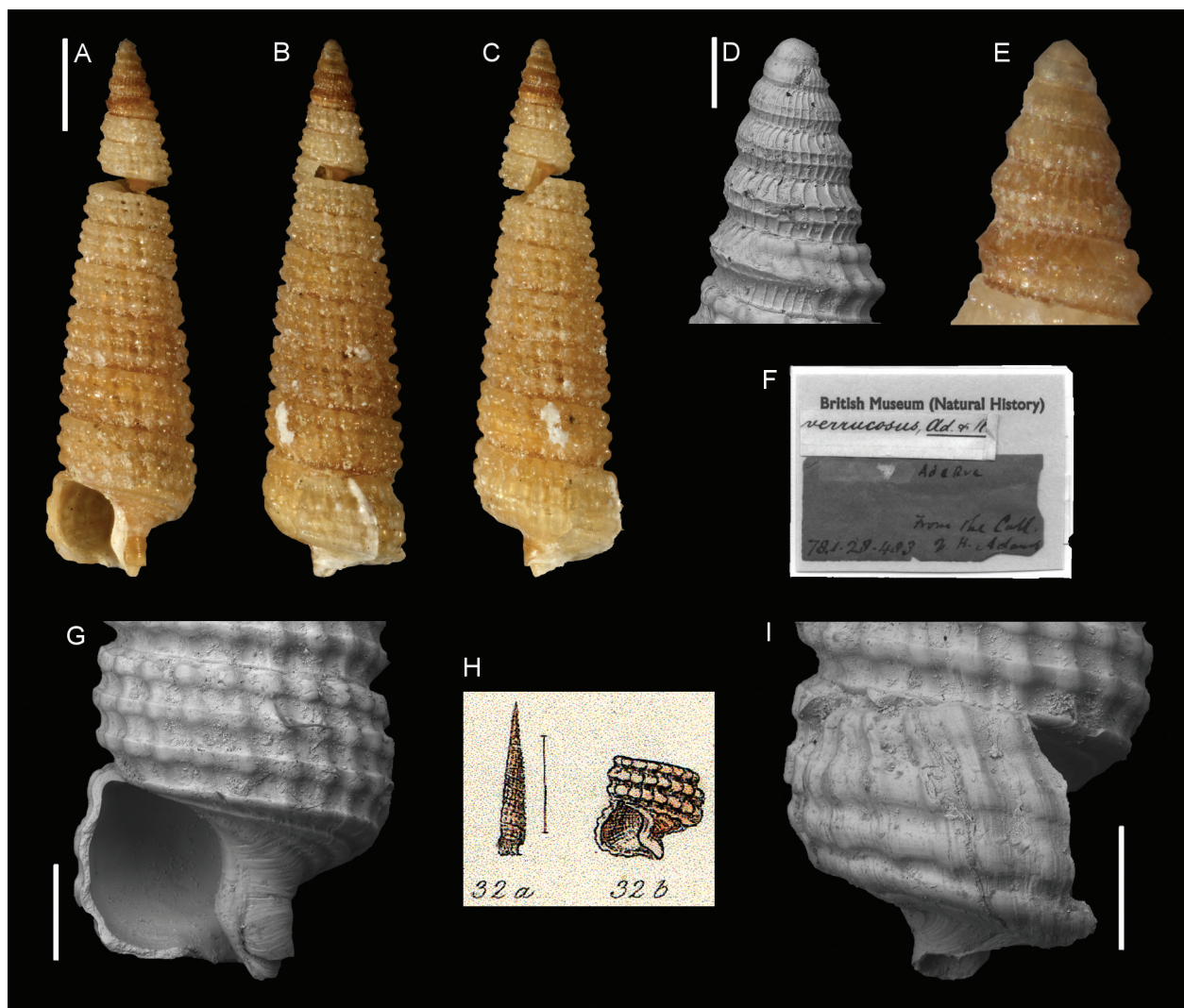


Figure 13. *Triphora* sp. (labelled as *Triphoris verrucosus* Adams & Reeve, 1850), China Sea, coll. H. Adams in coll. H. Cuming. A–G, I NHMUK 1878.1.28.483: front (A), side (B), back (C), protoconch (D, E), original labels (F), aperture (G), peristome (I). H Original figures. Scale bars: A–C: 1 mm; D, E: 0.2 mm; G, I: 0.4 mm.

The original figure shows a slender shell with several whorls, but little more can be inferred because it is poorly detailed. At present, *T. verrucosus* should be considered a *nomen dubium*.

Species described by H.E.J. Biggs

Triphora sp. (*insularum* Biggs, ms)

Figure 14

Triphora sp. Biggs 1973: 362–363, pl. 4, figs 4, 5.

Original locality. NE of Abu Dhabi, United Arab Emirates.

Material examined. NHMUK 1968760–3: 4 specimens (from original locality).

Remarks. Biggs (1973) described and illustrated this species in his work on the Trucial Coast (Persian (Arabian) Gulf) but refrained from naming it because it lacked the apex. We agree that the presence of a complete apex is fundamental for the institution of any triphorid new species due to the important characters it bears as acknowledged by several authors (e.g. Barnard 1963; Marshall 1983; Bouchet and Strong 2010). We thus refrain from redescribing it because we have not been able to locate new suitable material. From the remnants of apexes on the examined material, the species likely bears a multispiral protoconch.

In the NHMUK collection, the specimens studied by Biggs have been located with the manuscript name *insularum*. They are labelled as “holotype” and “paratypes”

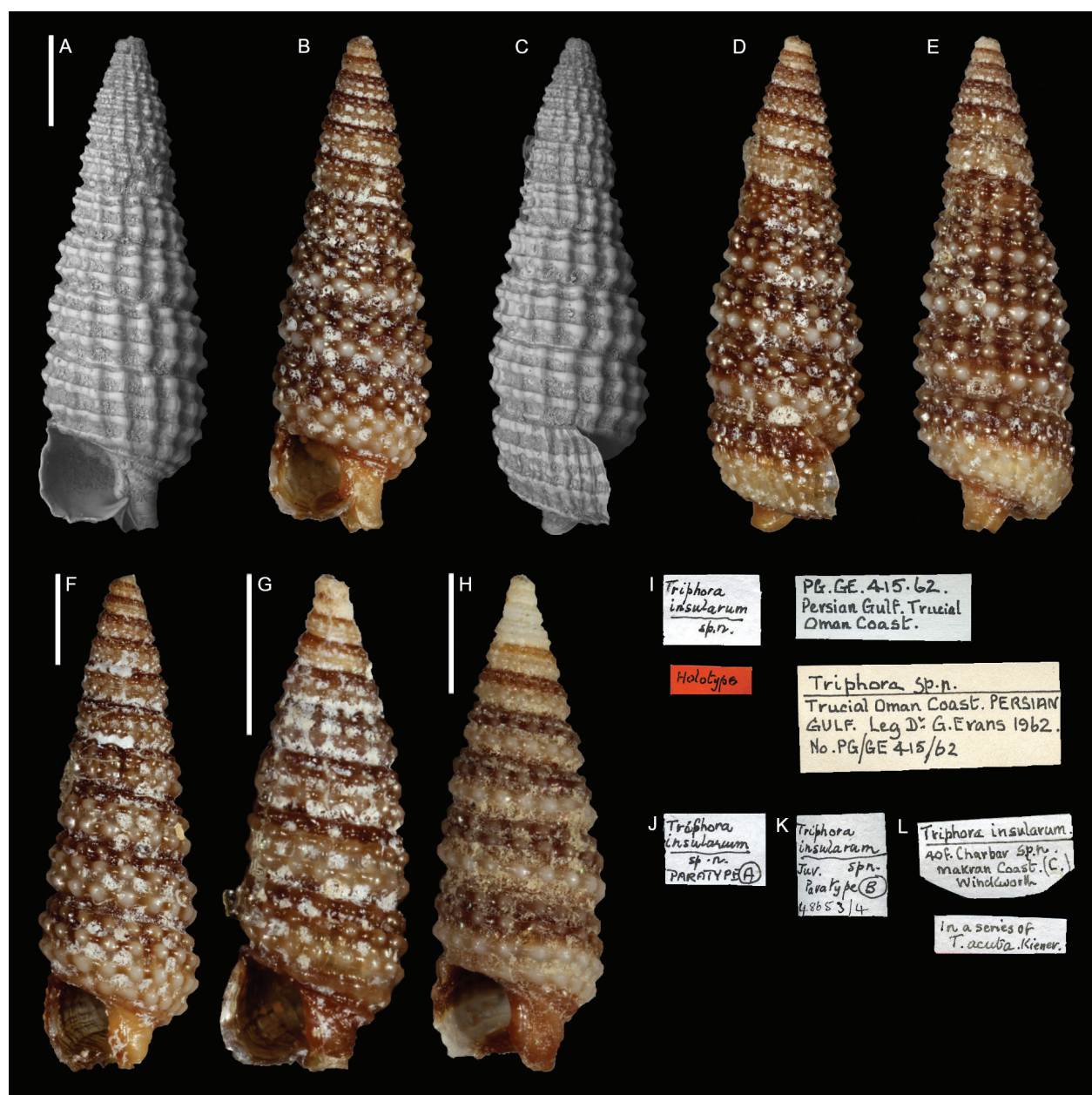


Figure 14. *Triphora* sp. (*insularum* Biggs ms). A–E “Holotype”, NHMUK 198760, Abu Dhabi, United Arab Emirates: front (A, B), side (C, D), back (E). F–H “Paratypes”, NHMUK 198761–3: front views of Paratype A (F), B (G) and C (H). I Original labels of the “holotype”. J–L Original labels of “paratypes” A (J), B (K) and C (L). Scale bars: A–E, F–H: 1 mm.

although, pending a formal introduction of the name, these specimens are not name-bearing types. The label bears the locality “Trucial Oman Coast” and 1962 as collecting year. At the time, the United Arab Emirates had not been founded yet and the coastal emirates were known as Trucial States, a British Protectorate since 1819.

Species described by J. Crosse and P. Fischer

While J. Crosse and P. Fischer’s type material is supposed to be preserved in the collections of the *Journal de Conchyliologie* at the MNHN (Dance 1966), the types of *Triphoris angasi* and *T. pfeifferi* were not found in Paris (Marshall 1983, V. Héros, pers. comm. July 2014). Specimens labelled as types of these two species were found in the NHMUK, likely bequeathed by G.F. Angas among 240 types and 1500 shells (Smith 1906). Indeed, the two species were described on Angas’ material.

Triphoris angasi Crosse & Fischer, 1865

Figure 15

Triphoris angasi Crosse and Fischer 1865: 46, pl. 1, figs 12, 13.

Type locality. “St. Vincent” [Gulf St Vincent, South Australia].

Type material. Syntypes: NHMUK 1870.10.26.127, 1 specimen, St. Vincent Gulf, South Australia (coll. G.F. Angas).

Original description. *T. imperforata, sinistrorsa, conico-turrita, subelongata, tenuiuscula, brunnea; apice acuminato; sutura linearis, fere inconspicua; anfr: 15 planiusculi, embryonales 3 laeves, sequentes cingulis 3 granulorum (intermedio paulo minore) spiraliter impressi, ultimus quadricingulatus, transversim zona alba ornatus, basi brunneo-violacea; apertura oblique subquadrato-piriformis, intus brunneo lirata, margine columellari arcuato, externo flexuoso, in vicinio columellae ligulatim ascendente; canali brevi tubuliformi. — Long. 7 millim., diam. maj. 1 millim. 7/19.*

Hab. in sinu “Saint-Vincent” dicto (coll. Angas).

Coquille imperforée, sénestre, de forme conico-turriculée, suballongée, assez mince et de couleur brune; le sommet est acuminé, la suture linéaire et Presque imperceptible. Les tours, au nombre de 15, sont aplatis; les trois premiers sont lisses, les suivants sont ornés transversalement de trois cercles de granulations assez grosses; celui du milieu est un peu plus petit que les autres, et tend même à disparaître dans les tours supérieurs; le dernier tour porte quatre cingulations au lieu de trois, et est orné d’une zone blanche transverse; sa partie basale est d’un brun violâtre. L’ouverture, située un peu obliquement, est plutôt piriforme que quadrangulaire, et marquée de quelques lignes brunes à l’intérieur. Le bord columellaire est arqué, le bord externe est flexueux et vient s’appliquer, en forme de languette, le long de la columelle. Le canal est court et

tubuliforme. — La longueur totale de la coquille est de 7 millimètres, son plus grand diamètre de 1 7/10.

Cette espèce provient du golfe de Saint-Vincent. Le T. hindsii, Deshayes (1), est, à notre connaissance, la forme qui s’en rapproche le plus sous le rapport du système de sculpture; mais les granulations sont proportionnellement plus grosses dans le T. angasi, qui compte, d’ailleurs, trois tours de spire de plus, et qui se distingue par son ouverture plus large et par la zone blanche de son dernier tour. Nous dédions cette espèce à M. French Angas.

Translation of the Latin text. Sinistral imperforated shell, turreted-conical, subelongated, rather slender, brown; sharp apex; linear suture more or less inconspicuous; 15 rather flat whorls, three light embryonic, subsequent with three spiral rows of granules (smaller intermediate), four on the last with a white spiral band, base violet-brown; subsquared, pyriform slanting aperture with brown lines inside, arched columellar edge, bending external lip ascending like a strip near the columella; short, tubular anterior siphon. Length 7 mm, major diameter 1 7/19 mm.

Habitat. In the gulf known as “St. Vincent” (coll. Angas).

Diagnosis. Syntype 5.9 mm. Shell conical, with flat sides. Teleoconch of 11 whorls, with three spiral cords with tubercles at the intersection with opisthocline axial ribs. The second cord appears on the fifth whorl as a fine thread and becomes fully grown at mid-shell height. A fourth poorly sculptured cord is sometimes visible suprasuturally. Fine growth striae are visible, especially in the interspaces of cords and ribs. The peristome has a shallow posterior sinus and no additional cords. The siphonal canal is short. The base has two additional almost smooth spiral cords. The protoconch is multispiral, but the upper whorls are missing in the lectotype, impeding the quantification of the number of whorls. The lower three whorls have two spiral keels and axial riblets. Teleoconch brown with lighter tubercles, fourth spiral cord on the last whorl white, base deep brown, apex likely white (although worn in the lectotype).

Remarks. This specimen may not be the one on which Crosse and Fischer based their original description, because it is smaller in size (5.9 vs 7 mm) and with fewer whorls (11 vs 15). However, it matches very well the original description and figure; the label (Fig. 15L) specifies that this is a “type”, from the type locality and collected by G.F. Angas (Crosse and Fischer specified that the new species was based on Angas’ material). Therefore, we consider this specimen as belonging to the type series.

Triphoris pfeifferi Crosse & Fischer, 1865

Figure 16

Triphoris pfeifferi Crosse and Fischer 1865: 47, pl. 1, figs 14, 15.

Type locality. “St. Vincent” [Gulf St Vincent, South Australia].

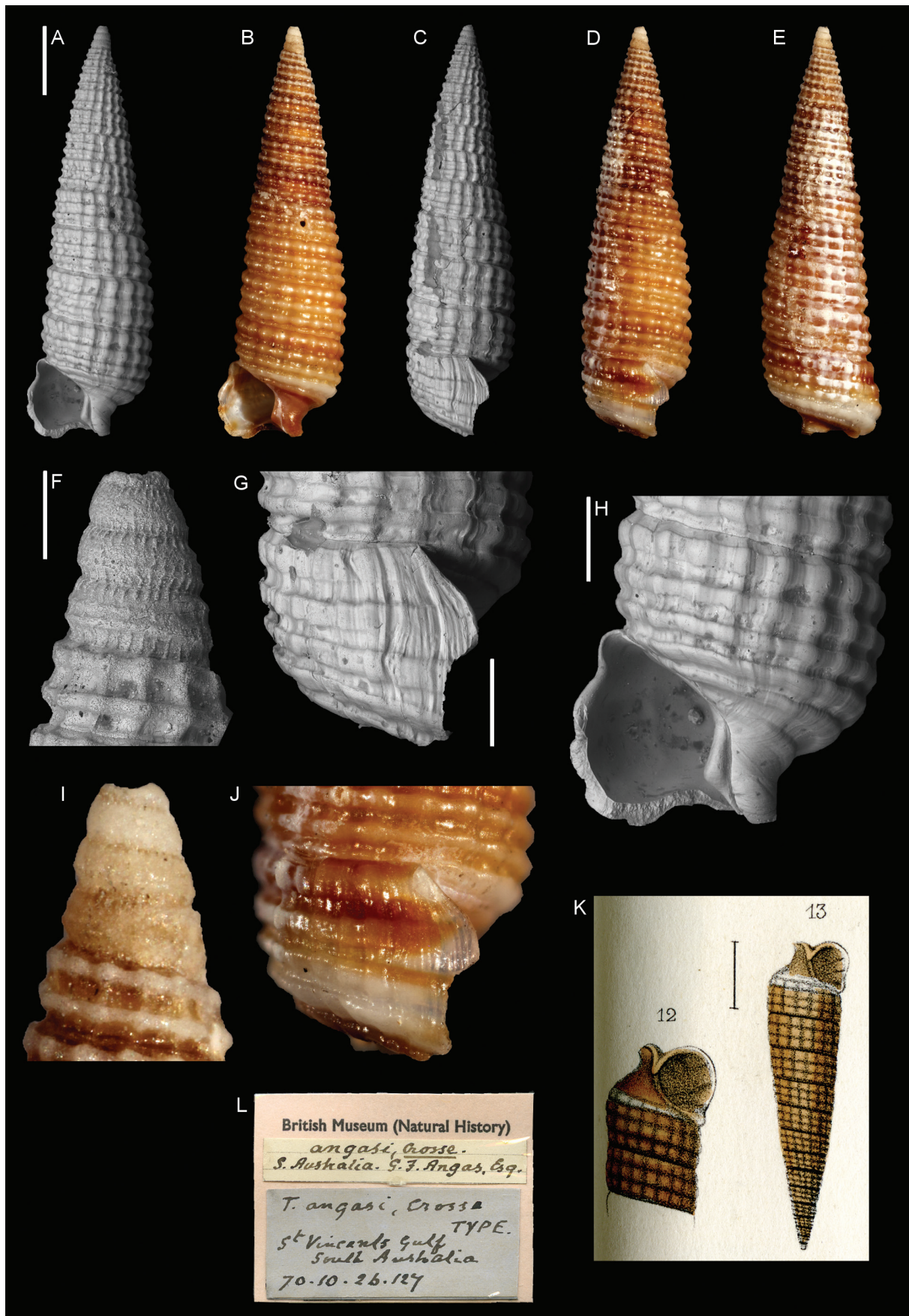


Figure 15. *Triphoris angasi* Crosse & Fischer, 1865, Gulf St Vincent, South Australia, coll. G.F. Angas. A–J, L Syntype NHMUK 1870.10.26.127: front (A, B), side (C, D), back (E), protoconch (F, I), peristome (G, J), aperture (H), original labels (L). K Original figures. Scale bars: A–E: 1 mm; F, I: 0.2 mm; G, H, J: 0.5 mm.

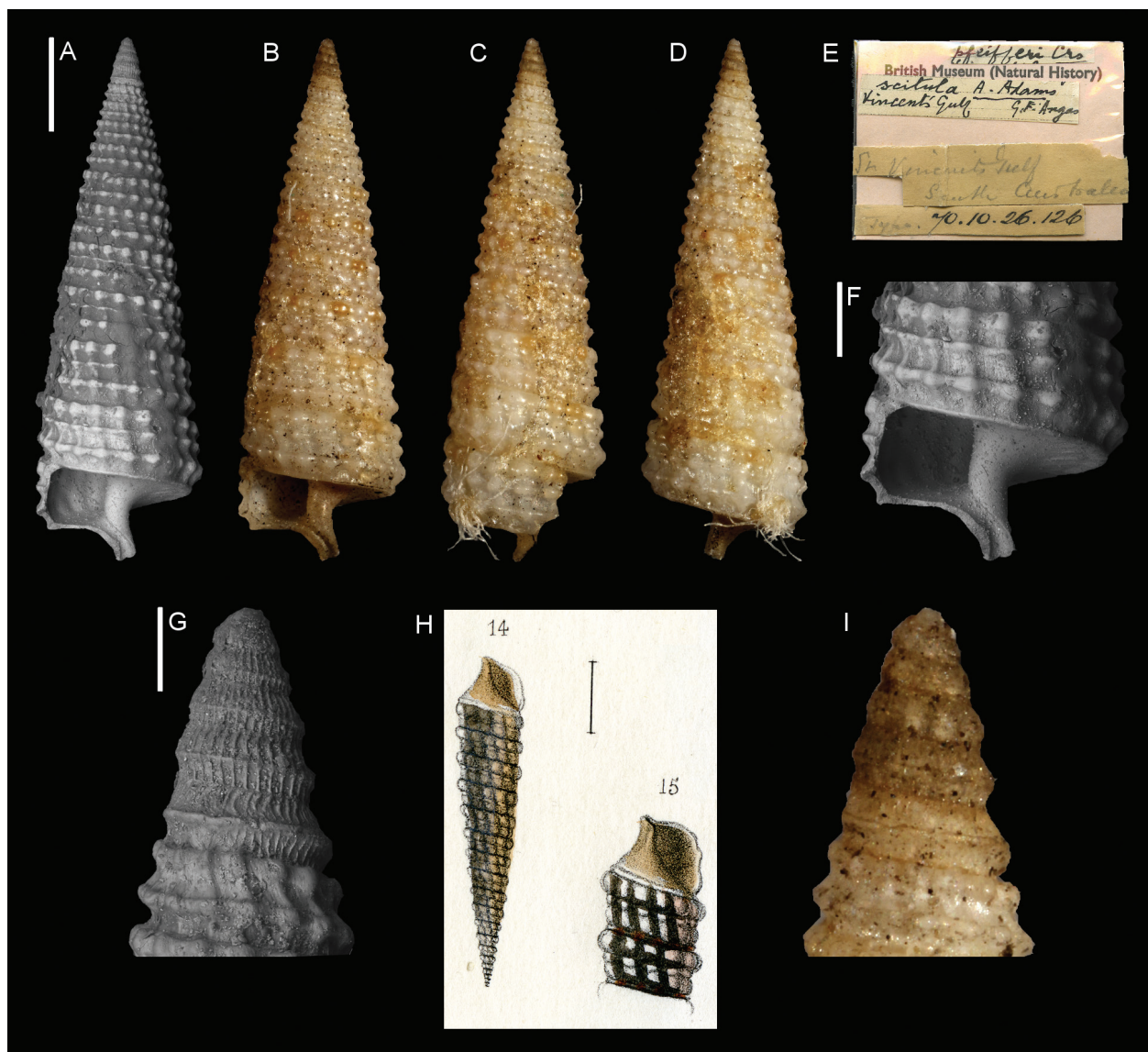


Figure 16. *Triphora* sp. (labelled as *Triphoris pfeifferi* Crosse & Fischer, 1865). **A–G, I** NHMUK 1870.10.26.126, St Vincent Gulf, South Australia, coll. G.F. Angas: front (**A, B**), side (**C**), back (**D**), original labels (**E**), microsculpture (**F**), protoconch (**G, I**). **H** Original figures. Scale bars: **A–D**: 1 mm; **F**: 0.5 mm; **G, I**: 0.2 mm.

Type material. Not found (the specimen NHMUK 1870.10.26.126 labelled as “type” is not this species, see Remarks).

Original description. *T. imperforata, sinistrorsa, turritata, elongata, tenuiuscula, subtranslucida, albida, fusco regulariter maculata; apice acuminato; anfr: 18, lentissime accrescentes, embryonales 3 laeves, caeteri cingulis 3 margaritarum elegantissimis transversim ornate (margaritulis regularibus, nitidis, lacteo-hyalinus), medio compresso, minimo, fere inconspicuo, basali multo majore, prominulo, et, infra cingulum basale, funiculo sat prominulo, fusco et albo articulado; ultimus brevis, basi laeviuscula, violaceabrunnea; apertura oblique sub-*

ovata, margine columellari subarcuato, externo simplice; canali brevi. — Long. 8, diam. maj. 1 ½ millim.

Hab. in sinu “St. Vincent” dicto (coll. Angas).

Coquille imperforée, sénestre, allongée, turriculée, assez mince, subtranslucide et blanchâtre avec certaines de ses parties marquées de brun; le sommet est acuminé. Les tours, au nombre de 18, s'accroissent très-lentement; les 3 premiers sont lisses. Le système d'ornementation des autres est des plus élégants: il se compose de trois rangées transverses de petites perles régulières, brillantes et d'un blanc nacré transparent; la rangée médiane est petite, comme écrasée entre les deux autres, et difficile à apercevoir sans le secours d'un fort grossissement; celle qui est le plus près de la base dépasse les autres

de beaucoup en dimension, et présente une forte saillie au-dessous de la rangée basale règne un petit cordonnet saillant, articulé de brun et de blanc, et se confondant avec la suture du tour suivant. Le dernier tour est assez court, sa partie basale est lisse et d'un brun violacé. L'ouverture est obliquement ovale, le bord columellaire subarqué, le bord externe simple et mince, le canal court. – La longueur totale de la coquille est de 8 millimètres, son plus grand diamètre de 1,5.

L'habitat de cette espèce est le même que celui de la précédente. L'individu qui nous a été communiqué n'est probablement pas complètement adulte, et nous ne pouvons, par conséquent, donner la description de l'ouverture que sous toutes réserves. Néanmoins, son système d'ornementation est si particulier, qu'il sera toujours facile de reconnaître l'espèce, même sur un fragment.

Notre espèce se rapproche du *T. mirificus* de Deshayes, et plus encore du *T. angustissimus* du même auteur (1). Elle est plus élancée que le premier, n'a pas, comme lui, de troisième ouverture, et compte trois rangs de perles et non deux. Elle est moins allongée que le second, et s'en distingue par ses tours plus nombreux (18 au lieu de 14), ses trois rangées de tubercules margaritifformes, et son petit funicule saillant régulièrement articulé de blanc et de brun. Nous donnons à cette remarquable espèce le nom de *M. Le docteur L. Pfeiffer*, dont les éminents travaux sont devenus classiques, en ce qui concerne la nomenclature des Mollusques terrestres.

Translation of the Latin text. Sinistral imperforated shell, turreted, elongated, rather slender, subtranslucent, whitish with regular brown spots; sharp apex; 18 very slowly growing whorls, three light embryonic, others with three very elegant spiral rows of pearls (regular, glossy, hyaline-milky pearls), the intermediate shrunk, rather inconspicuous, much more developed basally, slightly protruding, and, under the basal row a quite protruding dark white spotted cord; short last whorl, rather slender base, dark violet; subovate slanting aperture, subarched columellar edge, simple external lip; anterior siphon short. — Length 8, major diameter 1½ mm.

Habitat. In the gulf known as “St. Vincent” (coll. Angas).

Remarks. The specimen found and labelled as “type” is remarkably different from the specimen figured by Crosse and Fischer and must not be considered as belonging to the type series. On the basis of the original description and figure, *T. pfeifferi* should be considered a junior synonym of *Triphoris scitulus* A. Adams, 1854 (see p. 172) as already suggested by Marshall (1983).

Species described by L. de Folin

Léopold de Folin (1867) described 58 new species of molluscs in his work on the pearly oysters of Western Panama. Kisch (1960) reported the location of type specimens and highlighted that the type of de Folin's only triphorid, *Triphoris cucullatus*, could not be located. Indeed, we show below that the specimens present in NHMUK and labelled as syntypes are not this species.

Triphoris cucullatus de Folin, 1867

Figure 17

Triphoris cucullatus de Folin 1867: 72, pl. VI, fig. 13.

Type locality. Negritos and Iles aux Perles, Bay of Panama, Panama (de Folin 1867: 9); Iles aux Perles, Panama fide Kisch (1960).

Type material. Not found.

Original description. Testa elongato-turgidula, apice acuminata, alba, fusco marmorata; anfractibus septedecimis, sutura simplici junctis; prioribus liris duobus spiralibus, margaritis notatis; sequentibus inaequaliter triliratis; ultimo margaritarum seriebus quinque vel sextis ornato, testae ¼ adaequante; apertura subcirculari in canalem brevem, obliquum, clausum, desinente.

Long. 0,0075. Diam. 0,0019, 0.002.

Très curieuse espèce, allongée, un peu ventrue, très acuminée, de couleur blanche marbrée de brun, se fondant en des nuances légères, quelquefois d'un brun foncé, marbrée par des atténuations de teintes. Cette fort jolie coquille est composée de dix-sept tours de spire qui sont réunis par une suture simple, assez profonde. Le dernier de ces tours équivaut au quart environ de la longueur totale de la coquille. Ils sont ornés, les premiers, de deux cordons, puis de trois, le dernier de cinq et même de six. Sur les tours ornés de trois, le cordon du milieu est plus petit que les deux autres. Ils sont séparés par des sillons assez étroits, et sont divisés par une série de perles arrondies du plus gracieux effet. L'ouverture est presque circulaire et présente un caractère assez singulier. Le bord gauche, simple et crénelé, décrit les trois quarts environ d'un cercle et vient, en passant par dessus la columelle, retomber sur la base de la coquille; en cet endroit il forme un angle très-aigu suivant lequel il se rejette en arrière, suit une autre courbe et produit un canal arrondi fort court qui se trouve ainsi presque entièrement recouvert. Le bord droit s'arrondit lui-même en s'inclinant vivement pour rejoindre la base sur laquelle il termine la courbure de l'ouverture.

Translation of the Latin text. Swollen-elongated shell, sharp apex, white, dark marbled; seventeen whorls with a plain suture; earliest with two spiral rows of granules; subsequent with three unequal rows; last with five or six series of granules, as large as ¼ of the shell; subcircular aperture ending in a short, slanting, closed canal.

Length 0.0075. Diam 0.0019, 0.002.

Remarks. The lot NHMUK 1984153 contains two labels stating “De Folin's syntype in coll. Sykes” signed by A. Blake and “*Triphora cucullata* Folin, Panama (Folin coll.)”. However, the specimen is very different from what was described by de Folin and from the original figure (Fig. 17G). *T. cucullatus* is described as having 17 whorls while the shell found has seven whorls (although a few may be lacking because the apex is incomplete). In

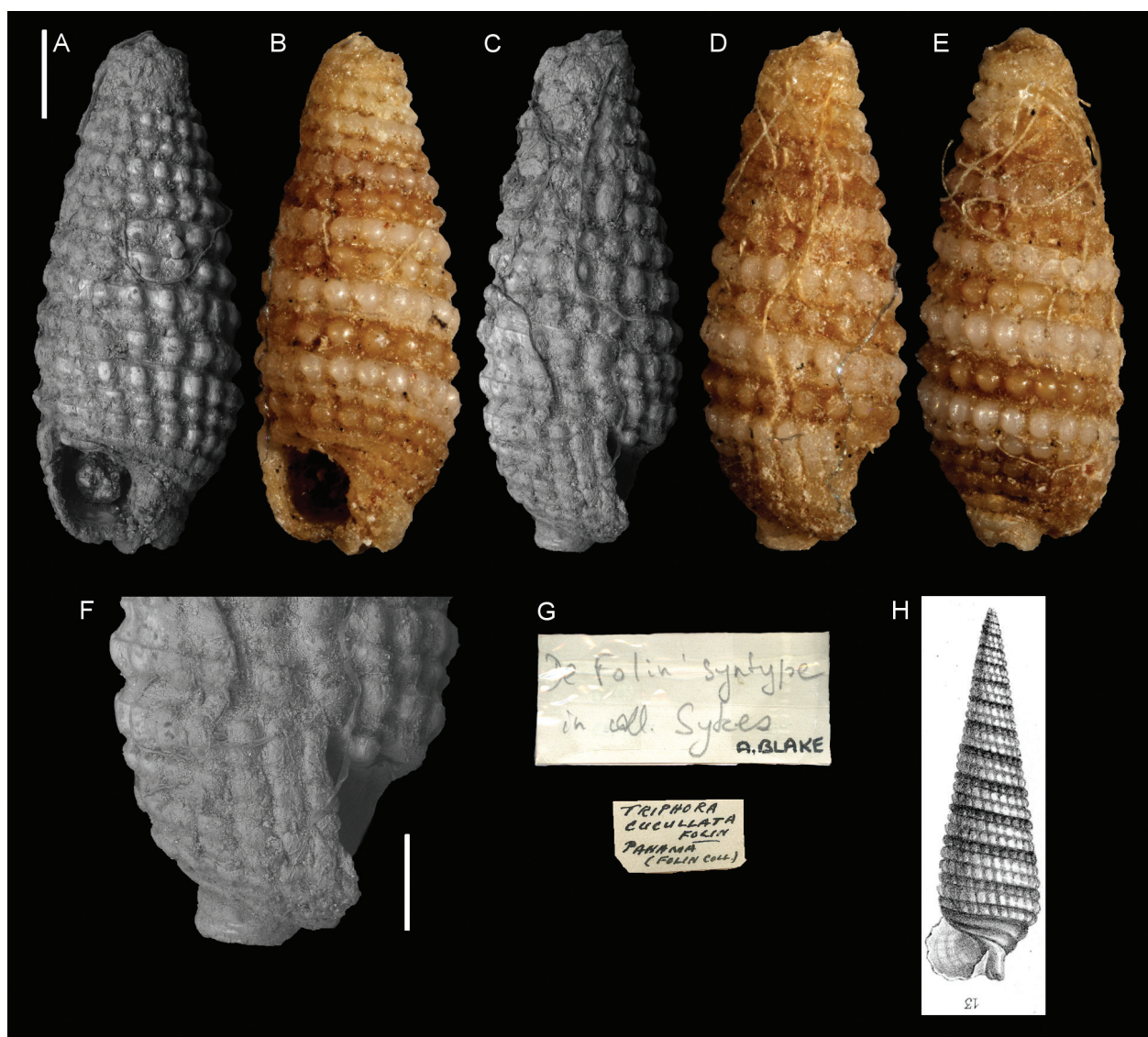


Figure 17. *Triphora* sp. (labelled as *Triphoris cucullatus* de Folin, 1867), Panama, coll. E.R. Sykes. **A–G** NHMUK 1984153: front (**A**), side (**B**), back (**C**), side (**D**), back (**E**), peristome (**F**), original labels (**G**). **H** Original figure of *T. cucullatus*. Scale bars: **A–E**: 0.5 mm; **F**: 0.3 mm.

addition, the pointed profile is missing, and the original figure shows a colour pattern with a dark first spiral cord on a white background which is the opposite of the one of the shells. Therefore, we do not consider this specimen belonging to the type series.

Species described by R.B. Hinds

Richard B. Hinds described 31 species of Triphoridae from the collections Cuming (Hinds 1843a), Belcher, Gray, and Metcalfe (Hinds 1843b). Those described from the latter (*T. aemulans*, *affinis*, *candidus*, *coelebs*, *concinus*, *hilaris* and *metcalfei*) were dispersed at auction in the 19th century and the material is not in NHMUK (K. Way, pers. comm.). The type of *T. marmoratus* was also not found. A lot, which apparently was related to this species (NHMUK 20170299) because it came from the “West Indies” and was stored in the Gray collection, is

unlikely to belong to *T. marmoratus* because shells are completely white, while Hinds (1843b) described them as brown with white flammulae (Fig. 18).

Hinds stated the length of specimens in “lines” that are equivalent to a tenth of an inch, that is 2.54 mm (Keen 1966).

Triphoris (Ino) asperrimus Hinds, 1843

Figure 19

Triphoris (Ino) asperrimus Hinds 1843b: 18, not illustrated. Illustration available in Hinds (1844): 29, pl. 8, fig. 10.

Type locality. New Guinea.

Type material. Holotype: NHMUK 1879.2.26.203, fixed by monotypy (coll. E. Belcher).

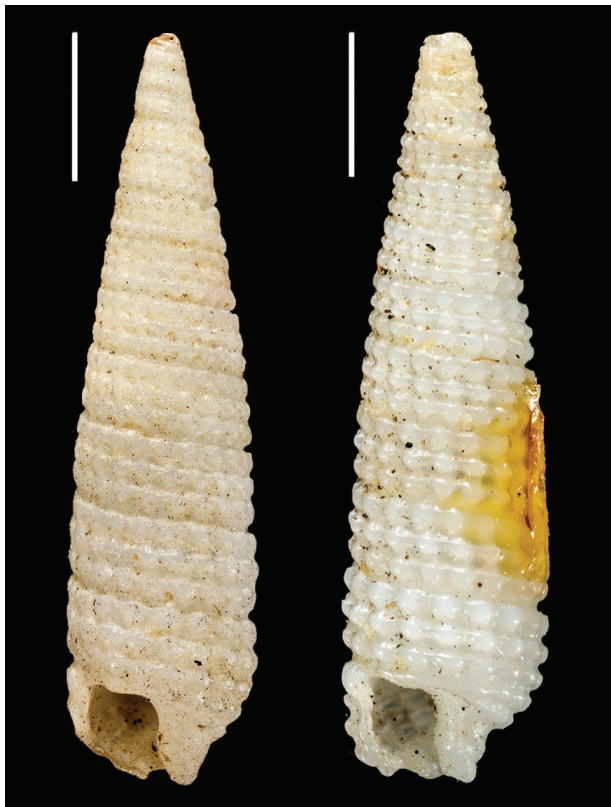


Figure 18. *Triphora* sp., NHMUK 20170299, West Indies, J.E. Gray collection, not *Triphoris marmoratus* Hinds, 1843.

Original description. *Testa gracili attenuata; anfractibus 24–26, superne valde coarctatis, inferne angulatis, serie duplici granulorum; prope suturam granuloso-carinata. Axis 6 lin.*

Geog. New Guinea; dredged from a muddy bottom in 8 fathoms.

The only specimen of this species in the collection has an injured mouth. It is remarkable for its long needle-like shape; and the upper portion of each whorl being strangulated, and the lower angular and with a series of tubercles, the shell has a very rough and jagged appearance.

Translation of the Latin text. Slender shell; 24–26 whorls, very narrow upper portion and angulated lower portion, with two series of tubercles; near the suture a granulated carina. Height 6 lines.

Diagnosis. Holotype 8.5 mm high and bearing 13 whorls, but the specimen lacks several apical whorls. The shell is extremely elongated. Teleoconch whorls have three tuberculated spiral cords, the first is smaller and appears later along the spire; the third is the most prominent. A suprasutural smooth cord is visible in the last whorls. The holotype is a subadult, and thus its peristome, sinuses, and base cannot be described. The apex is missing too. The teleoconch is white.

Triphoris (Ino) bilix Hinds, 1843

Figure 20

Triphoris (Ino) bilix Hinds 1843b: 17, not illustrated. Illustration available in Hinds (1844): 28, pl. 8, fig. 5.

Type locality. Straits of Malacca.

Type material. Syntypes: NHMUK 1879.2.26.206: 3 specimens, Straits of Malacca (coll. T. Lombe Taylor).

Original description. *Testa attenuata pallida; anfractibus quindecim tricarinatis; carina inferiore paululum maxima marmorata, media minima; apertura rotundata; sinu laterali patulo. Axis 3 lin.*

Geog. Straits of Malacca; dredged from a muddy bottom in 20 fathoms.

Translation of the Latin text. Slender pale shell; fifteen whorls with three spiral cords; the lower carina is marbled and a little bit more developed, the intermediate is the smallest; mouth rounded; open posterior sinus. Height 3 lines.

Diagnosis. Syntypes ranging in size from 6.7 to 7.5 mm. Teleoconch cyrtocoid, with flat whorls. Syntype 1 (Fig. 20A–F) teleoconch of 12 whorls, ornamented by three undulated spiral keels; the second being narrower and appearing on the fourth teleoconch whorl. A fourth fine smooth suprasutural cord is visible in the lower part of the shell. Axial prosocline fine growth lines are visible especially on the lower part of the teleoconch. On the last whorl, keels become tuberculated and the profile becomes angulated. The peristome shows an additional tuberculated spiral keel. Siphonal canal quite long. Base flat with an additional smooth spiral cord. Protoconch of six whorls: protoconch I of two apparently smooth whorls, but the preservation of this part of the shell is suboptimal. Protoconch II of four whorls with one spiral keel on the first two, and two on the last two; axial riblets are visible on all four whorls. The protoconch is brown, whereas the teleoconch has a creamy white background colour with orange blotches. The interspaces between the tubercles of the third keel are often orange-brown.

Triphoris (Ino) cancellatus Hinds, 1843

Figure 21

Triphoris (Ino) cancellatus Hinds 1843b: 18, not illustrated. Illustration available in Hinds (1844): 28, pl. 8, fig. 6.

Type locality. Straits of Malacca.

Type material. Syntypes: NHMUK 1844.6.7.30: 3 specimens, Straits of Malacca (coll. E. Belcher); NHMUK 1879.2.26.211: 1 specimen (coll. T. Lombe Taylor).

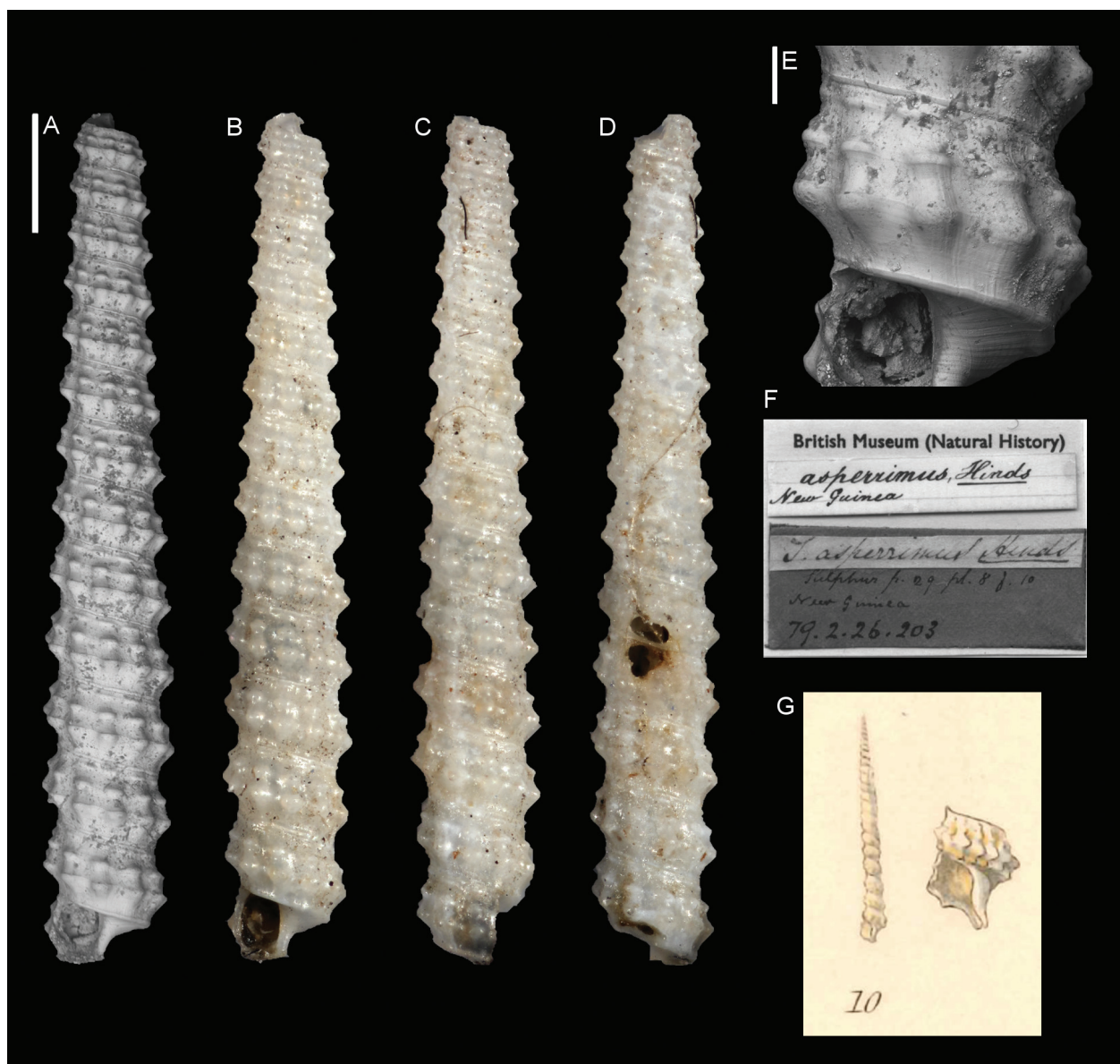


Figure 19. *Triphoris asperimus* Hinds, 1843, New Guinea, coll. E. Belcher. A–F Holotype, NHMUK 1879.2.26.203: front (A, B), side (C), back (D), microsculpture (E), original labels (F). G Figure in Hinds 1844. Scale bar: A–D: 1 mm; E: 0.2 mm.

Original description. *Testa pallide rufente; anfractibus 15–18 bicarinatis; carinis albo maculatis; inter carinas cancellata lineis albis longitudinalibus intervallis fuscis; sutura sulcata; apertura subquadrata; sinu laterali margine contracta. Axis 4½ lin.*

Geog. Straits of Malacca; in 2 fathoms.

Translation of the Latin text. Pale reddish shell; 15–18 whorls with two spiral cords which bear white spots; a cancellate space with longitudinal white lines and dark intervals occurs between the cords; incised suture; subquadrate aperture; posterior sinus with shrunk edge. Height 4½ lines.

Diagnosis. Syntype 1 (Fig. 21A–G) 8 mm high. Shell cyrtoconoid with 15 teleoconch whorls whose sides are char-

acterized by two prominent smooth spiral cords. In between, a fine tuberculated spiral cord develops; on the first whorls, it appears as a fine thread. Axial riblets are present between the cords. The last whorl has a fourth, weakly tuberculated, spiral cord and the base shows an additional smooth spiral cord. The peristome shows an additional spiral cord between the first and the second and fine spiral threads between main cords. Siphonal canal long. Posterior sinus deep. The protoch is multispiral and composed of six whorls. The first two have numerous rounded tubercles; on the third and fourth, there are axial riblets and an equally strong spiral keel positioned abapically; on the last two whorls, a second strong spiral keel develops apically. The teleoconch orange with white flammulae. The second spiral cord on whorls has white tubercles and deep orange to brown interstices. The protoconch is brown.

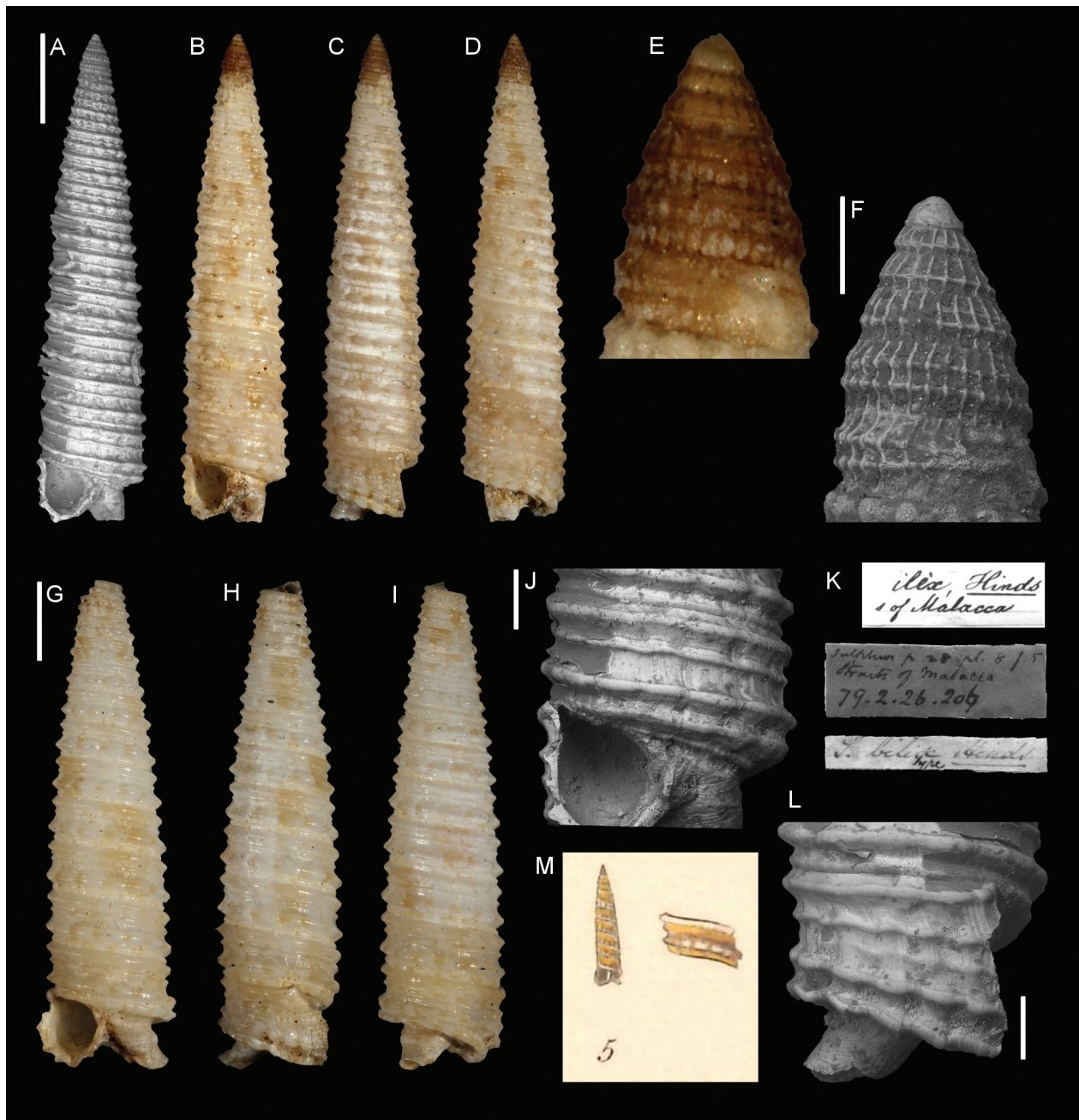


Figure 20. *Triphoris bilix* Hinds, 1843, Straits of Malacca, coll. T. Lombe Taylor. A–F, J, L Syntype NHMUK 1879.2.26.206/1: front (A, B), side (C), back (D), protoconch (E, F), microsculpture (J), peristome (L). G–I Syntype NHMUK 1879.2.26.206/2: front (G), side (H), back (I). K Original labels. M Figure in Hinds 1844. Scale bars: A–D, G–I: 1 mm; E, F, J, L: 0.2 mm.

***Triphoris (Mastonia) carteretensis* Hinds, 1843**

Figure 22

Triphoris (Mastonia) carteretensis Hinds 1843b: 20, not illustrated. Illustration available in Hinds (1844): 31, pl. 8, fig. 17.

Type locality. “Port Carteret, New Ireland” [Papua New Guinea].

Type material. Syntypes: NHMUK 1879.2.26.205, 1 specimen, Port Carteret, New Ireland (coll. T. Lombe Taylor).

Original description. *Testa pallida; anfractibus quatuordecim triseriatim granulosis, serie media minima, infra duas superiores sulcatis; apertura subquadrata; sinu laterali patulo. Axis 3 lin.*

Geog. Port Carteret, New Ireland; among fine gravel at low water.

The sulcus, which traverses the whorl transversely, will readily distinguish this species.

Translation of the Latin text. Pale shell, fourteen whorls with three series of granules, the intermediate

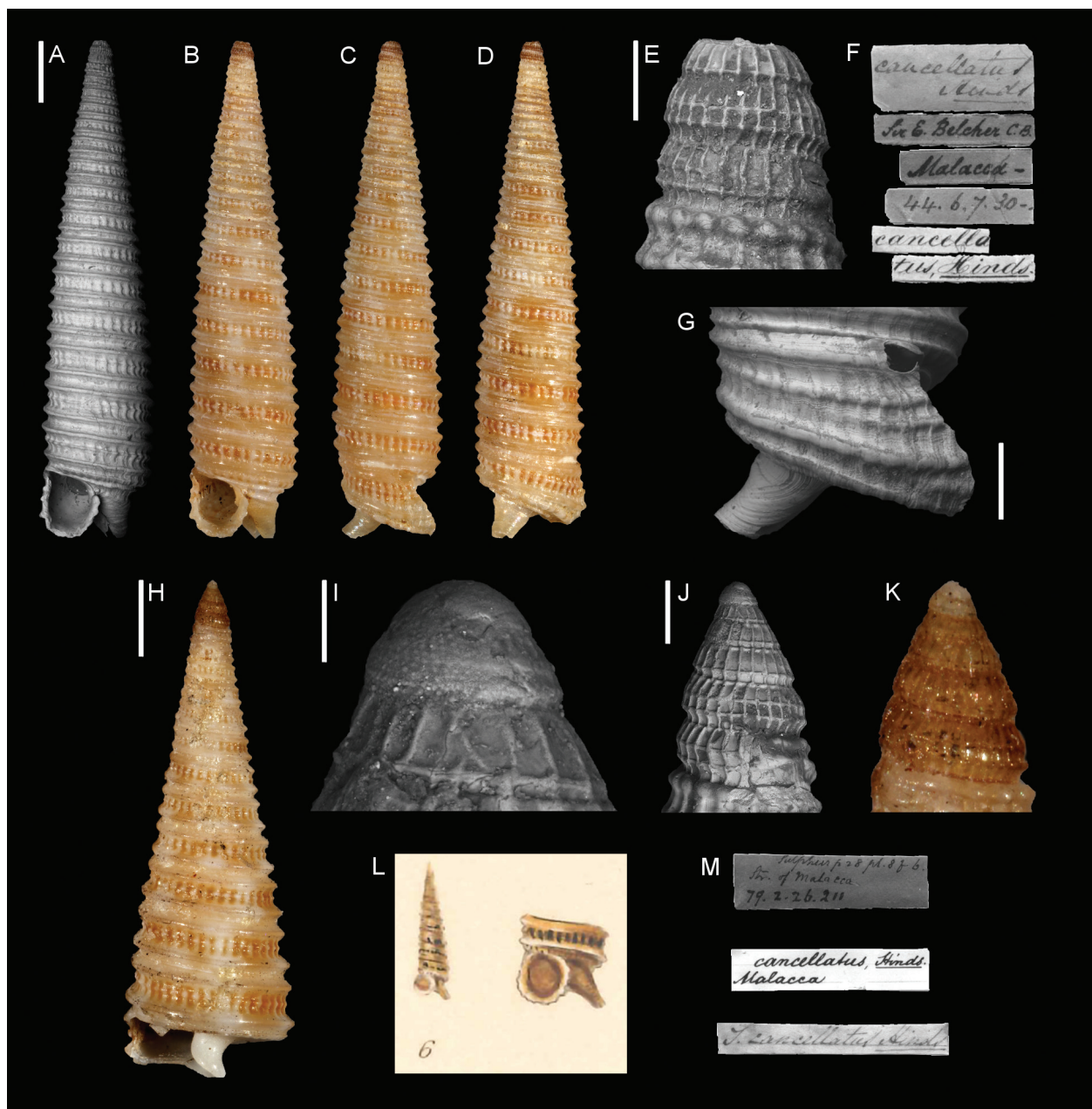


Figure 21. *Triphoris cancellatus* Hinds, 1843. A–G Syntype NHMUK 1844.6.7.30/1, Straits of Malacca (coll. E. Belcher): front (A, B), side (C), back (D), protoconch (E), original labels (F), peristome (G). H–K, M Syntype NHMUK 1879.2.26.211, Straits of Malacca (coll. T. Lombe Taylor): front (H), nucleus (I), protoconch (J, K), original labels (M). L Figure in Hinds 1844. Scale bars: A–D, H: 1 mm; E, J, K: 0.2 mm; I: 0.05 mm; G: 0.5 mm.

series is the smallest, under the upper ones with two series; subquadrate aperture, open posterior sinus. Height 3 lines.

Diagnosis. Syntype 4.6 mm high. Shell cyrtconoid with nine whorls with flat sides. Such whorls are ornamented by three spiral cords with tubercles at the intersection with the prosocline axial ribs. The second cord develops at mid-teleoconch and is initially a fine thread. Among the main cords, fine spiral threads are visible. A fourth tuberculated cord is present on the last whorl and the base has one more. The peristome shows additional spiral

cords between the main ones. The posterior sinus is shallow, the siphonal canal short. The protoconch is missing. The teleoconch is brown to orange with darker interspaces between the spiral cords.

Triphoris (Mastonia) castus Hinds, 1843

Figure 23

Triphoris (Mastonia) castus Hinds 1843b: 20, not illustrated.

Type locality. “St. Vincent’s”, Caribbean.

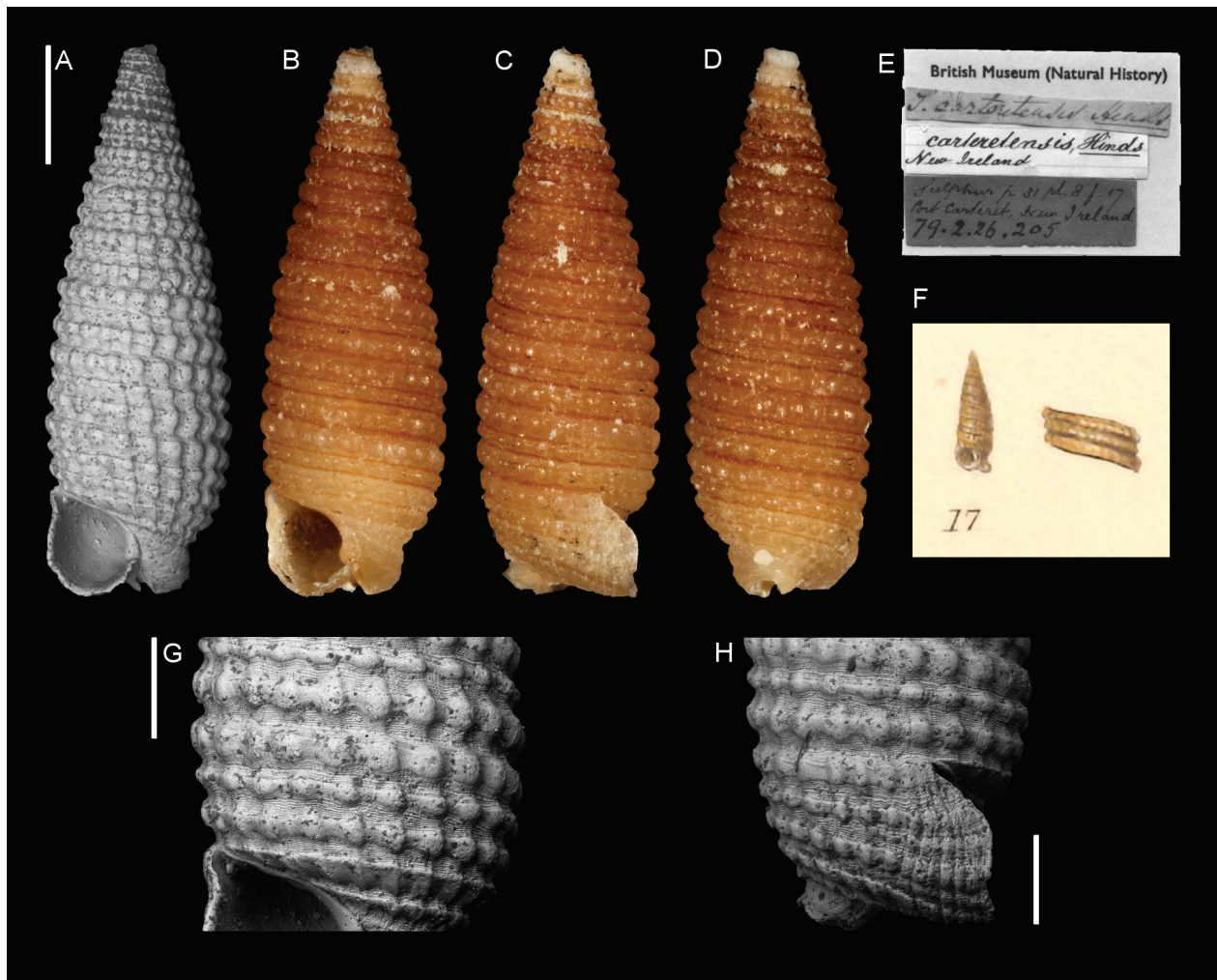


Figure 22. *Triphoris carteretensis* Hinds, 1843, Port Carteret, New Ireland, coll. T. Lombe Taylor. **A–E, G, H** Syntype NHMUK 1879.2.26.205: front (**A, B**), side (**C**), back (**D**), original label (**E**), microsculpture (**G**), peristome (**H**). **F** Figure in Hinds 1844. Scale bars: **A–D**: 1 mm; **G–H**: 0.5 mm.

Type material. Syntypes: NHMUK 196536: 1 specimen, and NHMUK 196537: 1 specimen, both St Vincent, Caribbean (J.E. Gray coll.).

Original description. *Testa parva; anfractibus duodecim, biseriatim eleganter granosis; serie inferiore parva fusca, superiore maxima margaritacea; apertura rotunda; sinu laterali postico tubiformi. Axis 2 lin.*

Geog. St. Vincent's, West Indies; Rev. W. J. Guilding. *Cab. Gray et Metcalfe*.

Translation of the Latin text. Small shell; twelve whorls with two finely granulated rows; dark smaller lower row, whitish bigger upper one; rounded aperture; lateral sinus posteriorly tubular. Height 2 lines.

Diagnosis. Syntype NHMUK 196536 4.9 mm high. Shell conical, with nine flat whorls bearing two strongly tubercled spiral cords. The base has one additional

tubercled spiral cord. Siphonal canal quite long, with two spiral ridges, posterior canal tubular and ca 1 mm more interiorly than the lip. Protoconch paucispiral of 1.5 whorls. Shell white with an orange stripe on the second spiral cord.

Remarks. Rolán and Fernández-Garcés (1993) stated that a lectotype designation was in progress by Moolenbeek and Faber, but the paper was never published (M. Faber, pers. comm., May 2014).

Triphoris (Mastonia) clemens Hinds, 1843

Figure 24

Triphoris (Mastonia) clemens Hinds 1843b: 20, not illustrated. Illustration available in Hinds (1844): 30, pl. 8, fig. 16.

Type locality. Straits of Malacca.



Figure 23. *Triphora castus* Hinds, 1843, St Vincent, Caribbean, J.E. Gray coll. A–E Syntype NHMUK 196536: front (A), side (B), back (C), apex (D), siphonal canal (E). F–J Syntype NHMUK 196537: front (F), side (G), back (H), upper teleoconch whorls (I) and peristome (J). K Original labels. Scale bars: A–C: 1 mm; D–J: 0.5 mm. Images are property of the NHMUK, courtesy of H. Taylor, NHMUK Photographic Unit.

Type material. Syntypes: NHMUK 196540: 1 specimen, Straits of Malacca (H. Cuming coll.).

Original description. *Testa cornea nitenti; anfractibus quindecim triseriatim granulosis; serie media parva ad inferiorem appropinquante; inferiore prominulo-*

margaritacea; anfractus ultimi granulis parvis; sutura sulcata; apertura rotunda; sinu laterali patulo. Axis 3 lin.
Geog. Straits of Malacca; from 20 fathoms, mud.

Translation of the Latin text. Bright brown shell; fifteen whorls with three series of granules; the small interme-

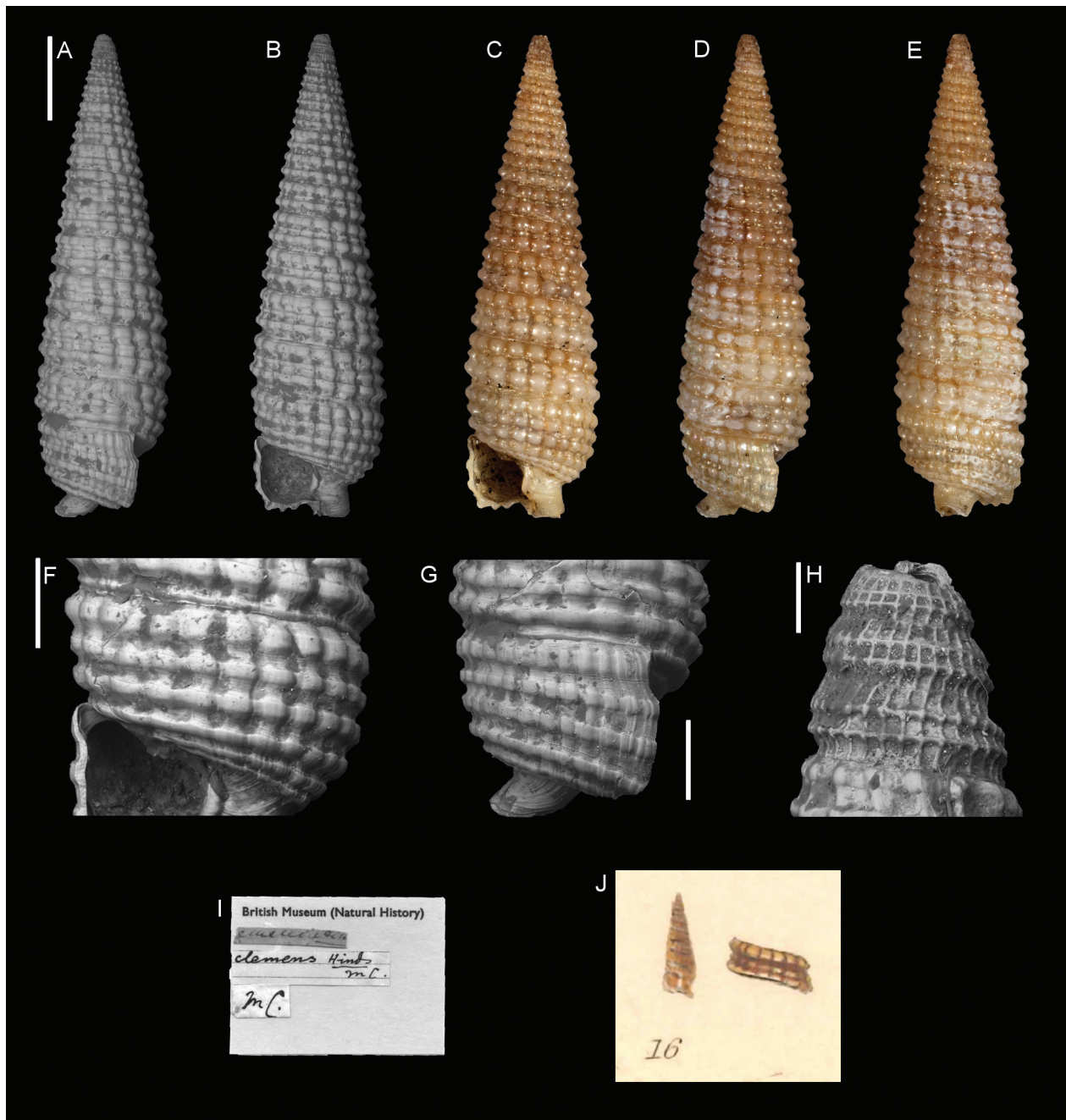


Figure 24. *Triphoris clemens* Hinds, 1843, Straits of Malacca, coll. H. Cuming. A–I Syntype NHMUK 196540: front (B, C), side (A, D), back (E), microsculpture (F), peristome (G), protoconch (H), original labels (I). J Figure in Hinds 1844. Scale bars: A–E: 1 mm; F, G: 0.5 mm; H: 0.1 mm.

diate one closer to the lower which is pearly grey; last whorls with small granules; grooved suture; rounded aperture; open posterior sinus. Height 3 lines.

Diagnosis. Syntype 5.7 mm high. Shell conical with flat sides. The teleoconch has 12 flat whorls ornamented by three spiral cords with large rounded tubercles at the interstices with prosocline axial ribs. The second cord appears on the seventh whorl and is initially very narrow. A fourth suprasutural smooth cord is present which devel-

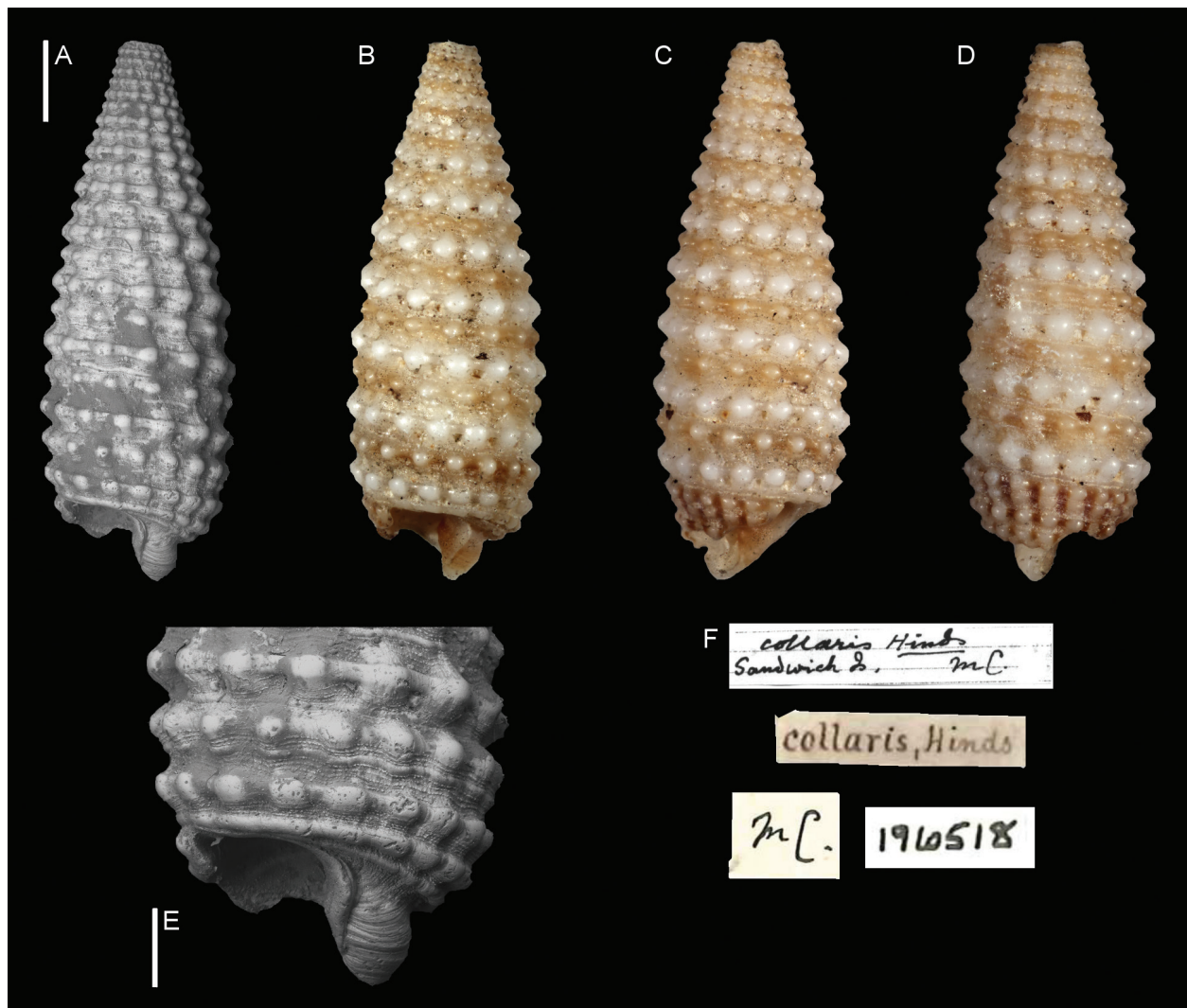
ops into a fully tuberculated cord on the last whorl. The base has two more tuberculated cords. Fine spiral threads are also visible among the main cords. The peristome is incomplete in the holotype hindering its description. Siphonal canal short. In the holotype, the protoconch is incomplete but clearly multispiral. Three whorls are visible and ornamented by two strong spiral keels and several equally strong axial riblets. The teleoconch has a whitish background with pearly tubercles and orange interstices. Protoconch brown.

***Triphoris (Mastonia) collaris* Hinds, 1843**

Figure 25

Triphoris (Mastonia) collaris Hinds 1843a: 23, not illustrated.**Type locality.** Island of Corregidor, Philippine Islands.**Type material.** Syntypes: NHMUK 196518: 1 specimen, Philippines (H. coll. H. Cuming).**Original description.** *Tri. (Mastonia) testâ ovatâ, acuminatâ; anfractibus duodecim biseriatim granulosus, serie inferiore paululum maximâ, margaritaceâ, superiore pallidè fuscâ; anfractu ultimo quadriseriatim subaequaliter catenato. Axis 4 lin.**Hab.* Island of Corregidor, Philippine Islands.

Found among coarse sand at a depth of six fathoms. Many of these small shells have received an injury which has destroyed the mouth, and the present specimen has not escaped.

Translation of the Latin text. *Triphora (Mastonia)* with ovate pointed shell; 12 whorls with two series of granules, the lower a little bit larger, pearly, the upper faintly brown; last whorl with rather equal four cords. Height 4 lines.**Diagnosis.** The examined syntype is 6.6 mm high. Shell cyrtocoid, with flat whorls. The examined specimen lacks the apical part, but it has 11 whorls with two spiral cords ornamented by large tubercles at the intersection with prosocline axial ribs. A third very fine cord is visible below the first one on the last two to three whorls. Among the main cords, numerous finely tuberculated narrow spiral cords can be seen. Peristome and apex missing. Moderately long siphonal canal. The base has two additional, weakly granulated, spiral cords. The teleoconch has the upper spiral cord brown with paler tubercles and the lower spiral cord white. The last whorl has a distinct pattern of white tubercles and brown interspaces.**Figure 25.** *Triphoris collaris* Hinds, 1843, Baclayon, Bohol Island, Philippines, coll. H. Cuming. A–F Syntype NHMUK 196518: front (A, B), side (C), back (D), microsculpture (E), original labels (F). Scale bars: A–D: 1 mm; E: 0.5 mm.

Remarks. The *locus typicus* of *T. collaris* is the Island of Corregidor in the Philippines. Although this locality is indicated in modern labels accompanying this lot in the NHMUK, an old label reports “Sandwich I.” (Fig. 25F). Hinds stated in the original description the existence of several specimens and we can assume that this specimen is a syntype, although not topotypic. In the same lot, two more specimens were present, but they belong to completely different species, as already annotated by S.P. Dance in 1965.

Triphoris (Ino) concors Hinds, 1843

Figure 26

Triphoris (Ino) concors Hinds 1843b: 17, not illustrated. Illustration available in Hinds (1844): 28, pl. 8, fig. 2.

Type locality. Straits of Malacca.

Type material. Lectotype: NHMUK 1844.6.7.27/1, here designated (coll. E. Belcher). Paralectotypes: NHMUK 1844.6.7.27/2: 1 specimen, Straits of Malacca (coll. E. Belcher); NHMUK 1879.2.26.200/1: 1 specimen (broken into two parts), Straits of Malacca (coll. T. Lombe Taylor).

Original description. *Testa cylindracea; anfractibus viginti-duo triseriatim granulosis; serie media paululum minima; sutura lineata; apertura rotundata; sinu laterali tubiformi. Axis 6 lin.*

Geog. Straits of Malacca; in 18 fathoms.

Translation of the Latin text. Cylindrical shell; twenty-two whorls with three rows of granules; the median a little bit smaller; linear suture; rounded aperture; tubiform posterior sinus. Height 6 lines.

Diagnosis. Lectotype 10.4 mm high. Shell cyrtconoid, with 20 flat-sided whorls with three spiral cords with tu-

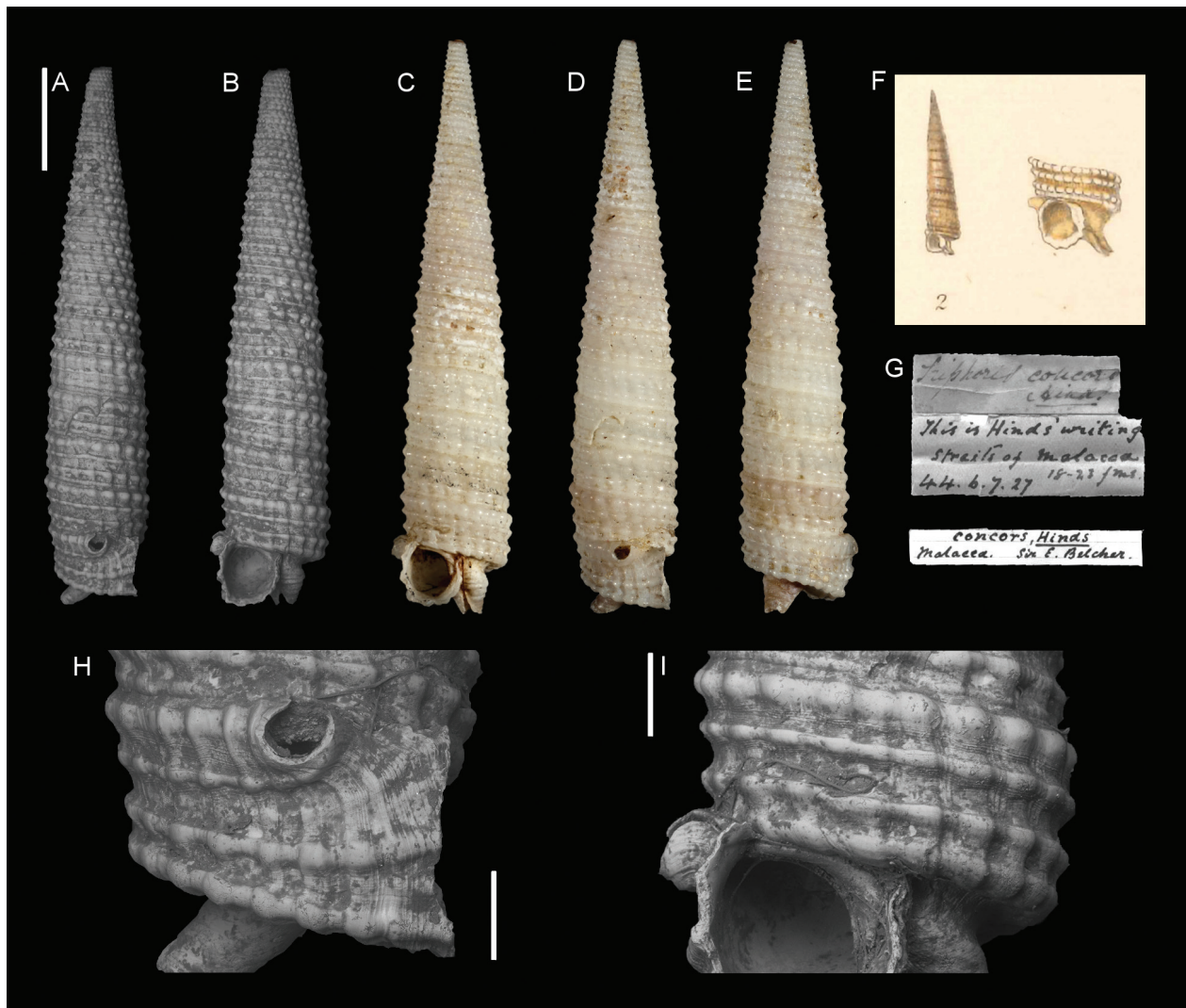


Figure 26. *Triphoris concors* Hinds, 1843, Straits of Malacca, coll. E. Belcher. **A–E, G–I** Lectotype NHMUK 1844.6.7.27/1: front (**B, C**), side (**A, D**), back (**E**), original labels (**G**), peristome (**H**), microsculpture (**I**). **F** Figure in Hinds 1844. Scale bars: **A–E**: 2 mm; **H, I**: 0.5 mm.

bercles. The second row develops later on the spire and on the last whorls a fourth smooth suprasutural cord is visible. Slightly prosocline axial ribs intersect the spiral cords forming the tubercles. Numerous fine spiral striae are visible between the main cords on the lower whorls. Additional spiral cords are visible on the peristome. The posterior sinus is tubular. The base has no additional spiral cords. The protoconch is absent in the type series, but a small remnant suggests it to be brown and multispiral. The teleoconch is dirty white.

Remarks. Lot NHMUK 1879.2.26.200 contains also one subadult specimen that is broader, bears a different sculpture, and thus may not be this species. The lectotype was thus designated to univocally define the morphology of this taxon and stabilize the nomenclature. The lectotype is the best preserved specimen and the only one to bear remnants of the protoconch,

Triphoris (Ino) corrugatus Hinds, 1843

Figure 27

Triphoris (Ino) corrugatus Hinds 1843b: 18, not illustrated. Illustration available in Hinds (1844): 29, pl. 8, fig. 7.

Type locality. New Guinea and Straits of Malacca.

Type material. Syntypes: NHMUK 1879.2.26.195: 3 specimens, New Guinea and Straits of Malacca (J. Lombe Taylor coll.); NHMUK 1998167/1–5: 5 specimens, Straits of Malacca (coll. E. Belcher).

Original description. *Testa cornea; anfractibus 17–20 bicarinatis, inter carinas corrugatis, medio carina secundaria; sutura leviter carinata; apertura rotunda; sinu laterali lineari. Axis 6½ lin.*

Geog. New Guinea; dredged from 23 fathoms, among fine gravel. Straits of Malacca; from 18 to 23 fathoms.

Translation of the Latin text. Brown shell; 17–20 bicarinated whorls with corrugated interspaces, smaller median carina; slightly carinated suture; round aperture; linear posterior sinus. Height 6½ lines.

Diagnosis. Adult specimens of the type series range between 11.2 and 14.2 mm. Shell conical and very elongated. The teleoconch has 17 flat sides with three strong smooth spiral cords. The second whorl develops later along the teleoconch and is initially weakly undulated as a result of the intersection with prosocline axial riblets which are well developed in the lectotype. A fourth smooth spiral cord is visible on the last whorls. An additional spiral cord develops between the second and the third and is clearly visible on the peristome. The base has two additional smooth spiral cords. Syntype NHMUK 1879.2.26.195/2 (but see Remarks and Fig. 27A–D) bears a multispiral brown protoconch; the first whorl and half are smooth with numerous rounded tubercles. Three whorls follow with strong axial riblets intersecting one

spiral keel in the first and two spiral keels in the following whorls. The original description suggested the species to be brown, but some specimens show darker fletches.

Remarks. Specimens belonging to these lots show variable strength of the prosocline axial ribs between the main cords. Hinds highlighted in the original description the presence of strong axial ribs and likely named the species after it. The significance of this character for species delimitation has still to be understood. Moreover, two colour forms are present in the type series: syntype NHMUK 1879.2.26.195/2 (Fig. 27A–D, H, I) shows a colouration of light spiral cords on a brown background, whereas the syntype NHMUK 1879.2.26.195/1 (Fig. 27F–G) is brown with darker flammulae. Therefore, this syntype may belong to a different species of this complex group.

This name has been used for the first Indo-Pacific triphorid species detected in the Mediterranean Sea, likely introduced through the Suez Canal. Notwithstanding the complexity of the group, the introduced species in the Mediterranean Sea probably best matches *Viriola bayani* Jousseaume, 1884 (Steger et al. 2018).

Triphoris (Ino) elegans Hinds, 1843

Figure 28

Triphoris (Ino) elegans Hinds 1843b: 18–19, not illustrated. Illustration available in Hinds (1844): 29, pl. 8, fig. 11.

Type locality. Straits of Malacca.

Type material. Syntypes: NHMUK 1879.2.26.197: 1 specimen, Straits of Malacca (J. Lombe Taylor coll.).

Original description. *Testa alba, fusco marmorata; anfractibus 16–18 quater carinatis; carinis duobus primariis, inferiore maximo; duobus secundariis alternantibus; carinis omnibus maculis albis et fuscis ornatis. Apertura rotundata, sinu laterali patulo. Axis 4½ lin.*

Geog. Straits of Malacca; from 20 fathoms, mud.

Translation of the Latin text. White shell marbled with brown; 16–18 four-keeled whorls; two larger carinae, the greatest in the lower part of the whorl; two smaller carinae alternated; all carinae with white and brown spots. Rounded aperture, open posterior sinus. Height 4½ lines.

Diagnosis. Syntype 8.1 mm high. Shell cyrtocoid, with flat sides. Teleoconch with 14 whorls bearing four spiral cords which are smooth, with the exception of the third which is undulated. Spiral microsculpture can be observed between the main cords. The peristome and posterior canal are missing in the holotype. The anterior canal is very elongated and bears two strong smooth spiral cords. The last whorl is strongly angulated at the periphery; the base bears an additional undulated strong spiral cord. The apex is missing in the holotype, but remnants of the last protoconch whorl point to a multispiral type. Such last whorl has two spiral keels and axial riblets. The teleoconch has

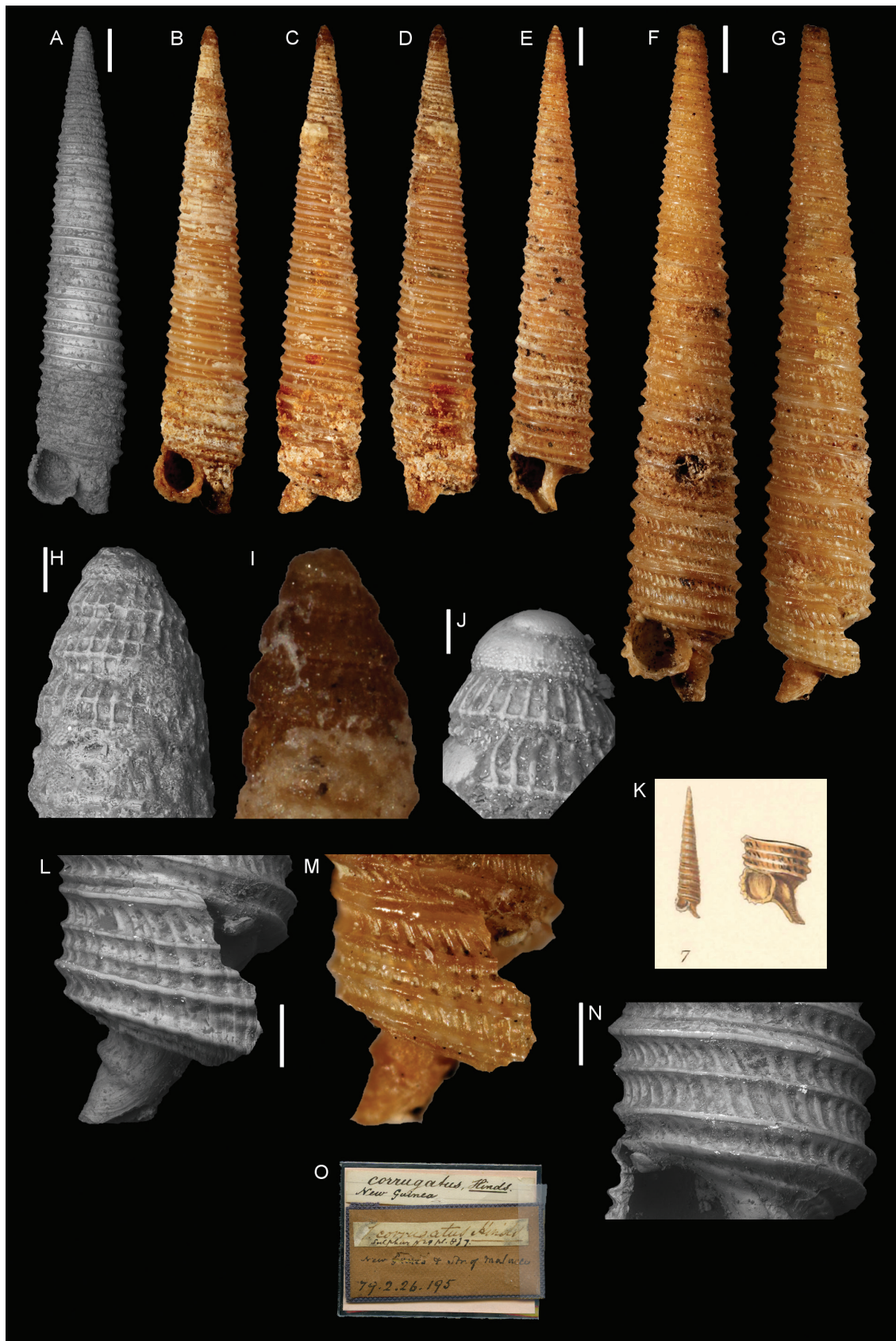


Figure 27. *Triphoris corrugatus* Hinds, 1843. A–D, H, I Syntype NHMUK 1879.2.26.195/2, New Guinea and Straits of Malacca (J. Lombe-Taylor coll.): front (A, B), side (C), back (D), protoconch (H, I). E, J Syntype NHMUK 1879.2.26.195/3, New Guinea and Straits of Malacca (J. Lombe-Taylor coll.): front (E), protoconch (J). F, G, L–N Syntype NHMUK 1879.2.26.195/1: front (F), side (G), peristome (L, M), microsculpture (N), K Figure in Hinds 1844. O Original labels lot NHMUK 1879.2.26.195. Scale bars: A–G: 1 mm; H, I: 0.2 mm; J: 0.05 mm; L–N: 0.5 mm

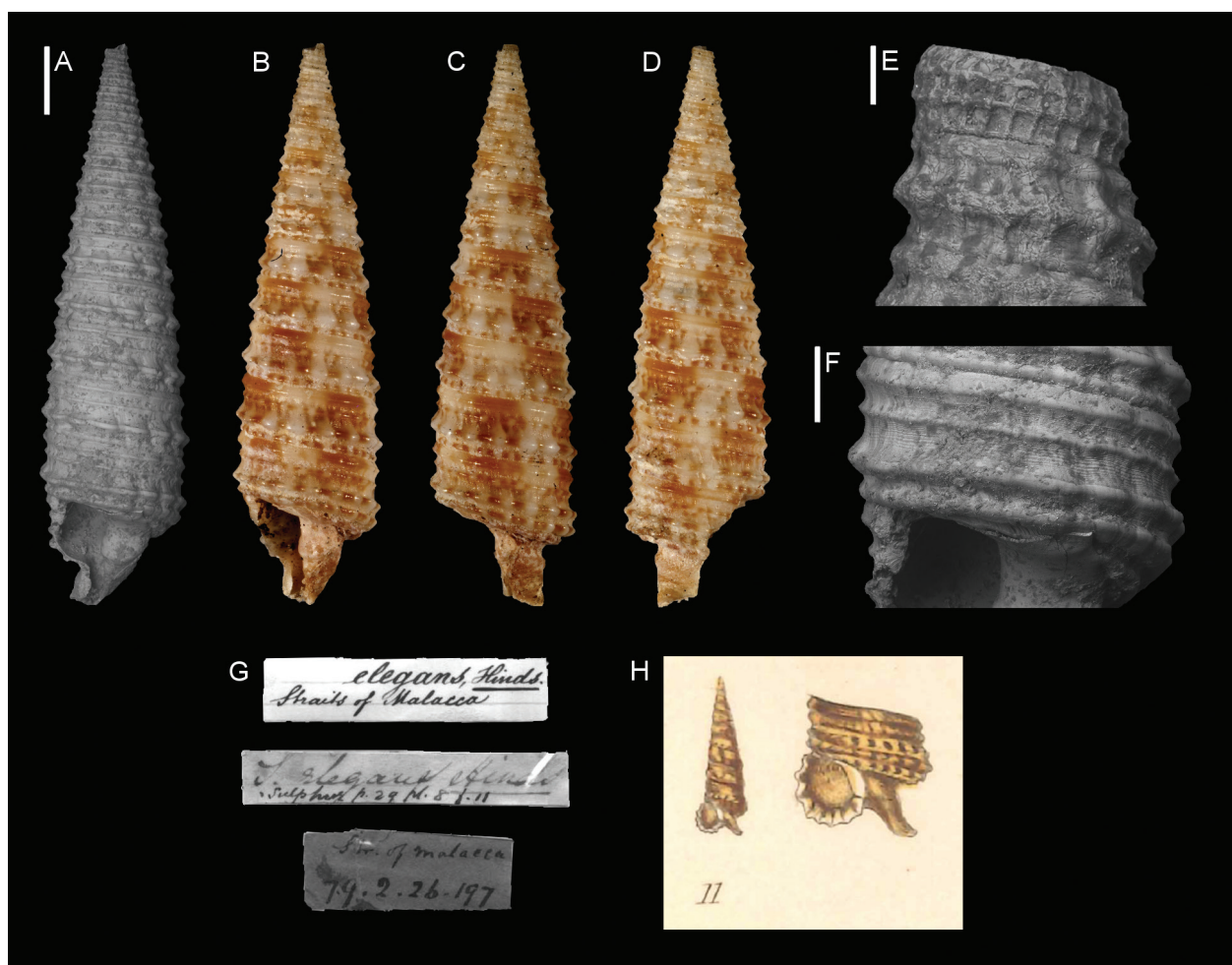


Figure 28. *Triphoris elegans* Hinds, 1843, Straits of Malacca, J. Lombe-Taylor coll. A–G Syntype NHMUK 1879.2.26.197: side (A, B), front (C), back (D), protoconch (E), microsculpture (F), original labels (G). H Figure in Hinds 1844. Scale bars: A–D: 1 mm; E: 0.1 mm; F: 0.5 mm.

a white background with brown to orange flammulae; the protoconch visible last whorl is brown.

Triphoris (Ino) gigas Hinds, 1843

Figure 29

Triphoris (Ino) gigas Hinds 1843b: 17, not illustrated. Illustration available in Hinds (1844): 28, pl. 8, fig. 1.

Type locality. New Guinea.

Type material. Syntypes: NHMUK 1879.2.26.194/1: 1 specimen, New Guinea, (coll. T. Lombe Taylor).

Original description. *Testa valde elongata; anfractibus 25–28 planulatis, quadriseriatim granulosis, inferior paululum maxima ad basin granulorum punctatis. Axis 11 lin.*

Geog. New Guinea; dredged from a muddy bottom at 18 fathoms.

This is the largest species with which I am acquainted. The colour would appear to be brown, but, as the specimens are dead, they cannot be relied on.

Translation of the Latin text. Shell very elongated; 25–28 plain whorls with four rows of granules, the lowest a little bit larger, base dotted by granules. Height 11 lines.

Diagnosis. Syntype broken into two pieces: the abapical and apical ones are 9.5 mm and 3.7 mm, respectively. Shell extremely elongated, cylindrical, with very flat sides. Whorls with four tuberculated spiral cords. The first is initially smooth. The third cord develops later and initially just as a fine thread. Axial ribs prosocline. Apex and base lacking in the available syntype. Syntype background teleoconch colour white, with orange blotches, but likely faded; the original figure shows a deeper brown-orange colour.

Remarks. A “potential” lectotype (NHMUK 196542) had been selected by S. Kosuge in 1965 but then lost while on loan to B. Marshall in 1979. This lectotype designation has never been published and is not deemed valid (as many other “potential” lecto- and paralectotypes of triphorids in NHMUK). A photograph (negative no. 0810) is available (Fig. 29A) and shows a specimen which hardly matches the original description and the figure by Hinds

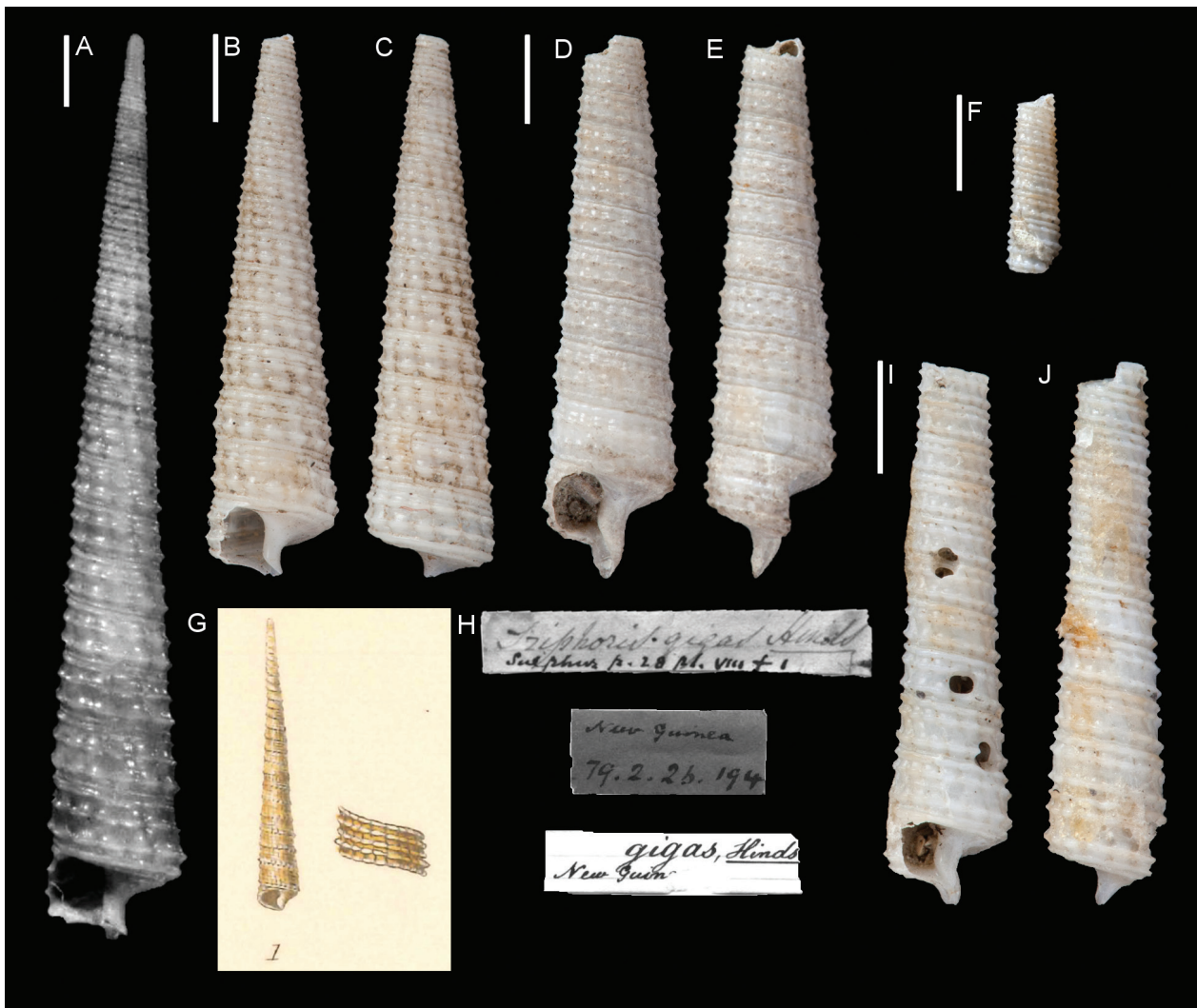


Figure 29. **A** *Triphora* sp. (labelled as “potential” lectotype of *Triphoris gigas* Hinds, 1843), NHMUK 196542, New Guinea, coll. H. Cumming. **B, C** *Triphora* sp. (labelled as “potential” lectotype of *Triphoris gigas* Hinds, 1843), NHMUK 196543, New Guinea, coll. H. Cumming: front (**B**), back (**C**). **D, E** *Triphora* sp. (labelled as “potential” paralectotype of *Triphoris gigas* Hinds, 1843), NHMUK 1879.2.26.194/2, New Guinea; coll. T. Lombe Taylor: front (**D**), back (**E**). **F, I, J** *Triphoris gigas* Hinds, 1843, syntype, NHMUK 1879.2.26.194/1, New Guinea; coll. T. Lombe Taylor: apical fragment (**F**), abapical fragment front (**I**) and back (**J**). **H** Figure in Hinds 1844. **I** Original labels lot NHMUK 1879.2.26.194. Scale bars: **A–F, I–J**: 2 mm.

(1844) in the *Zoology of the Sulphur*. In particular, *T. gigas* is characterized by three tuberculated spiral cords of equal size plus a smaller subsutural one, while the lost “potential” lectotype has clearly two main cords and a smaller subsutural one. The lot NHMUK 1879.2.26.194 contains two specimens belonging to two different species. The first specimen (Fig. 29F, I, J) likely belongs to *T. gigas*: it is a juvenile specimen and the third cord is visible between the second and the last as a fine thread (see under *T. princeps* Sowerby III 1904, Figure 97F, the unidentified specimen that is likely a mature *T. gigas*). The second specimen (Fig. 29D, E) has more rounded whorls with two tuberculated spiral cords and strong smooth supra- and subsutural spiral cords which do not appear in *T. gigas*. Lot NHMUK 196543 (Fig. 29B, C) was also labelled as “potential lectotype” but the shell is more conical and an additional spiral cord develops lately

between the first and the second, instead of between the second and the third like in *T. gigas*.

Triphoris (Mastonia) grayii Hinds, 1843

Figure 30

Triphoris (Mastonia) grayii Hinds 1843b: 19, not illustrated.

Type locality. “The Mediterranean Sea”.

Type material. Holotype: NHMUK 1874.9.9.2, fixed by monotypy (J.E. Gray coll.).

Original description. *Testa ovali; anfractibus decem, superioribus biserialim granulosis moniliferis, duabus inferioribus triserialim, serie media minima. Axis 4½ lin.*

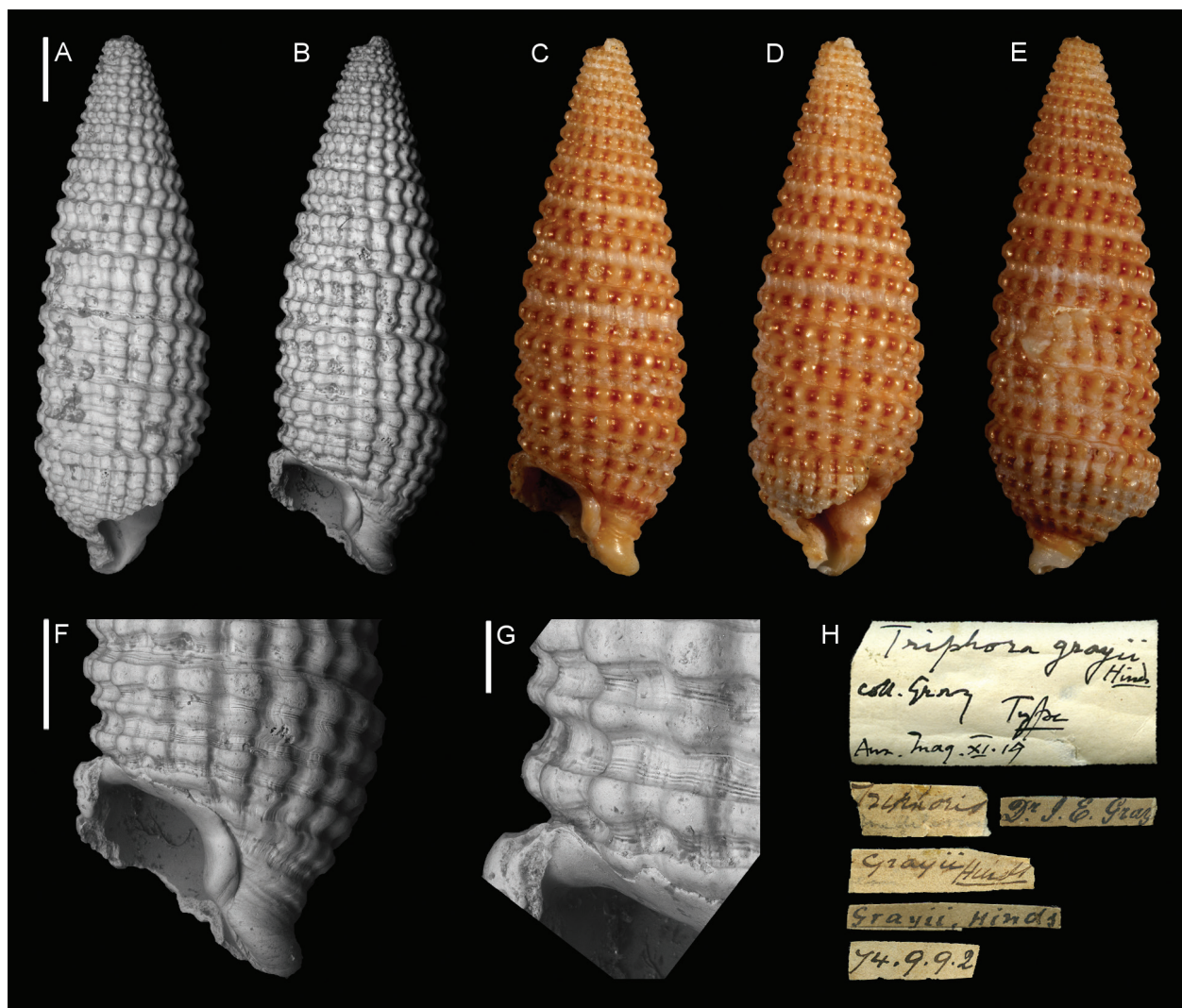


Figure 30. *Triphoris grayii* Hinds, 1843, J.E. Gray coll. A–H Holotype, NHMUK 1874.9.9.2: front (B, C), side (A, D), back (E), aperture (F), microsculpture (G), original labels (H). Scale bars: A–F: 1 mm; G: 0.3 mm.

Geog. The Mediterranean Sea. Cab. Gray.

The single specimen of this very pretty shell has the mouth much injured.

Translation of the Latin text. Oval shell; ten whorls, the upper ones with two rows of granules, the lower ones with three rows, the intermediate the smallest. Height $4\frac{1}{2}$ lines.

Diagnosis. Holotype 8.2 mm high. Shell cyrtconoid and rather broad. Teleoconch of 10 visible whorls, but likely the very first whorls are missing. Teleoconch whorls have two very strong spiral cords bearing large tubercles at the intersection with orthocline axial ribs. In the second half of the shell, a third finer one develops and a fine smooth suprasutural cord is also visible. Spiral microsculpture is also visible between the main cords. The base has one tuberculated and one smooth additional cords. The peristome is incomplete, but bears an additional spiral cord between the third and the fourth. The siphonal canal is well developed with additional smooth cords. The apex is missing. The te-

leoconch has a whitish background visible between the main cords which are deep orange in the interspaces and bear creamy tubercles.

Remarks. This has not been recognized as a Mediterranean species (Bouchet 1985). In contrast, it is remarkably similar to the shell identified as *Monophorus* cf. *thiriota* Bouchet, 1985 illustrated by Rolán (1993, 2001, 2005: 327) from the Canary Islands, the Cape Verde Islands and other localities in West Africa.

Triphoris (Ino) maxillaris Hinds, 1843

Figure 31

Triphoris (Ino) maxillaris Hinds 1843b: 18, not illustrated. Illustration available in Hinds (1844): 29, pl. 8, fig. 8.

Type locality. Straits of Malacca.

Type material. Lectotype: NHMUK 1879.2.26.202/1, here designated (J. Lombe Taylor coll.). Paralectotypes:

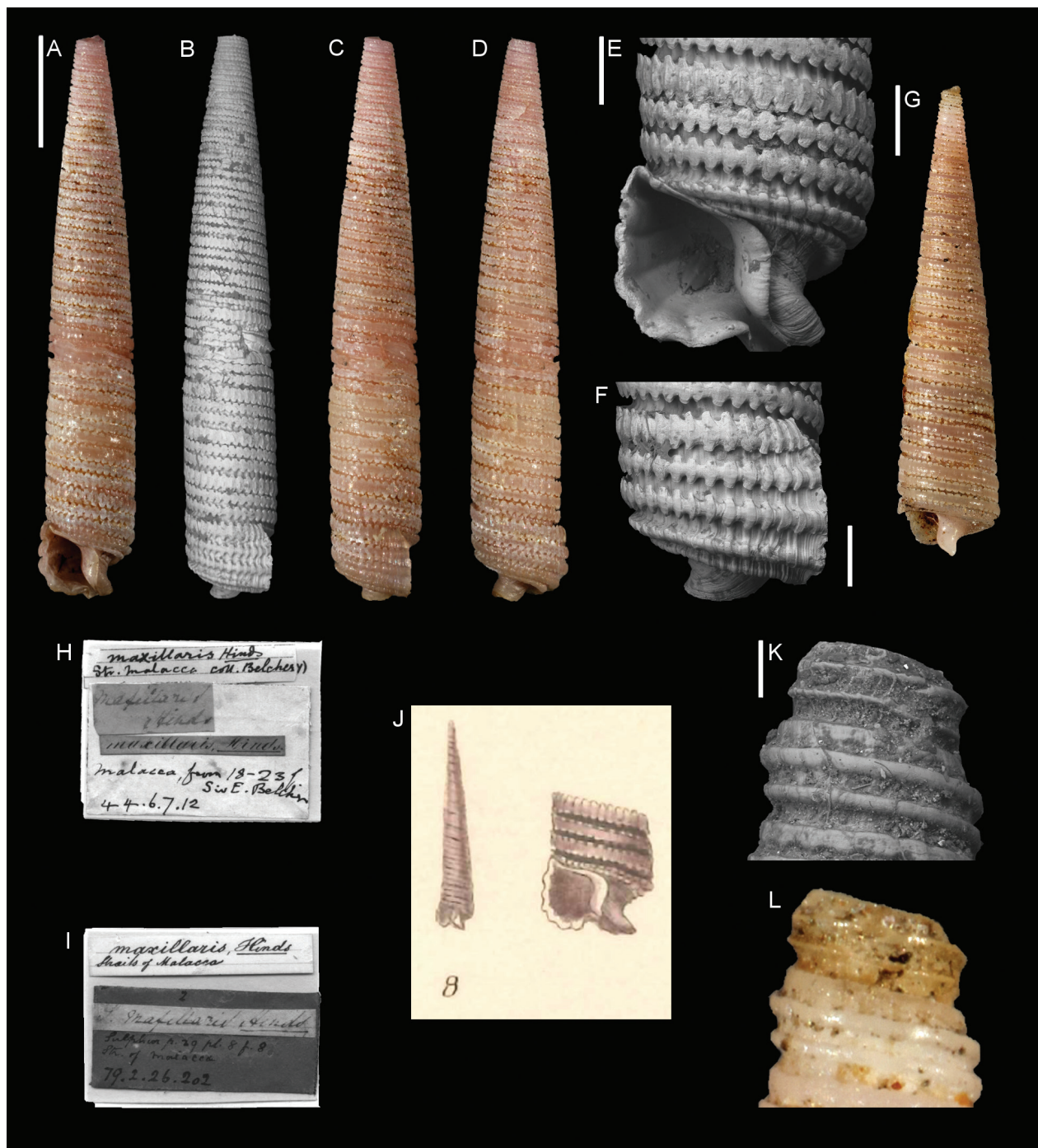


Figure 31. *Triphoris maxillaris* Hinds, 1843. **A–F, H** Paralectotype, NHMUK 1844.6.7.12, Straits of Malacca (coll. E. Belcher): front (**A**), side (**B, C**), back (**D**), aperture (**E**), peristome (**F**), original labels (**H**). **G, I, K, L** Lectotype NHMUK 1879.2.26.202/1, Straits of Malacca (Mrs J. Lombe-Taylor coll.): front (**G**), original labels (**I**), protoconch (**K, L**). **J** Figure in Hinds 1844. Scale bars: **A–D**: 2 mm; **E, F**: 0.5 mm; **G**: 1 mm; **K, L**: 0.1 mm.

NHMUK 1879.2.26.202/2, 1 specimen, Malacca (J. Lombe Taylor coll.); NHMUK 1844.6.7.12, Malacca, 1 specimen (coll. E. Belcher).

Original description. *Testa rosea; anfractibus 16–18, superficie laevigata, bisulcatis; marginibus sulcorum granulatis; sutura sulcata, marginibus granulatis apertura subquadrata, sinu laterali parvo patulo. Axis 5½ lin.* This shell is very remarkably characterized. The sur-

face is perfectly smooth, and of an agreeable rose-colour; but each whorl is divided into three unequal parts by two furrows. The margins of each furrow, and of the depressed line which marks the course of the suture, are provided with a series of horizontal granulations, which look towards each other and do not appear above the surface of the shell, but under a magnifying glass display an appearance which seems to justify the specific name.

Translation of the Latin text. Pink shell; 16–18 whorls with a smooth surface with two grooves whose margins are granulated; deep suture, subquadrate aperture with granulated margin, slightly open posterior sinus. Height $5\frac{1}{2}$ lines.

Diagnosis. The lectotype is a subadult, but the paralectotype is 9.9 mm high. Shell conical and elongated. The lectotype has 17 flat whorls, but the apical part is missing. The three spiral cords have broad flat coalescent tubercles. The base has two more spiral cords with similar tubercles and a depression between the fifth cord and the siphonal canal which is short. The peristome has no additional cords and bears a shallow posterior canal. The protoconch is absent in the types, but remnants of its last whorl suggest a multispiral type. Teleoconch pink, protoconch brown.

Remarks. Specimens with indistinguishable teleoconch sculpture, colour and overall appearance, but with paucispiral protoconch were found in Vanuatu. Consequently, we designated as lectotype of *T. maxillaris* a specimen that, although subadult, retains the last whorl of a typical planktotrophic protoconch (Fig. 31K, L) to unambiguously identify this species.

Triphoris (Ino) micans Hinds, 1843

Figure 32

Triphoris (Ino) micans Hinds 1843b: 18, not illustrated. Illustration available in Hinds (1844): 29, pl. 8, fig. 9.

Type locality. New Guinea.

Type material. Syntypes: NHMUK 1844.6.7.10: 1 specimen, and NHMUK 1844.6.7.11: 1 specimen, both New Guinea (coll. E. Belcher); NHMUK 1879.2.26.209, 2 specimens (coll. T. Lombe Taylor).

Original description. *Testa gracili attenuata, fusca; anfractibus 20–22, supra coarctatis, triseriatim granulosis, serie inferiore maxima albida, superiore minima; apertura subquadrata; sinu laterali lineari. Axis 6 lin.*

Geog. New Guinea; dredged from mud in from 5 to 18 fathoms.

Translation of the Latin text. Slender, dark shell; 20–22 whorls, narrow above, with three series of granules, the whitish lower is the greatest, the upper one is the smallest; subquadrate aperture; linear posterior sinus. Height 6 lines.

Diagnosis. Syntypes 12.2–13.3 mm high. Shell conical, narrow and very elongated. Teleoconch of ca 20 whorls with flat sides bearing three spiral cords with large tubercles at the intersection with prosocline axial ribs. The base has two additional almost smooth spiral cords. The last half whorl and peristome bear additional spiral cords between the main ones. Anterior siphonal canal long. The lectotype protonch is incomplete and worn but clearly

multispiral and composed of at least four whorls with two strong keels; axial riblets are also likely present. Shell white to creamy-white.

Remarks. The syntypes NHMUK 1844.6.7.10 and 1844.6.7.11 are broken into two fragments.

Triphoris (Mastonia) monilifer Hinds, 1843

Figure 33

Triphoris (Mastonia) monilifer Hinds 1843b: 19, not illustrated. Illustration available in Hinds (1844): 30, pl. 8, fig. 14.

Type locality. Straits of Malacca.

Type material. Syntypes: NHMUK 1879.2.26.208: 3 specimens, Straits of Malacca (coll. T. Lombe Taylor); NHMUK 1844.6.7.28–29, 2 specimens, Straits of Malacca (coll. E. Belcher).

Original description. *Testa parva, elegantissime monili; anfractibus decem biseriatim granulosis; granulis serie inferioris albis intervallis rubris, supremas albis; apertura subquadrata, sinu laterali angusto. Axis $2\frac{1}{3}$ lin.*

Geog. Straits of Malacca; in 18 to 23 fathoms, mud. The manner in which the lower series of markings is repeated in the last whorl is very evident in this species, though to be met with in nearly the whole. Thus, the series of beading, which is single on the upper whorls, will here be found to be double on the last.

Translation of the Latin text. Small shell, elegant like a jewel; ten whorls with two series of granules; the lower series with white granules with red interspaces, the upper one white; subquadrate aperture, narrow posterior sinus. Height $2\frac{1}{3}$ lines.

Diagnosis. Syntype NHMUK 1879.2.26.208/1 (Fig. 33A–G) 4.4 mm high. Shell conical and rather broad. Teleoconch of nine whorls with two main spiral cords bearing tubercles at the intersection with prosocline axial ribs. A fine third cord develops on the last whorl and numerous fine punctuated spiral striae are present between the main cords. A fourth and fifth smooth spiral cords are visible on the base. The peristome bears a deep posterior sinus and additional spiral cords near the lip. Anterior siphonal canal short. Protoconch multispiral of 5 whorls. The first is apparently smooth, while the others bear a strong spiral keel and axial riblets. Protoconch brown. Teleoconch with a creamy white background and orange interspaces between tubercles.

Triphoris (Ino) pagodus Hinds, 1843

Figure 34

Triphoris (Ino) pagodus Hinds 1843a: 22, not illustrated.

Type locality. Bacayon, island of Bohol, Philippines.

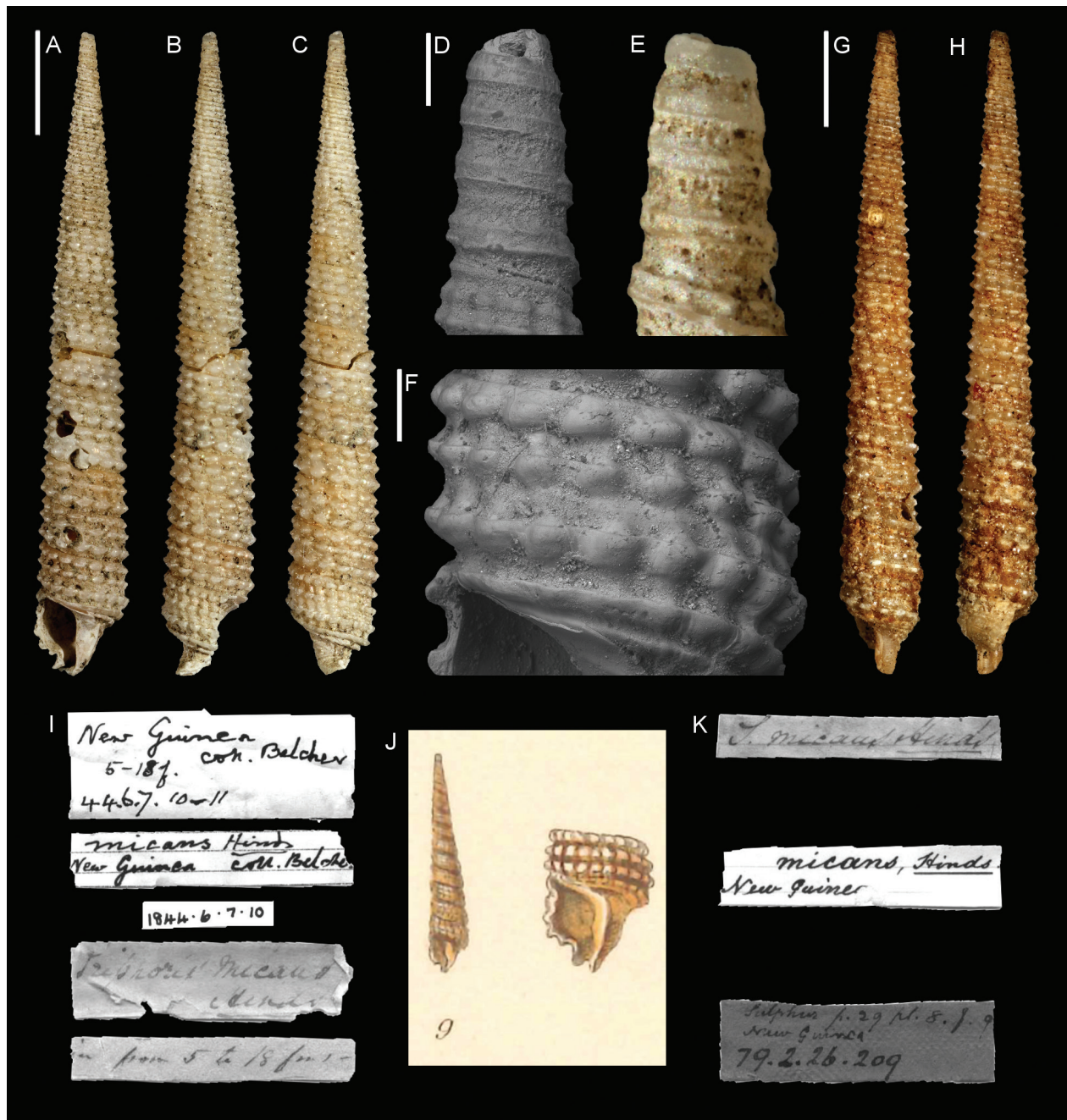


Figure 32. *Triphoris micans* Hinds, 1843. **A–F, I** Syntype NHMUK 1844.6.7.10, New Guinea (coll. E. Belcher): front (**A**), side (**B**), back (**C**), protoconch (**D, E**), microsculpture (**F**), original labels (**I**). **G, H, K** Syntype NHMUK 1879.2.26.209, New Guinea (coll. T. Lombe Taylor): front (**G**), back (**H**), original labels (**K**). **J** Figure in Hinds 1844. Scale bars: **A–C, G, H**: 2 mm; **D, E**: 0.2 mm; **F**: 0.3 mm.

Type material. Holotype: NHMUK 196517, fixed by monotypy (H. coll. H. Cuming).

Original description. *Tri. (Ino) testâ cylindraceâ, elongatâ, acuminatâ, anfractibus 18–20, tricarinatâ; carinis inaequalibus, inferiore multo maximâ, duobus superioribus parvis aequalibus; aperturâ quadratâ. Axis $8\frac{1}{2}$ lin.*

The only specimen of this shell is dead and imperfect. It is, however, slightly mottled with brown, being most probably the remains of a uniform colour. It is rendered

very distinct from any species hitherto described by the manner of its keeling. A faint elevated line would also appear to traverse the course of the suture.

Hab. Baclayon, island of Bohol, Philippines. Found under stones at low water.

Translation of the Latin text. Cylindrical shell, elongated, acuminate, 18–20 whorls, with three keels of unequal size, the lowest keel by far the largest, the two above equal and smaller; aperture quadrate. Height $8\frac{1}{2}$ lines.

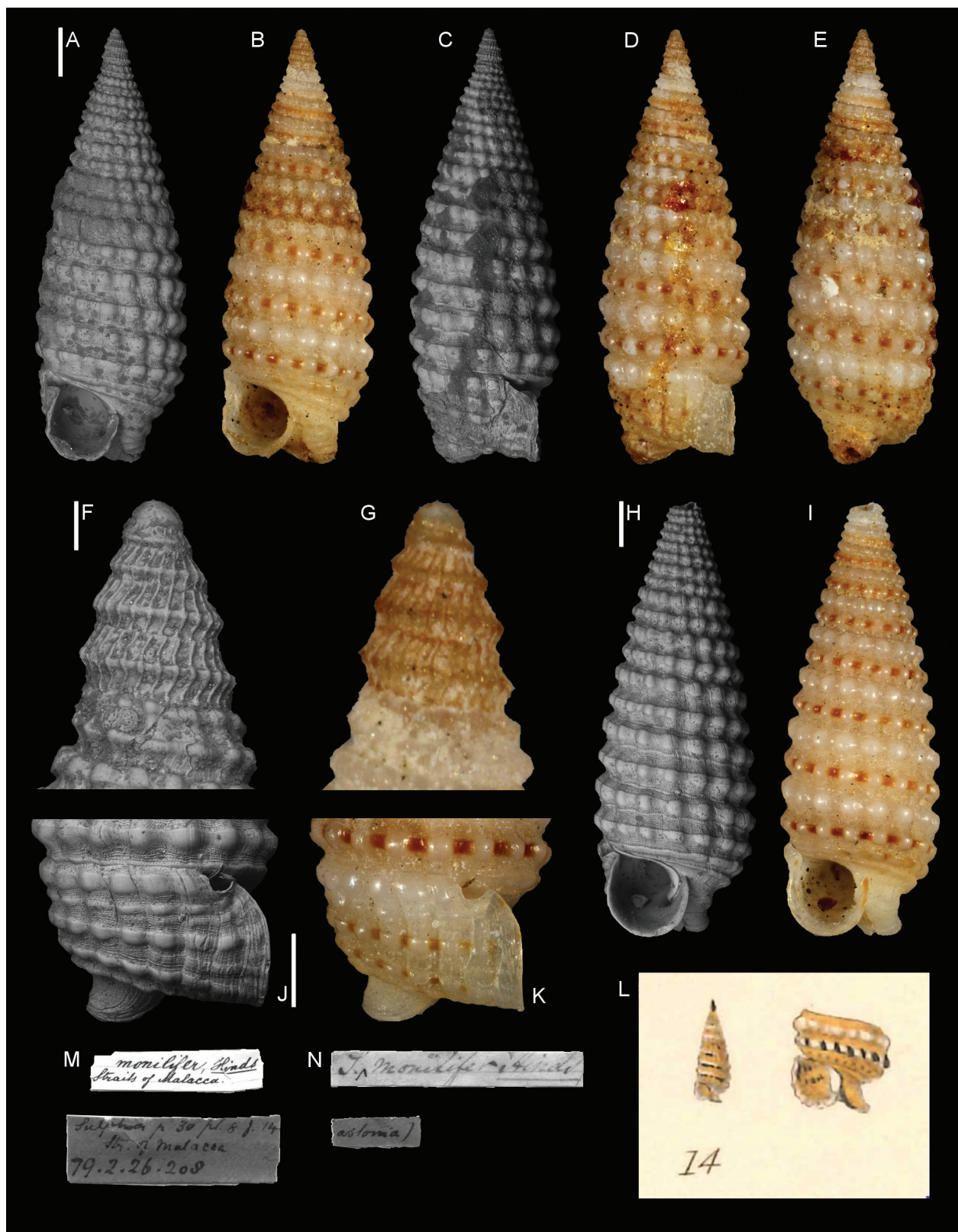


Figure 33. *Triphoris monilifer* Hinds, 1843, Straits of Malacca, coll. T. Lombe Taylor. A–G Syntype NHMUK 1879.2.26.208/1: front (A, B), side (C, D), back (E), protoconch (F, G). H–K Syntype NHMUK 1879.2.26.208/2: front (H, I), peristome (J, K). L Figure in Hinds 1844. M–N Original labels of lot 1879.2.26.208. Scale bars: A–E, H–K: 0.5 mm; F, G: 0.1 mm.



Figure 34. *Triphoris pagodus* Hinds, 1843, Baclayon, Bohol Island, Philippines, coll. H. Cuming. A–D Holotype, NHMUK 196517: front (A), side (B), back (C), original labels (D). Scale bar: A–C: 2 mm.

Diagnosis. Holotype 18.9 mm. Shell extremely elongated with flat whorls. It lacks the apical part and a portion of the last whorl. The specimen has 15 whorls, with three spiral keels: the third is very prominent whereas the first two are smaller and of equal size. Between these keels, there are prosocline axial threads. Siphonal canal long, peristome missing in the holotype. The base bears one additional strong keel and a second smaller one. A third faint one runs on the siphonal canal. Apex missing in the holotype. Teleoconch worn, but apparently whitish with brown blotches.

Triphoris (Mastonia) roseus Hinds, 1843

Figure 35

Triphoris (Mastonia) roseus Hinds 1843b: 21, not illustrated. Illustration available in Hinds (1844): 31, pl. 8, fig. 19.

Type locality. “Pacific Ocean?”

Type material. Syntypes: NHMUK 1879.2.26.212: 1 specimen, South Pacific Ocean (coll. T. Lombe Taylor).

Original description. *Testa ovali; anfractibus decem biseriatim granulosis, seriebus corneis, medio laevigato roseo serie tertia parva; apertura rotundata. Axis 3½ lin. Geog. Pacific Ocean? Cab. Metcalfe.*

Translation of the Latin text. Shell oval; 10 whorls with two granulated brownish cords; in the middle, a third small smooth pink cord; rounded aperture. Height 3½ lines.

Diagnosis. Syntype 5.5 mm high. Shell conical with 10 visible flat whorls, but the apical part is missing. Two main spiral cords run on the whorls; a third develops in between, initially as a fine thread and then as a fully-grown cord on the last whorl. Large, subrectangular tubercles are present at the intersection with slightly prosocline axial ribs. The last whorl and the base have three additional weakly tuberculated spiral cords. Very fine microsculpture is visible between the main spiral cords and axial ribs. The peristome has a very shallow posterior sinus and apparently does not bear additional spiral cords. The protoconch is missing in the syntype. Teleoconch light orange with pink to pearly lower spiral cords.

Triphoris (Mastonia) ruber Hinds, 1843

Figure 36

Triphoris (Mastonia) ruber Hinds 1843b: 19–20, not illustrated. Illustration available in Hinds (1844): 30, pl. 8, fig. 15.

Type locality. “New Ireland” [Papua New Guinea].

Type material. Syntypes: NHMUK 1844.6.7.22–26: 5 specimens, New Ireland (coll. E. Belcher); NHMUK 1879.2.26.192/1–5: 5 specimens, New Ireland and Straits of Malacca (J. Lombe Taylor coll.).

Original description. *Testa rufa; anfractibus undecim biseriatim granulosis, seriebus subdistantibus suturam obtegentibus; apertura rotundata; sinu laterali margine contracto. Axis 4 lin.*

Geog. New Ireland; numerous among fine gravel at low water. Straits of Malacca; in 20 fathoms.

Its reddish colour and double series of tubercles will readily distinguish this shell. In some of the specimens, a

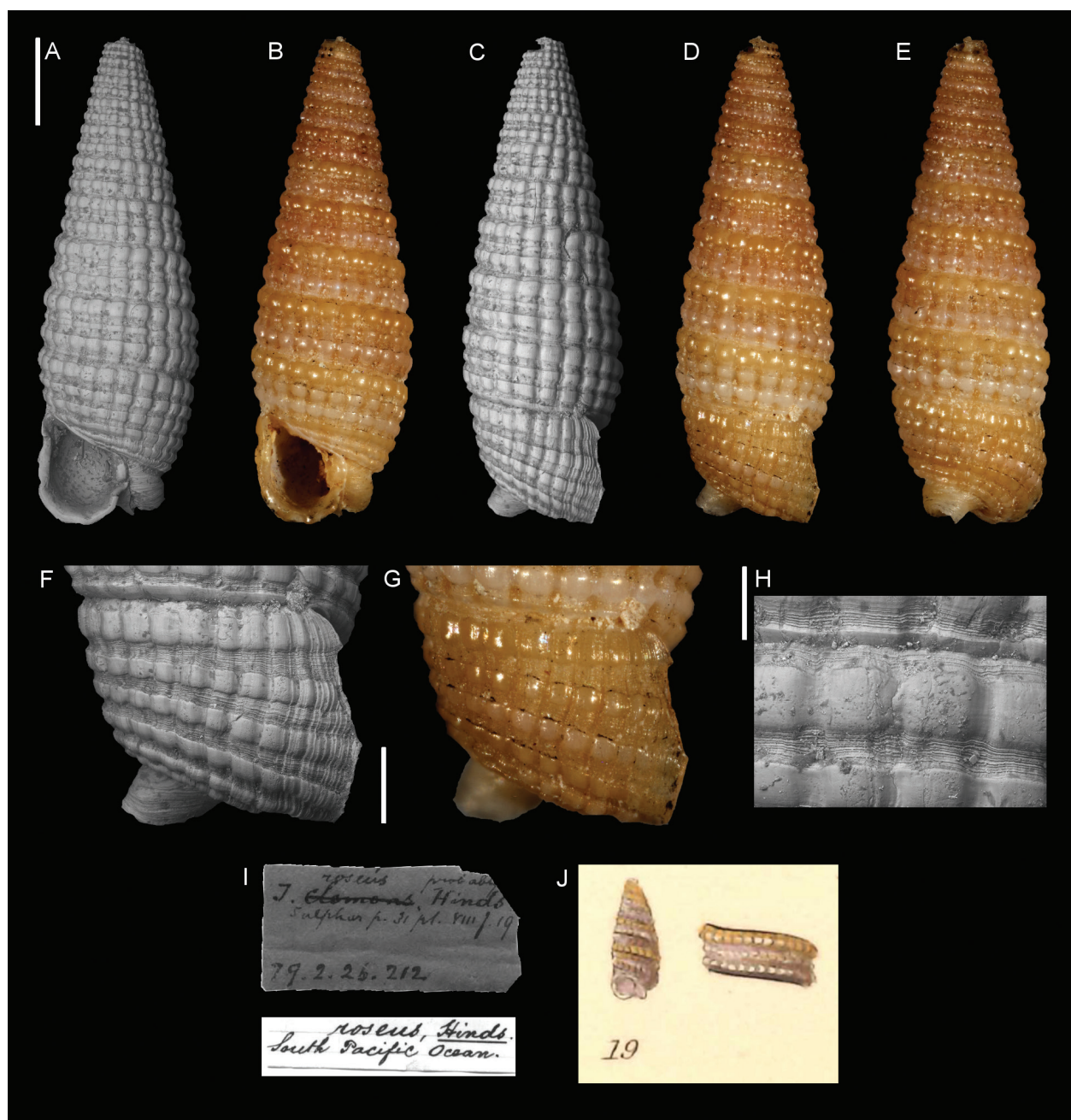


Figure 35. *Triphoris roseus* Hinds, 1843, South Pacific Ocean, coll. T. Lombe Taylor. **A–I** Syntype NHMUK 1879.2.26.212: front (A, B), side (C, D), back (E), peristome (F, G), microsculpture (H), original labels (I). **J** Figure in Hinds 1844. Scale bars: A–E: 1 mm; F, G: 0.5 mm; H: 0.2 mm.

small intermediate series is about to make its appearance on the one or two inferior whorls.

Translation of the Latin text. Shell red; 11 whorls with two granulated threads, lower series covering the suture; aperture rounded; sinus on the peristome with contracted edges. Height 4 lines.

Diagnosis. Syntype NHMUK 1844.6.7.22 (Fig. 36A–H) 5 mm high. Shell conical and broad. Teleoconch of 12 flat whorls bearing two large cords with tubercles at the interstices with opisthocline axial ribs. A third spiral cord

is visible on the last whorl as a fine smooth thread just below the first cord. The base bears two additional weakly tuberculated cords. In between the main sculpture, fine numerous finely tuberculated spiral cords are visible. The peristome has a deep posterior sinus and fine additional spiral cords. Siphonal canal short. Protoconch multispiral, of four whorls; the first has spherical tubercles, while the others bear two spiral keels and axial riblets. Teleoconch pink to light violet, with lighter tubercles. Protoconch brown. Operculum horny, rather thin, ovate, multispiral of about $4\frac{1}{2}$ whorls, nucleus a little eccentric, periphery thin and only a little upturned.

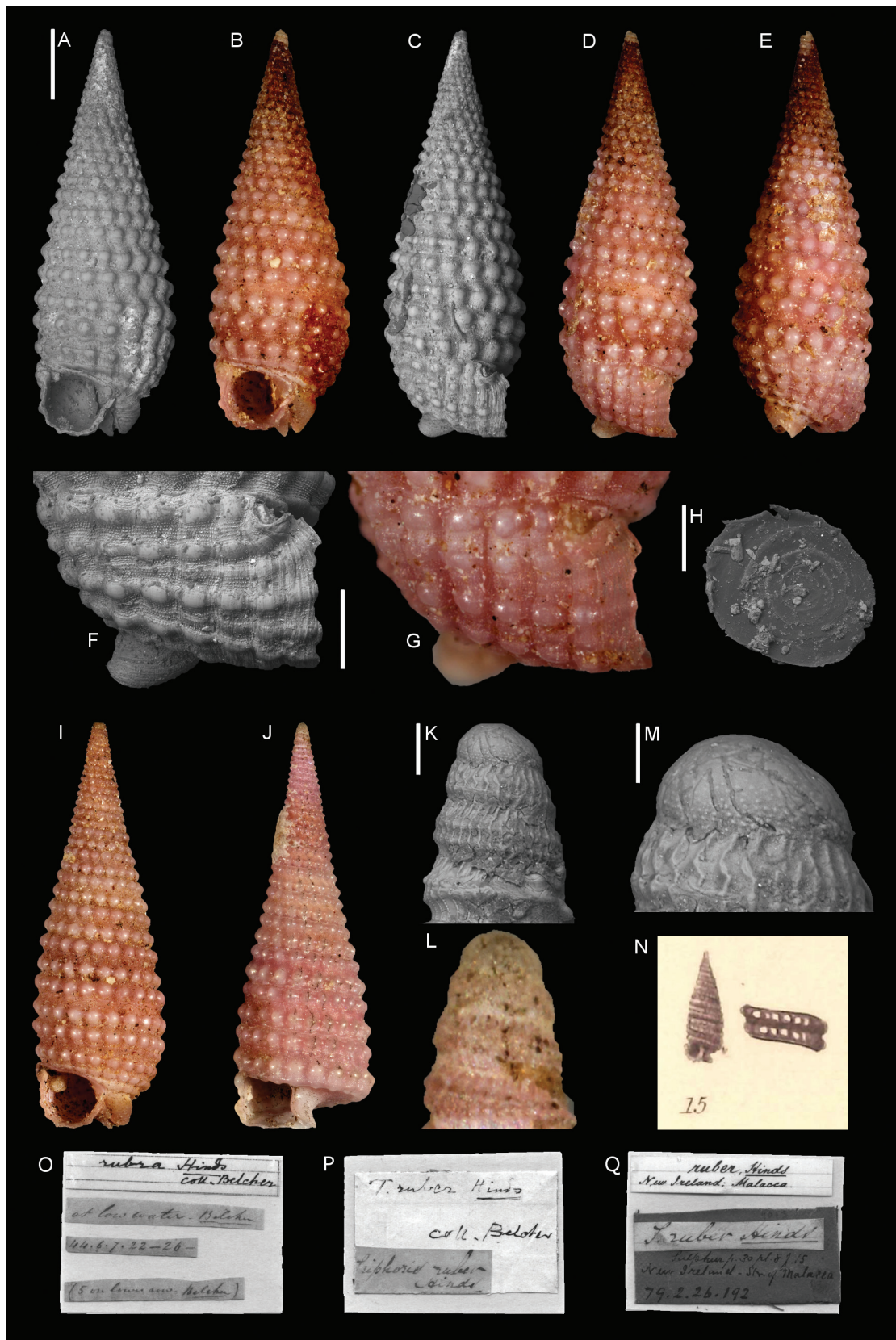


Figure 36. *Triphoris ruber* Hinds, 1843. **A–H** Lectotype NHMUK 1844.6.7.22, New Ireland (coll. E. Belcher): front (**A**, **B**), side (**C**, **D**), back (**E**), peristome (**F**, **G**), operculum (**H**). **I** Paralectotype, NHMUK 1844.6.7.23, New Ireland (coll. E. Belcher): front (**I**). **J–M**, **Q** Paralectotype, NHMUK 1879.2.26.192, New Ireland and Straits of Malacca (J. Tomble Taylor coll.): front (**J**), protoconch (**K–M**), original labels (**Q**). **N** Figure in Hinds 1844. **O–P** Original labels lot NHMUK 1844.6.7.22–26. Scale bars: **A–E**: 1 mm; **F**, **G**: 0.5 mm; **H**: 0.3 mm; **K**, **L**: 0.1 mm; **M**: 0.05 mm.

***Triphoris (Ino) sculptus* Hinds, 1843**

Figure 37

Triphoris (Ino) sculptus Hinds 1843b: 17, not illustrated. Illustration available in Hinds (1844): 28, pl. 8, fig. 3.

Type locality. Straits of Malacca.

Type material. Syntypes: NHMUK 1844.6.7.17– 19, 3 specimens, Straits of Malacca (coll. E. Belcher); NHMUK 1855.11.15.20, 1 specimen, no locality (coll. E. Belcher); NHMUK 1879.2.26.201, 1 specimen, Straits of Malacca (J. Lombe-Taylor coll.).

Original description. *Testa pallide rufente; anfractibus 15–18 biseriatim granoso-carinatis, medio laevigatis carina secundaria; prope suturam carinula monilifera; sinu laterali patulo. Axis 4½ lin.*

Geog. Straits of Malacca; in 3 fathoms.

Translation of the Latin text. Shell pale reddish; 15–18 whorls with two granulated-keeled cords, with a smooth interspace with a secondary keel; a thin granulated keel near the suture; open posterior sinus. Height 4½ lines.

Diagnosis. Subadult syntypes ca 9 mm high. Shell conical, with flat whorls bearing two quite thin main spiral cords with large oblong tubercles at the intersection with broad axial ribs. A third very fine spiral cord develops early in the teleoconch but never attains the strength of the other two whereas a fourth smooth cord is visible above the suture. A microsculpture of very fine threads is visible between the main cords. The apex is incomplete, but clearly bears a brown multispiral protoconch whose last two whorls have two strong spiral keels and axial riblets. The teleoconch has a whitish background with orange to brown flammulae.

Remarks. All available syntypes are subadults without a fully developed last whorl and peristome. Specimens NHMUK 1844.6.7.17 (Fig. 37A, B) and NHMUK 1844.6.7.19 (Fig. 37H) are probably those that best fit the figure by Hinds (1844) in terms of sculpture, colour pattern and shell profile. In contrast, NHMUK 1844.6.7.18 (Fig. 37G) has a much more slender profile and resembles *Triphoris bilix* Hinds, 1844 (p. 185), NHMUK 1879.2.26.201 (Fig. 37J) is again more slender and has more numerous tubercles on the third spiral cord, superficially resembling *T. concors* Hinds, 1844 (p. 193), and NHMUK 1855.11.15.20 might be a *sculptus*, but it is too ruined for proper identification.

***Triphoris (Mastonia) tristis* Hinds, 1843**

Figure 38

Triphoris (Mastonia) tristis Hinds 1843b: 20, not illustrated.

Type locality. Not reported.

Type material. Syntypes: NHMUK 196538: 1 specimen, and NHMUK 196539: 1 fragment (but likely conspecific), both without locality (J.E. Gray coll.).

Original description. *Testa ovali elongata, ferruginea; anfractibus tridecim biseriatim granulosis; serie superiori paululum maxima et albida; anfractu penultimo serie tertia minima. Axis 3 lin.*

Geog. — ? Cab. Gray.

Translation of the Latin text. Shell oval and elongated, reddish; 13 whorls with two granulated cords; the upper one slightly larger and white; on the penultimate whorl a small third cord appears. Height 3 lines.

Diagnosis. Syntype NHMUK 196538 6.2 mm high. Shell conical, composed of 13 teleoconch flat whorls which bear two main tuberculated spiral cords. A third develops in between on the penultimate whorl as a fine thread but attains full size on the last whorl. The base has two additional weakly tuberculated whorls. The apex is broken in the lectotype, but remnants of the last protoconch whorl suggest a multispiral type. Such last whorl bears a single strong spiral keel and axial riblets. Shell brown, with pearly white tubercles on the first spiral cord.

***Triphoris (Sychar) vitreus* Hinds, 1843**

Figure 39

Triphoris (Sychar) vitreus Hinds 1843b: 19, not illustrated. Illustration available in Hinds (1844): 30, pl. 8, fig. 12.

Type locality. Straits of Malacca.

Type material. Syntypes: NHMUK 1879.2.26.210: 1 specimen, Straits of Malacca (J. Lombe Taylor coll.).

Original description. *Testa pellucida; anfractibus quindecim laevigatis rotundatis, lineis duabus elevatis cinctis; apice mamillari; apertura subquadrata; sinu laterali patulo. Axis 4½ lin.*

Geog. Straits of Malacca; dredged from 20 fathoms. One of the elevated lines traverses the whorl about its centre; the other, not at first very apparent, will be found on its lower surface near the suture.

Translation of the Latin text. Transparent shell; 15 rounded whorls, smooth, surrounded by two lines; apex mamillated; aperture subquadrated; open posterior sinus. Height 4½ lines.

Diagnosis. Syntype 8.7 mm high. Conical shell with 12 slightly convex whorls with numerous prosocline growth lines and two deep spiral grooves. Very fine spiral threads are also visible. Base smooth. Peristome with no clear posterior sinus, siphonal canal short. Protoconch paucispiral with one large smooth whorl. Shell colour yellowish-white.

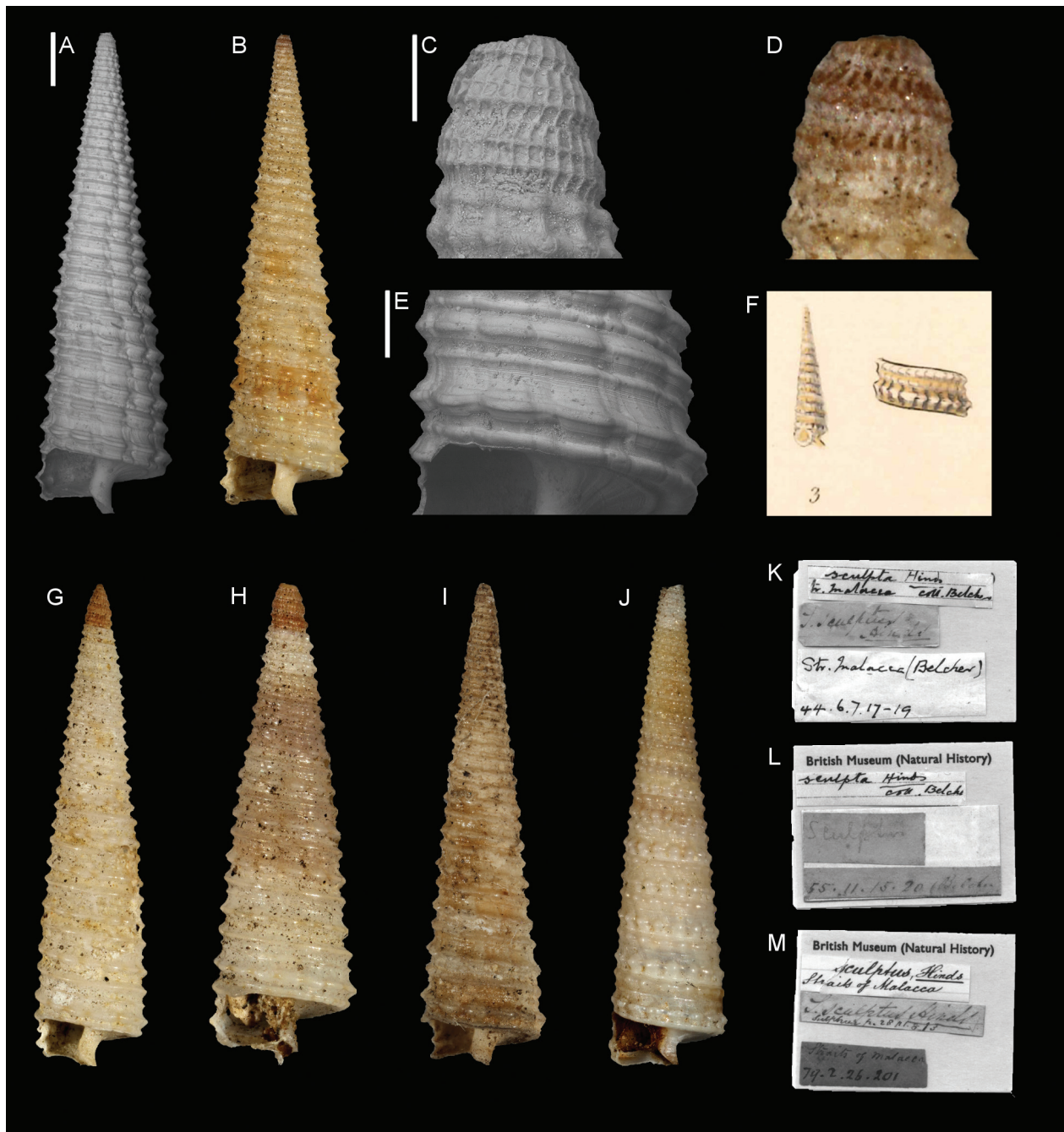


Figure 37. *Triphoris sculptus* Hinds, 1843. **A–E** Syntype NHMUK 1844.6.7.17, Straits of Malacca (coll. E. Belcher): front (**A, B**), protoconch (**C, D**), microsculpture (**E**). **F** Figure in Hinds 1844. **G** Syntype NHMUK 1844.6.7.18, Straits of Malacca (coll. E. Belcher): front. **H** Syntype NHMUK 1844.6.7.19, Straits of Malacca (coll. E. Belcher): front. **I** Syntype NHMUK 1855.11.15.20 (coll. E. Belcher). **J** Syntype NHMUK 1879.2.26.201, Straits of Malacca (J. Lombe-Taylor coll.). **K** Original labels NHMUK 1844.6.7.17–19. **L** Original labels lot NHMUK 1855.11.15.20. **M** Original labels lot NHMUK 1879.2.26.201. Scale bars: **A, B**: 1 mm; **C, D**: 0.2 mm; **E**: 0.5 mm.

Triphoris (Ino) vittatus Hinds, 1843

Figure 40

Triphoris (Ino) vittatus Hinds 1843b: 17, not illustrated. Illustration available in Hinds (1844): 28, pl. 8, fig. 4.

Type locality. Straits of Malacca.

Type material. Syntypes: NHMUK 1879.2.26.196: 2 specimens, Straits of Malacca (coll. T. Lombe Taylor);

NHMUK 1844.6.7.20, 1 specimen, Straits of Malacca (coll. E. Belcher); NHMUK 1844.6.7.21, 1 specimen, Straits of Malacca (coll. E. Belcher).

Original description. *Testa laevigata, cornea; anfractibus 22–25 transversim leviter sulcatis, medio fusco elegantissime vittatis; apertura subquadrata; sinu laterali obsoleto. Axis 8 lin.*

Geog. Straits of Malacca; in 23 fathoms.

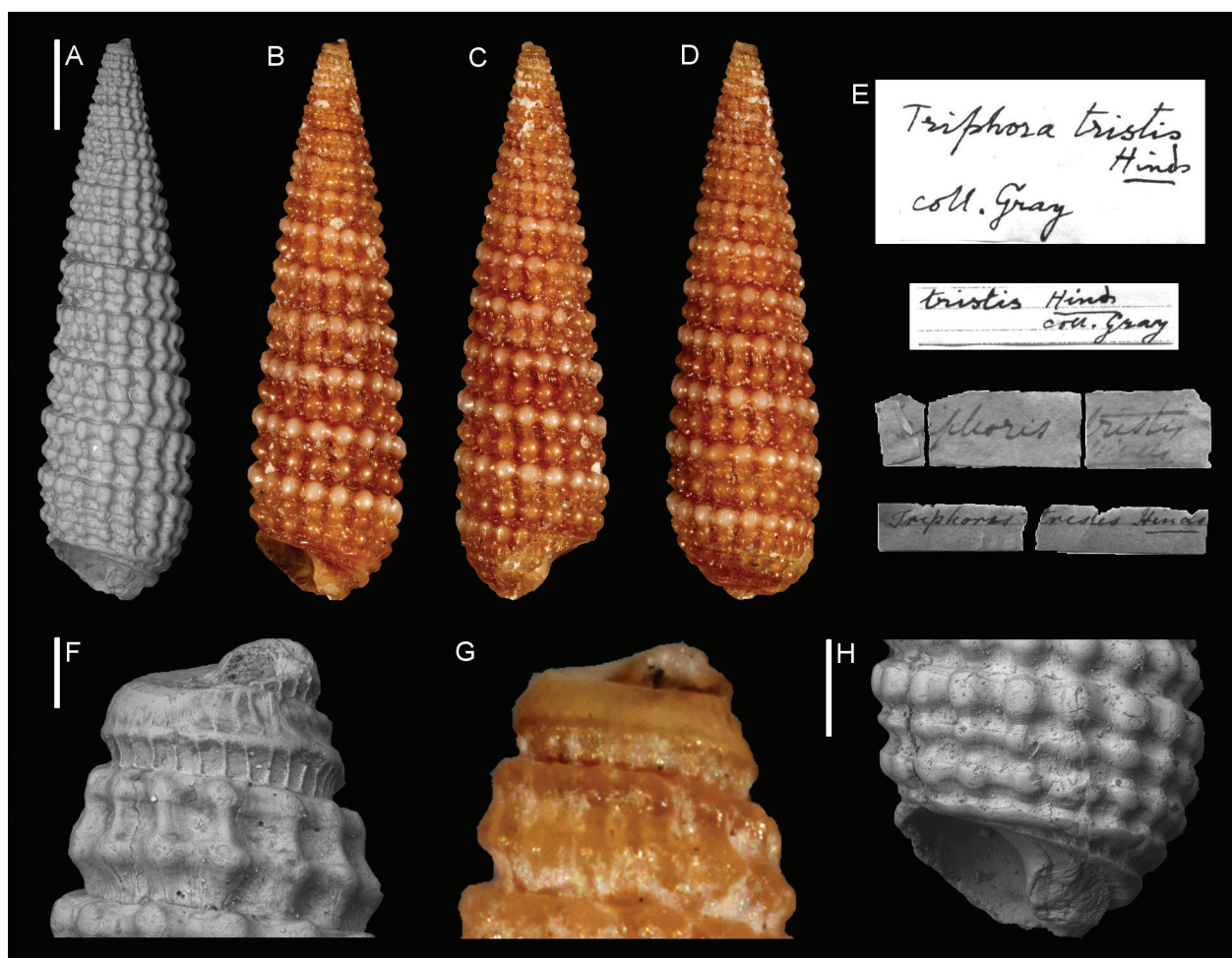


Figure 38. *Triphoris tristis* Hinds, 1843, unknown locality, J.E. Gray coll. A–H Syntype NHMUK 196538: front (A, B), side (C), back (D), original labels (E), protoconch (F, G), aperture (H). Scale bars: A–D: 1 mm; F, G: 0.1 mm; H: 0.5 mm.

Translation of the Latin text. Shell smooth, yellowish; 22–25 whorls crossed by faint threads, a graceful median dark band; subquadrate aperture; posterior sinus obsolete. Height 8 lines.

Diagnosis. Syntype NHMUK 1879.2.26.196/1 17.3 mm high. Shell conical and slender, with more than 20 whorls bearing three smooth spiral cords and prosocline growth lines. A suprasutural smooth cord and very fine spiral threads are also visible. Periphery of the last whorl angulated, the base has one smoother spiral cord. Protoconch incomplete and very worn, but apparently multispiral with two spiral keels and axial riblets on the last two whorls. Teleoconch yellowish with an orange band between the second and third spiral cord.

Triphoris (Mastonia) vulpinus Hinds, 1843

Figure 41

Triphoris (Mastonia) vulpinus Hinds 1843b: 19, not illustrated. Illustration available in Hinds (1844): 30, pl. 8, fig. 13.

Type locality. New Ireland [Papua New Guinea].

Type material. Syntypes: NHMUK 1879.2.26.199: 1 specimen, New Ireland (coll. T. Lombe Taylor).

Original description. *Testa nigricante; anfractibus quatuordecim tricarinatis; carina inferiore albida; apertura rotundata; sinu laterali subnullo. Axis 3 lin.*

Geog. New Ireland; found, with other small shells, among fine gravel about low-water mark.

Translation of the Latin text. Shell black; 14 whorls with three cords; the lowest cord white; rounded aperture; posterior sinus nearly absent. Height 3 lines.

Diagnosis. Syntype 5.5 mm high. Shell strongly cyrtocoid, broad. Teleoconch of 11 flat whorls with two main smooth spiral cords. A third develops in between early in the teleoconch. Several fine threads run between the main cords. There are faint prosocline axial ribs which form tubercles on the fourth spiral cord visible on the base which has a fifth smooth cord too. The peristome is incomplete in the lectotype, but like-

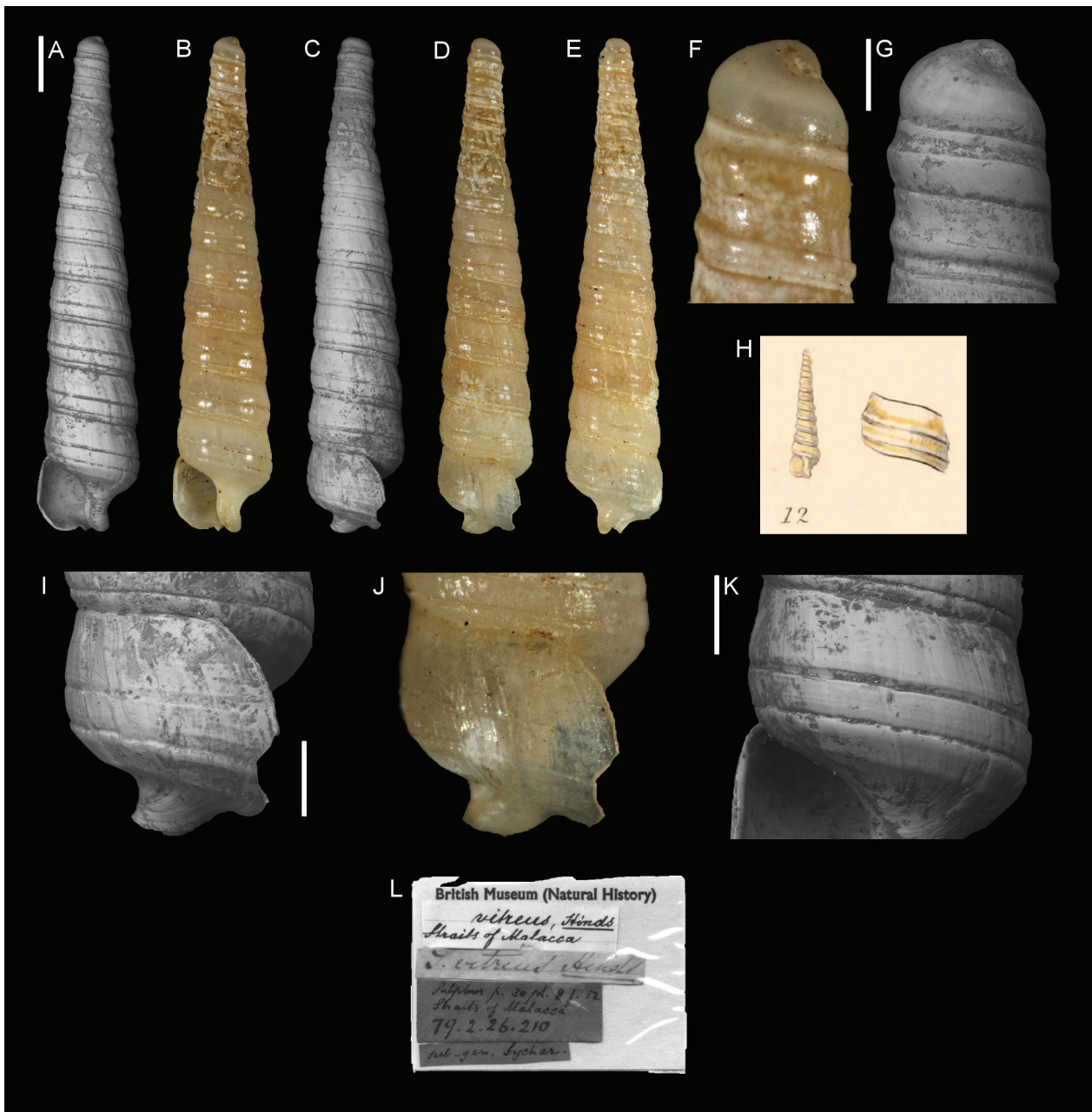


Figure 39. *Triphoris vitreus* Hinds, 1843, Straits of Malacca, J. Lombe Taylor coll. **A–G, I–L** Syntype NHMUK 1879.2.26.210: front (**A, B**), side (**C, D**), back (**E**), protoconch (**F, G**), peristome (**I, J**), microsculpture (**K**), original labels (**L**). **H** Figure in Hinds 1844. Scale bars: **A–E**: 1 mm; **F, G**: 0.3 mm; **I–K**: 0.5 mm.

ly bears additional spiral cords. Also, the apex is incomplete, but clearly bears a dark-brown multispiral protoconch whose last two whorls have two strong keels and axial riblets. Teleoconch brown with white to pearly flammulae particularly evident on the abapical spiral cord.

Remarks. Hinds (1843a) introduced the genus *Mastonia* without designating the type species but listing as first species *T. vulpinus*. The type species designation was later done by Jousseume (1884) who selected *T. ruber* Hinds, 1843. Such designation is valid (ICZN 1999, Arti-

cle 69.1) because *T. ruber* is an originally included nominal species (ICZN 1999, Article 67.2).

Species described by J.G. Jeffreys

John G. Jeffreys described two species of Triphoridae: *Cerithium perversum* var. *pallescent* Jeffreys, 1867 and *Triphoris aspera* Jeffreys, 1885. The former was reviewed by Bouchet and Guillemot (1978) who selected the lectotype (USNM 62160) (Bouchet 1985 as *Cheirodonta pallescens*). For the former, syntypes have been traced in USNM (87324) and NHMUK (Warén 1980); the latter are here reviewed.

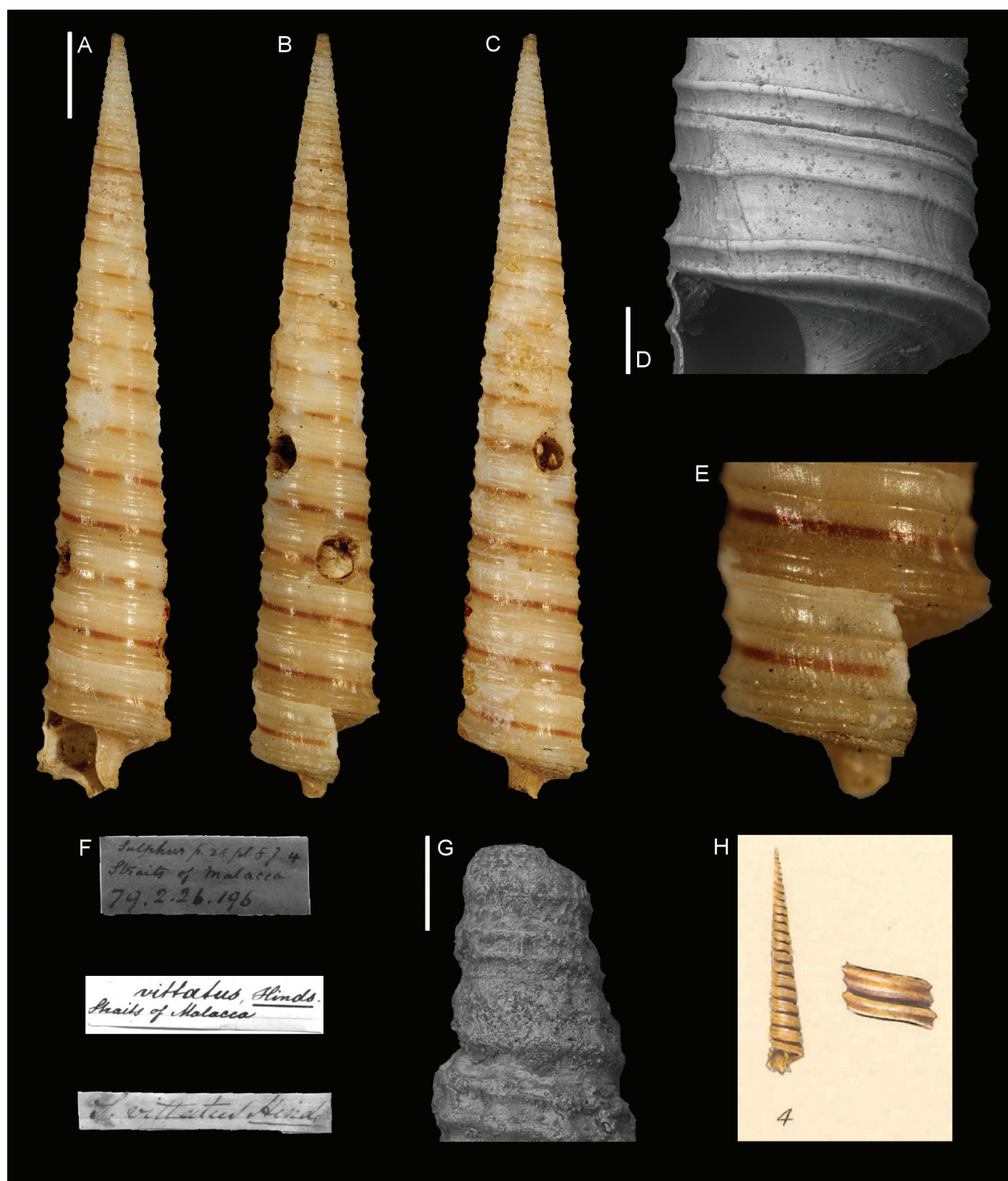


Figure 40. *Triphoris vittatus* Hinds, 1843, Straits of Malacca, coll. T. Lombe Taylor. **A–G** Syntype NHMUK 1879.2.26.196/1: front (A), side (B), back (C), microsculpture (D), peristome (E), original labels (F), protoconch (G). **H** Figure in Hinds 1844. Scale bars: A–C: 2 mm; D: 0.5 mm; G: 0.2 mm.

Triforis aspera Jeffreys, 1885

Figure 42

Triforis aspera Jeffreys 1885: 58–59, pl. VI, figs 7, 7a.

Original localities. Porcupine Expedition 1870: off western Portugal, station 16 (994 fathoms, 39°55'N,

9°56'W); off south-western Portugal: station 24 (292 fathoms, 37°19'N, 9°13'W); Gulf of Cádiz: stations 27 (322 fathoms, 36°37'N, 7°33'W), 28 (304 fathoms, 36°29'N, 7°16'W), 28a (286 fathoms, 36°27'N, 6°54'W), 29 (227 fathoms, 36°20'N, 6°47'W) and 30 (386 fathoms, 36°15'N, 6°52'W); the Adventure Bank in the Sicily Channel.

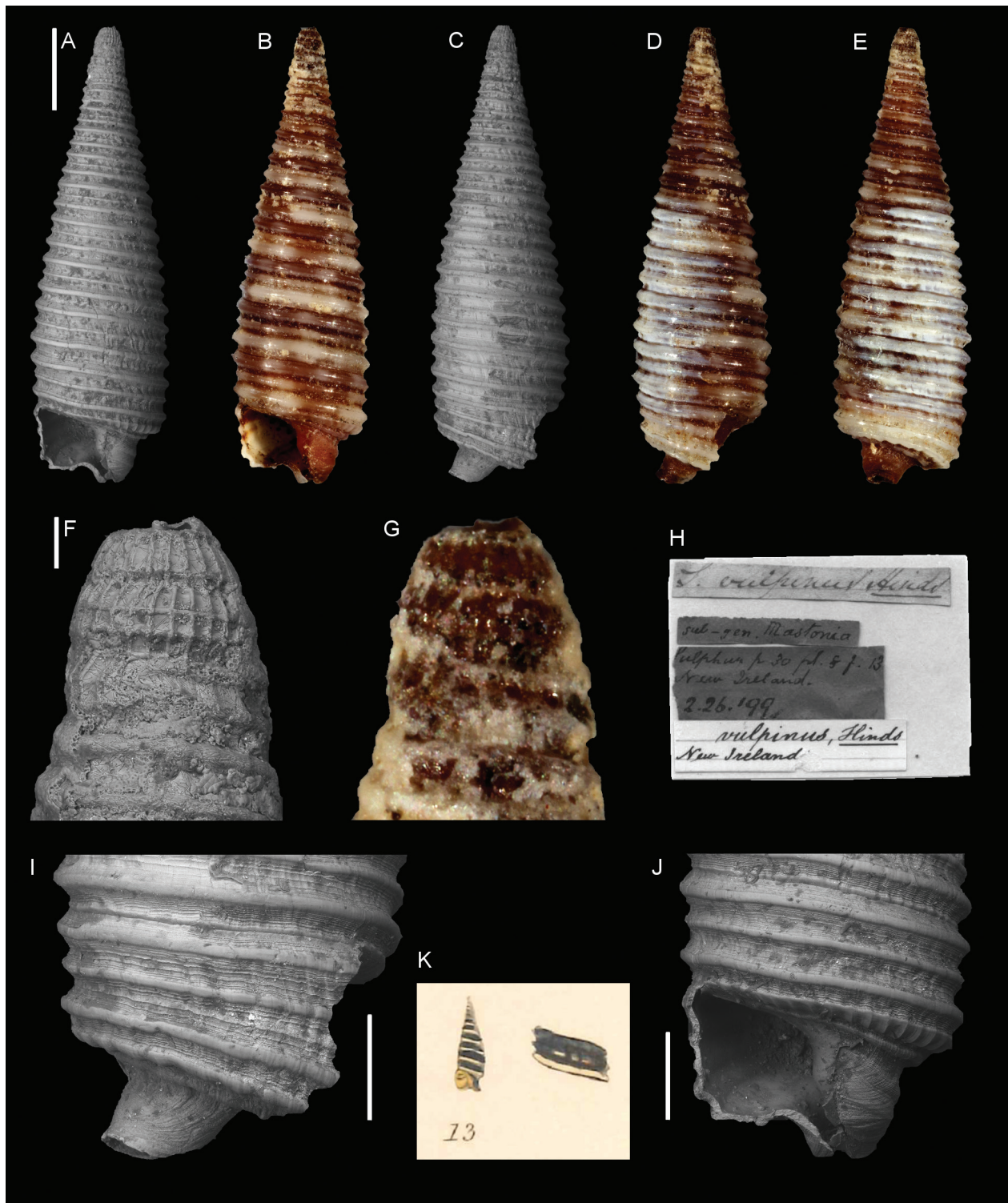


Figure 41. *Triphoris vulpinus* Hinds, 1843, New Ireland, coll. T. Lombe Taylor. **A–J** Syntype NHMUK 1879.2.26.199: front (**A**, **B**), side (**C**, **D**), back (**E**), protoconch (**F**, **G**), original labels (**H**), peristome (**I**), aperture (**J**). **K** Figure in Hinds 1844. Scale bars: **A–E**: 1 mm; **F**, **G**: 0.1 mm; **I**, **J**: 0.5 mm.

Type material. Syntypes: NHMUK 1885.11.5.2673, 1 specimen, Porcupine Expedition; NHMUK 1885.11.5.2674, 1 fragment, Porcupine Expedition station 16 (fide modern label); NHMUK 1885.11.5.3934–5, 2 fragments, Adventure Bank; NHMUK 1885.11.5.3936, 1 specimen glued on cardboard, Porcupine Expedition, “Coast of Spain” (from original label); NHMUK

1885.11.5.3937–8, 2 specimens (but one is not *T. aspera*, see remarks), Porcupine Expedition, “Atlantic” (from original label); NHMUK 1985008, 32 fragments or juveniles, Porcupine Expedition, Adventure Bank 92 fathoms (fide modern label) (coll. E.R. Sykes). Additional syntypes USNM 87324, not seen.

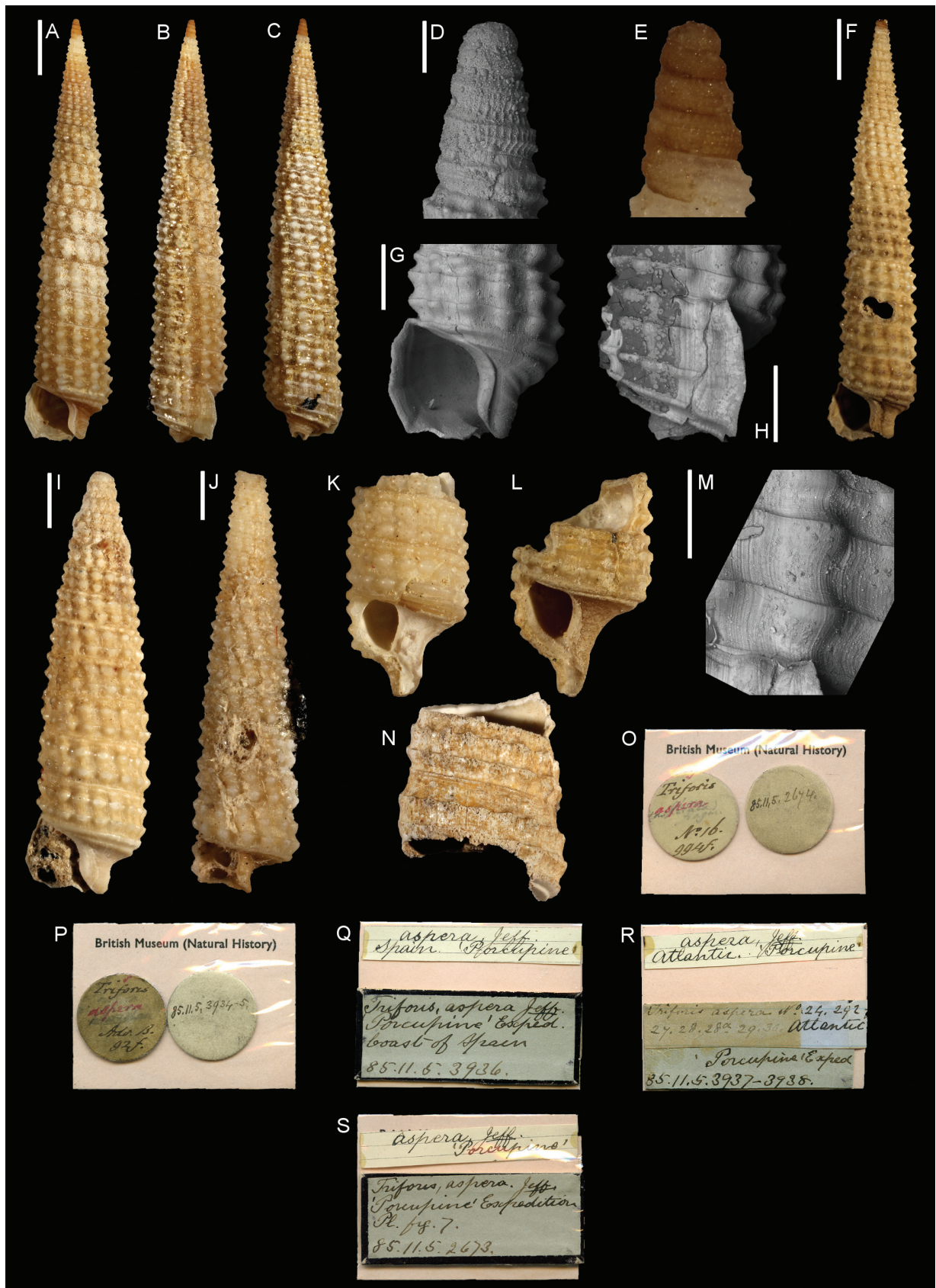


Figure 42. *Triphoris aspera* Jeffreys, 1885. A–E, G, H, M, S Syntype NHMUK 1885.11.5.2673, Porcupine expedition, unknown locality: front (A), side (B), back (C), protoconch (D, E), aperture (G), peristome (H), microsculpture (M), original labels (S). F, Q: Syntype NHMUK 1885.11.5.3936, Porcupine Expedition, “Coast of Spain”. I, J, R Syntypes NHMUK 1885.11.5.3937–8, Porcupine Expedition, “Atlantic” (I is not *T. aspera*). K–L, P Syntypes NHMUK 1885.11.5.3934–5, Adventure Bank, Sicily Channel. N, O Syntype NHMUK 1885.11.5.2674, Porcupine expedition station 16. Scale bars: A–C, F: 2 mm; D, E: 0.2 mm; G–J: 1 mm; M: 0.5 mm.

Original description. Shell elongated, rather solid, nearly opaque and glossy: *sculpture*, rows or bands of small tubercles (18–20 on the last or bottom row), which arise from the mutual intercrossing of longitudinal and spiral striae; of these rows there are usually three on the last whorl above the periphery, and the same number on several of the succeeding whorls and afterwards two only; each of the apical whorls (3 or 4) is closely striated lengthwise and encircled by two spiral lines; the periphery is defined by a rather strong ridge, a little below which is another ridge, besides a shorter and smaller one at the base; the tubercles which compose the lower two rows are larger and more prominent than those of the uppermost or third row: *colour* pale yellowish, with a faint tinge of brown; apical whorls dark brown: *spire* tapering to a fine point; apex pinched-in and narrower than the rest of the spire: *whorls* 21–22, compressed, gradually enlarging; the last equals only from 1/5 to 1/6 of the shell: *suture* slight, indicated by the uppermost spiral row: *mouth* rhomboidal; and all other characters similar to those of *T. perversa*. L. 0"6, B. 0"15.

Diagnosis. The two adult specimens among the syntypes are 13.7 and 15.1 mm. Shell conical with 18 teleoconch whorls bearing three spiral cords with spiny tubercles at the intersection with orthocone axial ribs. A fourth and a fifth smooth cord are present on the base, and the fourth is already visible on the spire as a suprasutural cord. Numerous fine spiral threads adorn the whorls between the main cords and fine growth lines are also visible. Siphonal canal short. Protoconch multispiral of 4.5 whorls; the last three bearing two strong spiral keels and axial riblets whereas the first are too worn for description. Teleoconch brown with lighter tubercles and whitish first three whorls; protoconch orange-brown.

Remarks. Specimen NHMUK 1885.11.5.2673 (Fig. 42A–C) is likely the one used for the original figure because it is the only adult specimen with complete protoconch known and because of an annotation on the original label. Bouchet and Guillemot (1978) proposed the nomen novum *Triphora brychia* because of oonymy with *Triforis asper* Deshayes, 1864, which is a fossil species from the Paris Basin (Le Renard and Pacaud 1995; Le Renard 1995). Lot NHMUK 1885.11.5.3937–8 contains an adult specimen which is not *T. aspera*, as already noted by Warén (1980): it is broader, with more numerous axial ribs and with the first tubercled spiral cord clearly visible only from mid-teleoconch (Fig. 42I).

Species described by E.A. Kay

Elizabeth A. Kay described nine species of Triphoridae in her monograph on Hawaiian molluscs (1979). With a single exception (*Triphora keiki*), paratypes of all species have been deposited in the NHMUK.

Metaxia albicephala Kay, 1979

Figure 43

Metaxia albicephala Kay 1979: 130, 132, fig. 48L, M.

Type locality. Poipu Beach, Kauai, Hawaiian Islands.

Type material. Holotype: BPBM 9784. Paratypes: NHMUK 1982260, 1 specimen, Keahole Point, Hawaii, Hawaiian Islands. Other paratypes: AMS and USNM (fide Kay 1979; not seen).

Remarks. The specimen in NHMUK may be a different species than the holotype figured by Kay (1979, fig. 48L, M). The holotype has large flat spiral cords (a character also included in the original description) and the interspaces are smaller than the cords. In contrast, the NHMUK specimen has thin spiral cords with ample interspaces. Unfortunately, Kay's illustration of the teleoconch is blurred, and the NHMUK specimen is worn and lacks the apex, which would have offered additional diagnostic characters for observation.

Metaxia brunnicephala Kay, 1979

Figure 44

Metaxia brunnicephala Kay 1979: 132, fig. 48E, F, K.

Type locality. Poipu Beach, Kauai, Hawaiian Islands.

Type material. Holotype: BPBM 9782. Paratypes: NHMUK 1982262, 1 specimen, Keahole Point, Hawaii, Hawaiian Islands. Other paratypes: USNM (fide Kay 1979; not seen).

Triphora chrysolitha Kay, 1979

Figure 45

Triphora chrysolitha Kay 1979: 143–145, fig. 51B, G, H.

Type locality. Makaha, Oahu, Hawaiian Islands.

Type material. Holotype: BPBM 9788. Paratypes: NHMUK 1982275, 5 specimens, Kukuiula, Kauai, Hawaiian Islands. Other paratypes: AMS and USNM (fide Kay 1979; not seen).

Triphora earlei Kay, 1979

Figure 46

Triphora earlei Kay 1979: 145, fig. 52D, E.

Type locality. Kepuhi Point, Oahu, Hawaiian Islands.

Type material. Holotype: BPBM 9794 (not seen, fide Kay 1979). Paratypes: NHMUK 1982255, 4 specimens,

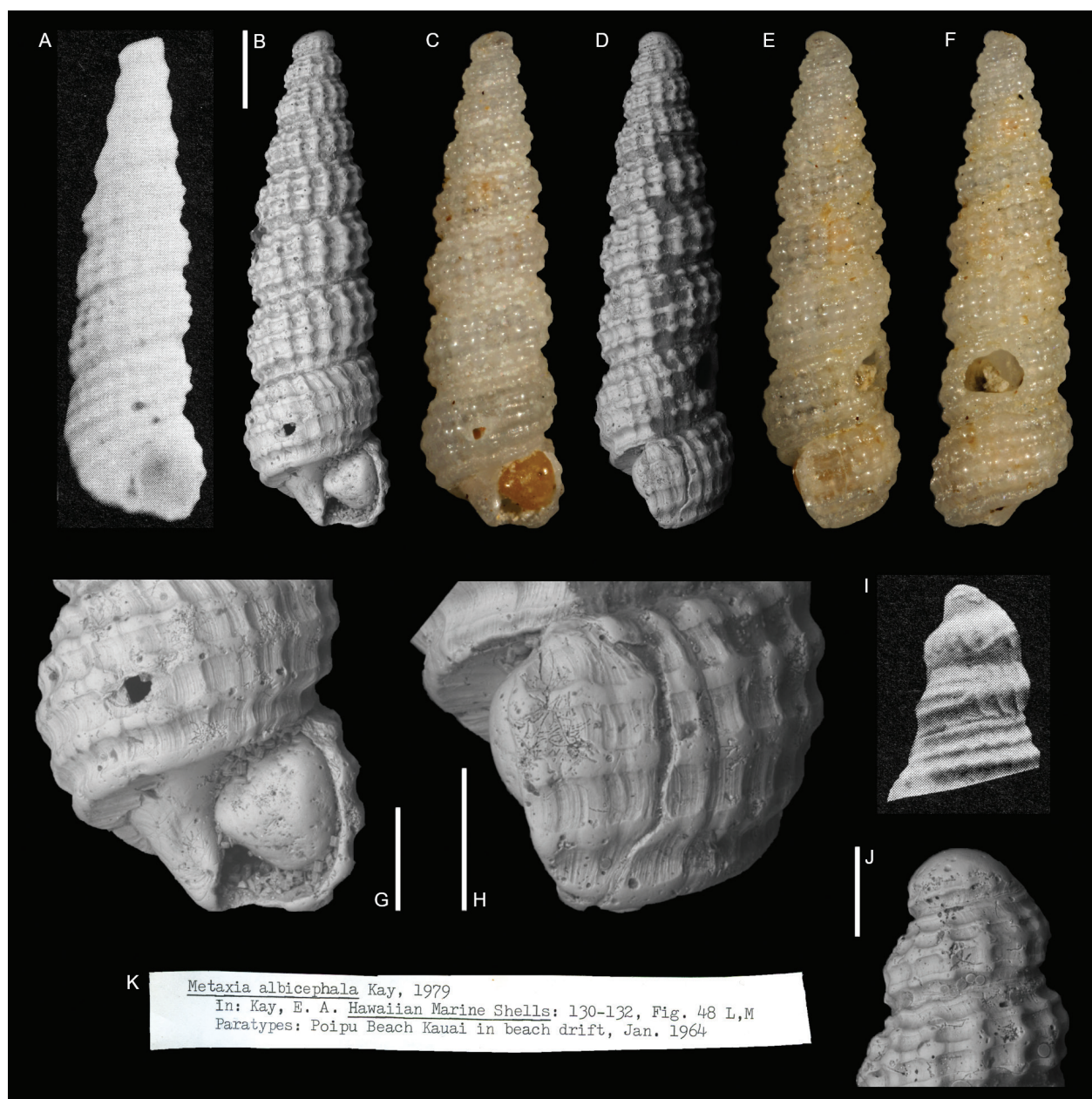


Figure 43. *Metaxia albicephala* Kay, 1979, Poipu Beach, Kavaï, Hawaii. **A, I** Original figure. **B–H, J** Paratype, NHMUK 1982260: front (**B, C**), side (**D, E**), back (**F**), aperture (**G**), peristome (**H**), protoconch (**I**). **K** Original label. Scale bars: **B–F**: 0.5 mm; **G, H**: 0.3 mm; **J**: 0.2 mm.

Makaha, Oahu, Hawaiian Islands. Other paratypes: AMS and USNM (fide Kay 1979; not seen).

***Viriola fallax* Kay, 1979**

Figure 47

Viriola fallax Kay 1979: 140, 142, fig. 50C, G.

Type locality. Milolii, Hawaii.

Type material. Holotype: BPBM 9798 (fide Kay 1979; not seen). Paratypes: NHMUK 1982250, 3 specimens,

Kepuhi Point, Oahu, Hawaiian Islands. Other paratypes: USNM (fide Kay 1979; not seen).

Remarks. This is a junior synonym of *Viriola alboguttata* Tomlin (p. 280). These specimens given by Kay to the NHMUK and labelled as paratypes were not listed as such in Kay (1979).

***Iniforis hinuhinu* Kay, 1979**

Figure 48

Iniforis hinuhinu Kay 1979: 134, fig. 48H.

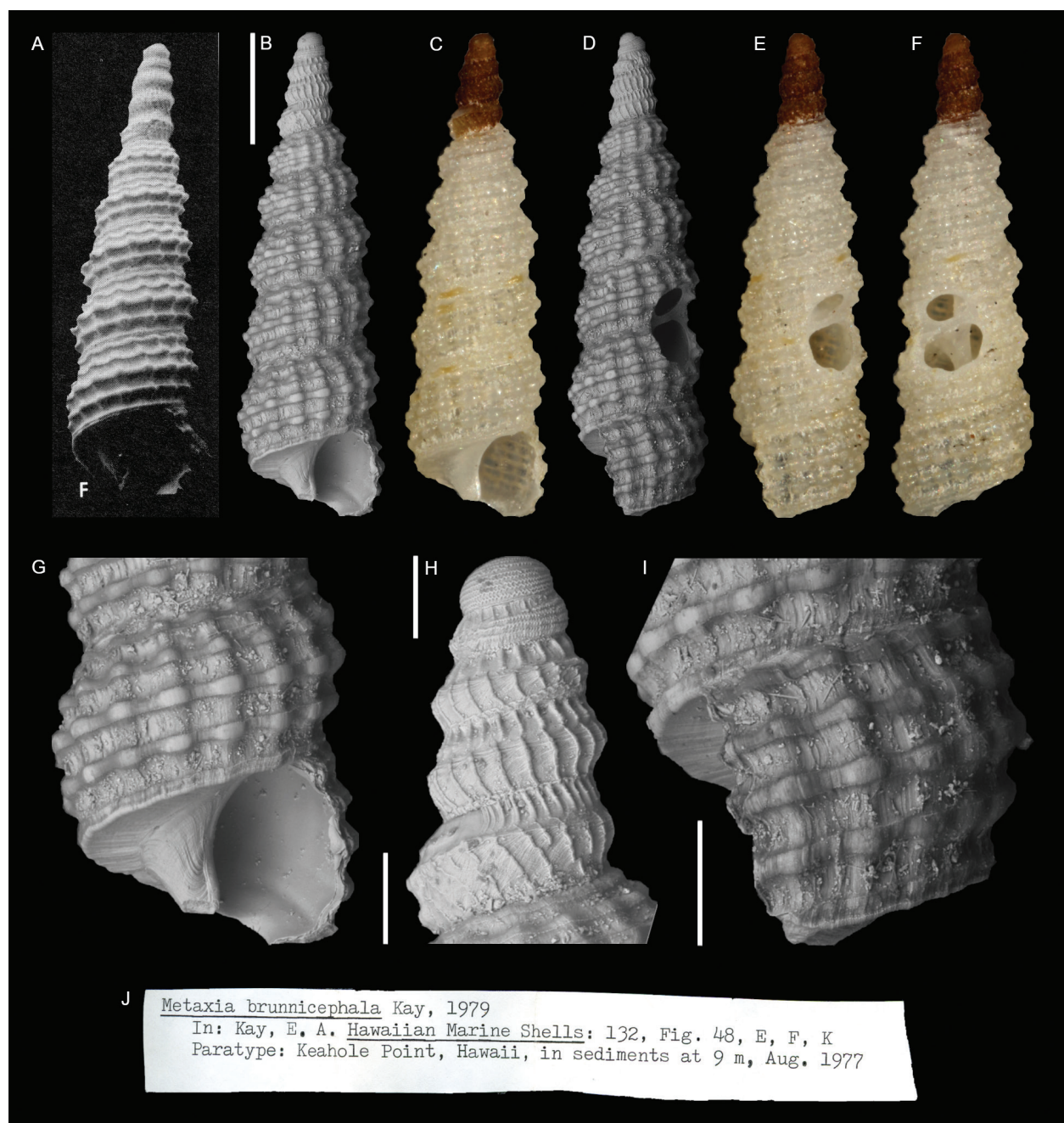


Figure 44. *Metaxia brunnicephala* Kay, 1979, Keahole Point, Hawaii. **A** Original figure. **B–I** Paratype, NHMUK 1982262: front (**B**, **C**), side (**D**, **E**), back (**F**), aperture (**G**), protoconch (**H**), peristome (**I**). **J** Original label. Scale bars: **B–F**: 0.5 mm; **G**, **I**: 0.2 mm; **H**: 0.1 mm.

Type locality. Kepuhi Point, Oahu, Hawaiian Islands.

Type material. Holotype: BPBM 9786 (fide Kay 1979; not seen). Paratypes: NHMUK 1982263, 2 specimens, Kepuhi Point, Oahu, Hawaiian Islands. Other paratypes: AMS and USNM (fide Kay 1979; not seen).

Triphora laddi Kay, 1979

Figure 49

Triphora laddi Kay 1979: 147, fig. 51D–I.

Type locality. off Waikiki, Hawaiian Islands.

Type material. Holotype: BPBM 9800 (fide Kay 1979; not seen). Paratypes: NHMUK 1982273, 3 specimens, Poipu Beach, Kauai, Hawaiian Islands. Other paratypes in USNM (fide Kay 1979; not seen).

Remarks. These specimens given by Kay to the NHMUK and labelled as paratypes were not listed as such in Kay (1979).

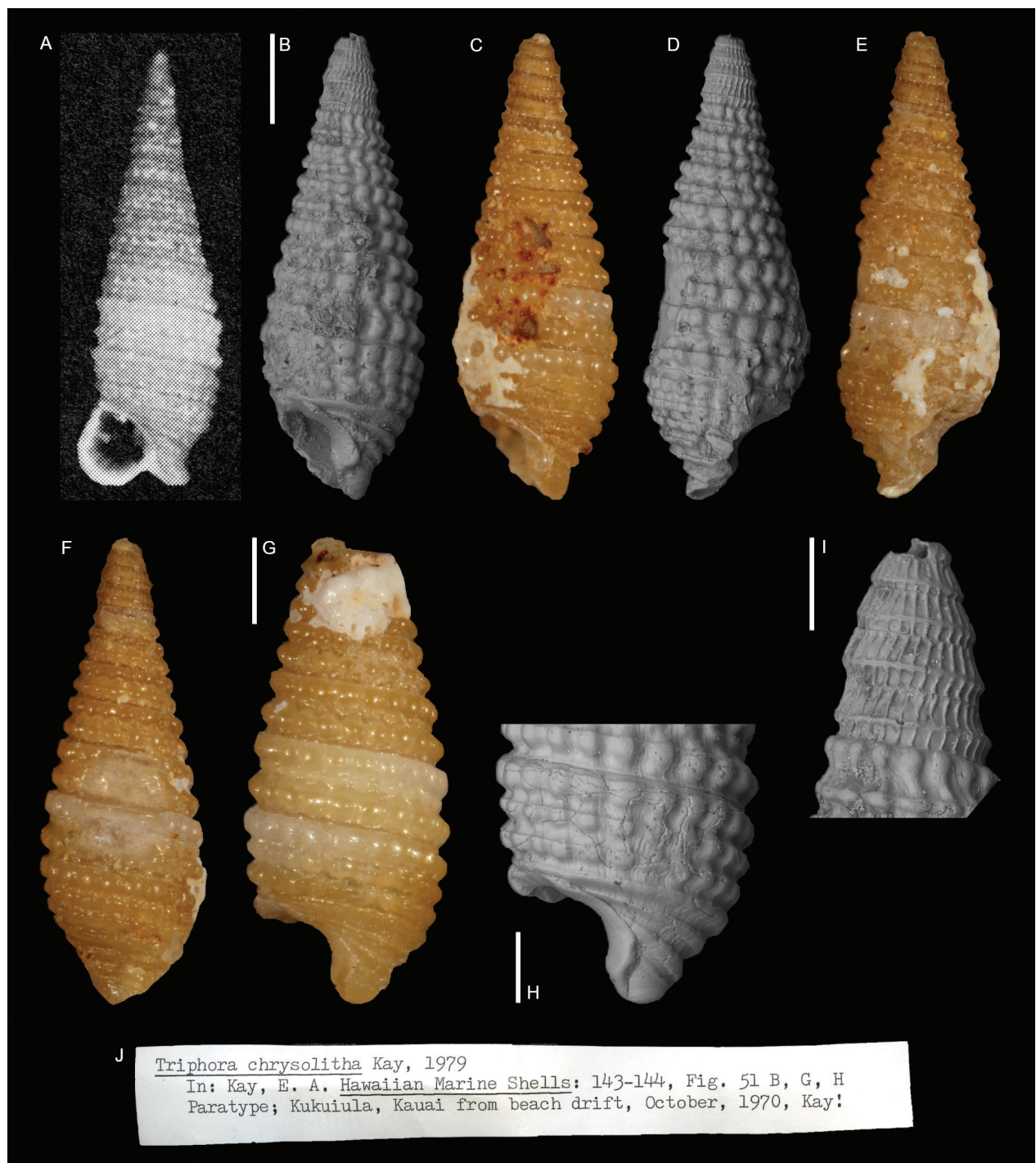


Figure 45. *Triphora chrysolitha* Kay, 1979, Kukuiula, Kauai, Hawaiian Islands. **A** Original figure. **B–F, I** Paratype, NHMUK 1982275/1: front (**B, C**), side (**D, E**), back (**F**), protoconch (**I**). **G, H** Paratype, NHMUK 1982275/2: front (**G**), aperture (**H**). **J** Original label. Scale bars: **B–G**: 0.5 mm; **H**: 0.3 mm; **I**: 0.2 mm.

***Triphora thaanumi* Kay, 1979**

Figure 50

Triphora thaanumi Kay 1979: 149–150, fig. 52A, B.

Type locality. Kahe Point, Oahu, Hawaiian Islands.

Type material. Holotype: BPBM 9796 (fide Kay 1979; not seen). Paratypes: NHMUK 1982252, 1 specimen, Kahe Point, Oahu, Hawaiian Islands; NHMUK 1982281, 1 specimen, Makaha, Oahu, Hawaiian Islands. Additional paratypes in AMS and USNM (fide Kay 1979; not seen).

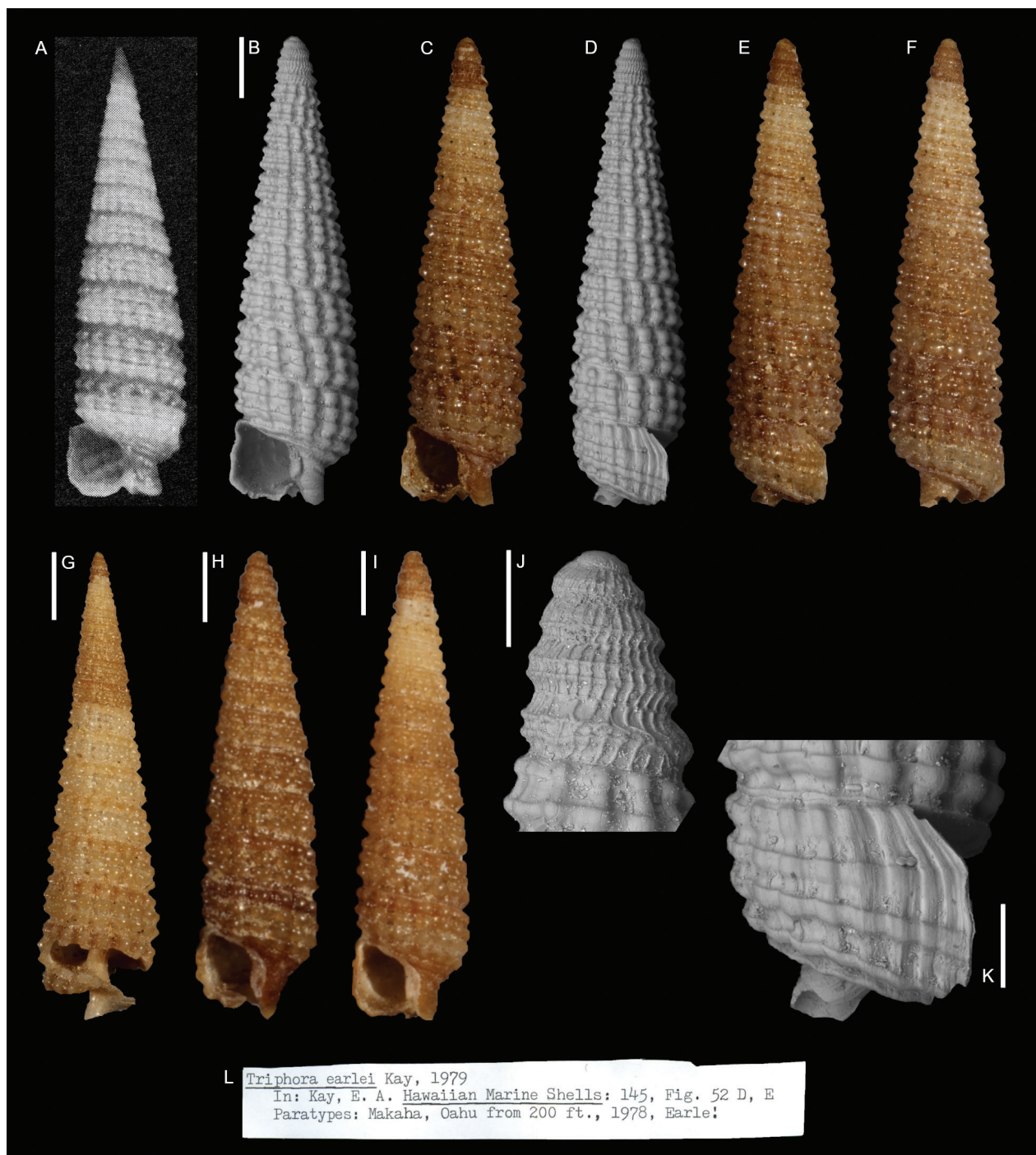


Figure 46. *Triphora earlei* Kay, 1979, Makaha, Oahu, Hawaiian Islands. **A** Original figure. **B–F, J, K** Paratype, NHMUK 1982255/1: front (**B, C**), side (**D, E**), back (**F**), protoconch (**J**), peristome (**K**). **G–I** Paratypes, NHMUK 1982255/2–4: front paratype 2 (**G**), front paratype 3 (**H**), front paratype 4 (**I**). **L** Original label. Scale bars: **B–F, H, I**: 0.5 mm; **G**: 1 mm; **J**: 0.2 mm; **K**: 0.3 mm.

Remarks. The NHMUK labels report two specimens per lot but we found a single specimen per lot only.

Species described by S. Kosuge

Sadao Kosuge was a prolific author who described 47 species of Triphoridae. Most holotypes are in Japanese museums and a few in the USNM. He was usually very accurate in stating the location of type material in his

papers. In the NHMUK we found specimens labelled as paratypes of 14 species whose existence he did not report; however, the museum registry confirmed that these specimens were donated by Kosuge himself. We illustrate these shells because the original figures were often in black and white or line drawings. We also add the original descriptions (omitting the type locality and the location of type material which we report in other sections of each spe-



Figure 47. *Viriola fallax* Kay, 1979, Kepuhi Point, Oahu, Hawaii. **A** Original figure. **B–H** Paratype, NHMUK 1982250/1: front (**B**, **C**), side (**D**, **E**), back (**F**), protoconch (**G**), aperture (**H**). **I** Paratype, NHMUK 1982250/2: front. **J** Paratype, NHMUK 1982250/3: front. **K** Original label. Scale bars: **B–F**: 1 mm; **G**: 0.2 mm; **H–J**: 0.5 mm.

cies' paragraph) because the journals where these species were published were not of wide distribution. However, we do not add diagnoses because Kosuge's descriptions are recent and detailed.

Notosinister atratus Kosuge, 1962

Figure 51

Notosinister atratus Kosuge 1962a: 83, pl. 9, fig. 5, text figs 9, 13.

Type locality. Ankyaba, Setouchi-machi, Amami Islands.



Figure 48. *Iniforis hinuhinu* Kay, 1979, Kēpuhi Point, Oahu, Hawaii. A Original figure. B–E, G–I Paratype, NHMUK 1982263/1: front (B), side (C, D), back (E), aperture (G), peristome (H), protoconch (I). F Paratype, NHMUK 1982263/2: front. J Original label. Scale bars: B–F: 1 mm; G, H: 0.5 mm; I: 0.2 mm.

Type material. Holotype: TZM Mo. 13039 (fide Kossuge 1962a, not seen; illustrated in Higo et al. 2001: 51, G1705). Paratype: NHMUK 1966142: 1 specimen, Amami Islands, Japan.

Original description. Shell small, rather fusiform, inflated, rapidly attenuated to the early whorls, slightly narrowed at the base. Protoconch reddish brown, 2 spiral keels overridden by axial threads. Mature whorls 9 to 10 in number; suture well defined as a shallow groove. Sculpture 3 spiral costae, widely apart from each other

and decussated with irregular axial grooves, divided into 26 ill-defined granules, upper row largest, median one faint, and turns to a thread at the antepenultimate whorl and diminished at the earlier whorls. Body whorl has 2 slightly granulated extra-costae, anterior canal slightly recurved, aperture subquadrate. White in colour at the earlier 3 whorls and remainder blackish reddish brown.

Shell length: 5.5 mm.

Remarks: This species is easily distinguished by its peculiar sculpture and colour patterns from the allied form.

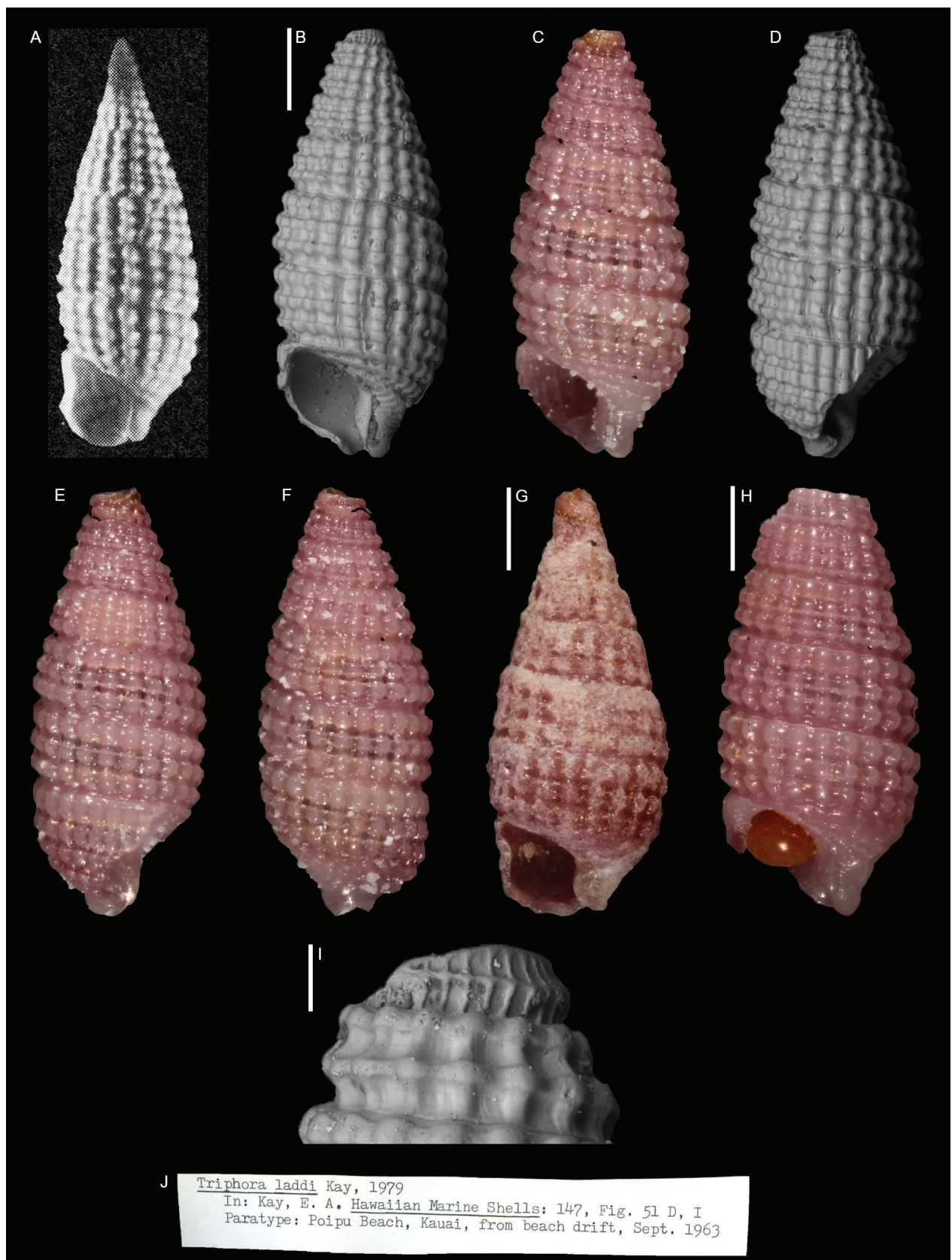


Figure 49. *Triphora laddi* Kay, 1979, Poipu Beach, Kawai, Hawaii. **A** Original figure. **B–F, I** Paratype, NHMUK 1982273/1: front (**B, C**), side (**D, E**), back (**F**), protoconch (**I**). **G, H** Paratypes, NHMUK 1982273/2–3: front views. **J** Original label. Scale bars: **B–H**: 0.5 mm; **I**: 0.1 mm.

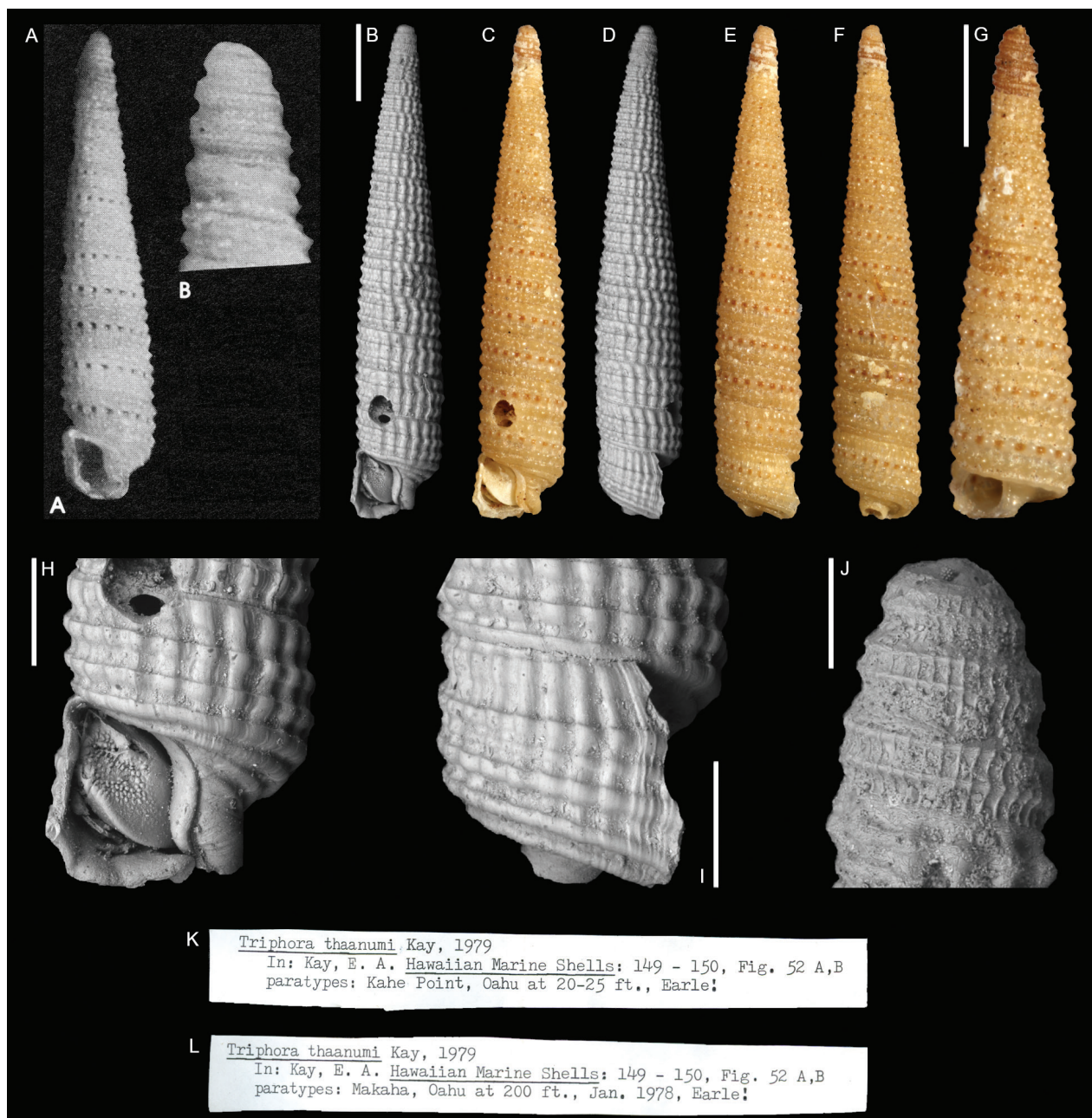


Figure 50. *Triphora thaunami* Kay, 1979. A Original figure. B–F, H–J, K Paratype, NHMUK 1982252, Kahe Point, Oahu, Hawaii: front (B, C), side (D, E), back (F), aperture (H), peristome (I), protoconch (J), original label (K). G, L Paratype, Makaha, Oahu, Hawaii, NHMUK 1982281: front (G), original label (L). Scale bars: B–G: 1 mm; H, I: 0.5 mm; J: 0.2 mm.

Inella granicostata Kosuge, 1962

Figure 52

Inella granicostata Kosuge 1962b: 121, pl. 8, fig. 11, text fig. 7.

Type locality. Ankyaba, Setouchi-machi, Amami Islands.

Type material. Holotype: TSM Mo. 12128 (fide Kosuge 1962b, not seen; illustrated in Higo et al. 2001: 50, G1676). Paratype: NHMUK 1966137: 1 specimen, Amami Islands, Japan.

Original description. Shell of medium size, conical, rather cylindrical in lower part of spire. Protoconch of 2 whorls, mammillate, suture distinct and grooved. Sculpture of 3 rows of granules, furrows between rows deep. Granules elongate and beset close together, connected by axial threads and spiral keels and appear like somewhat indented costae, 22–24 to a whorl. Upper row slightly larger and blackish brown, lower two light brown and sometimes whitish. 2 extra rows of granules on the body whorl.

Length: 8.5 mm.

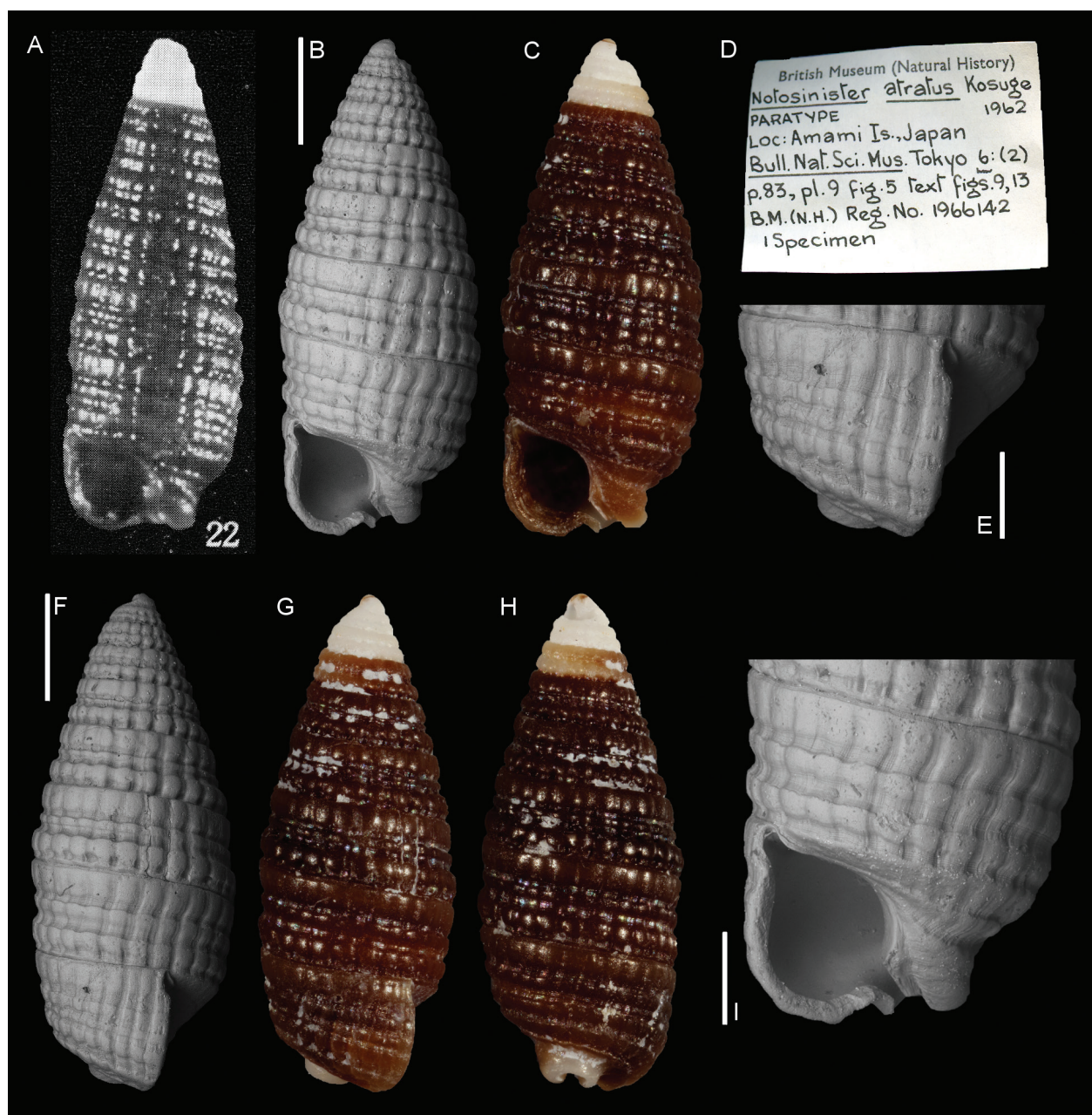


Figure 51. *Notosinister atratus* Kosuge, 1962, Amami Islands, Japan. A Original figure. B–C, E–I Paratype, NHMUK 1966142: front (B, C), peristome (E), side (F, G), back (H), aperture (I). D NHMUK label. Scale bars: B, C, F–H: 1 mm; E, I: 0.5 mm.

Remarks: This species is allied to *T. angasi* Crosse, though the latter has a white band in lower granules of body whorl and also differs from *T. marmoratus* Pease in details of sculpture of body whorl.

Notosinister hervieri Kosuge, 1962

Figure 53

Notosinister hervieri Kosuge 1962a: 81, pl. 10, fig. 1, text fig. 15, 18.

Type locality. Ankyaba, Setouchi-machi, Amami Islands.

Type material. Holotype: TZM Mo. 13036 (fide Kosuge 1962a; not seen, illustrated in Higo et al. 2001: 50,

G1670). Paratype: NHMUK 1966140: 1 specimen, Amami Islands, Japan.

Original description. Shell large to medium in size, conical, tapering to the summit, somewhat narrowed at the base. Protoconch of 5 whorls, acuminate conical, with 2 spiral keels overridden by numerous axial threads, brownish red in colour. Mature whorls 16, suture distinct and rather deep, each whorl somewhat inflated and sculptured with 3 equal rows of granules which are connected with fine spiral threads and broad axial columns, median row decreases to a fine thread at its upper 2 or 3 whorls. Granules large, apart by about half of its diameter, 22 to a whorl; on the body whorl, fourth row encircles on the periphery and coloured orange yellow, other 2 faintly

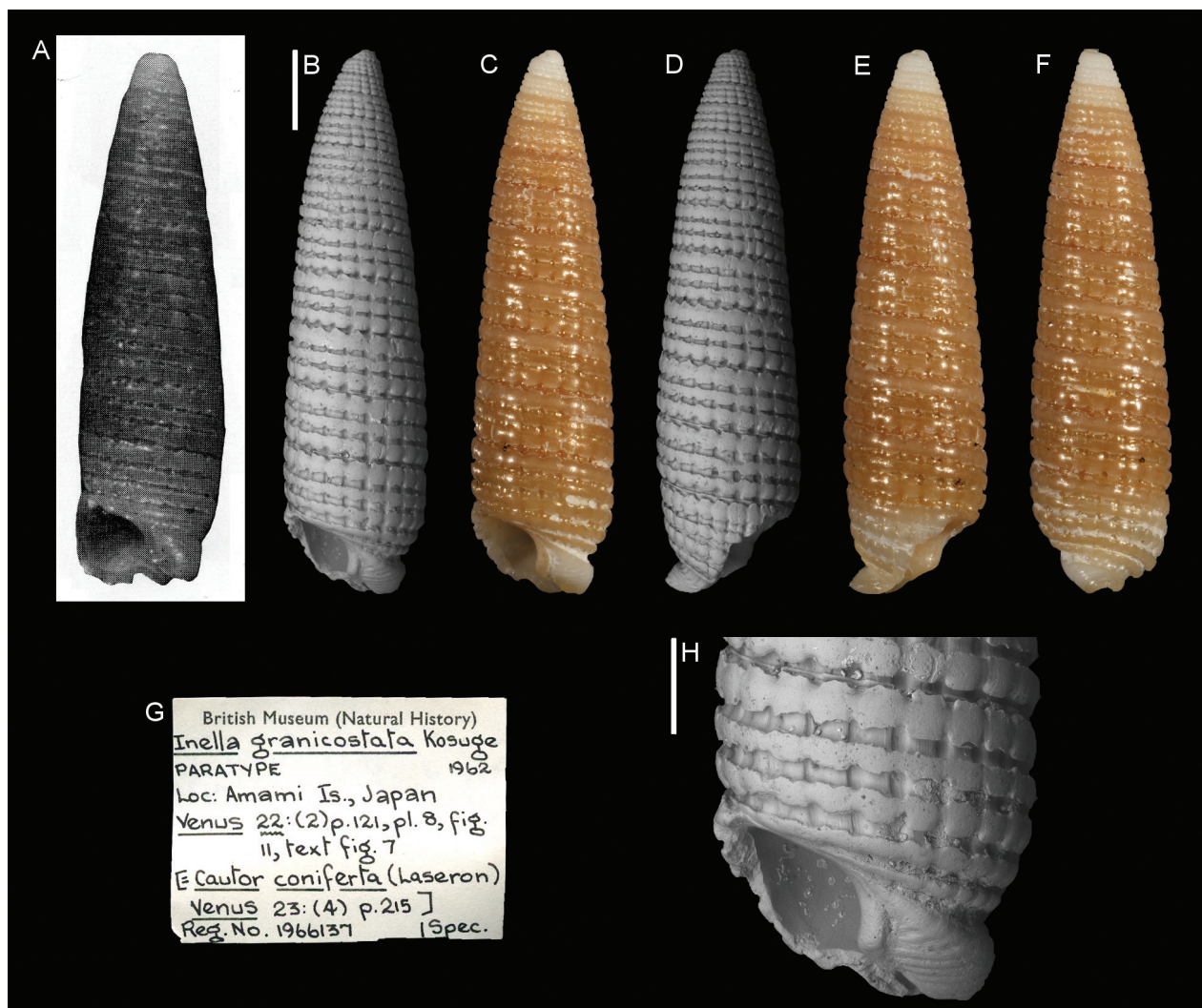


Figure 52. *Inella granicostata* Kosuge, 1962, Amami Islands, Japan. **A** Original figure. **B–F, H** Paratype, NHMUK 1966137: front (**B, C**), side (**D, E**), back (**F**), aperture (**H**). **G** NHMUK label. Scale bars: **B–F**: 2 mm; **H**: 0.5 mm.

granulated keels on the rounded base. Aperture subquadrate, anterior canal long and recurved backward. The colouration is distinctive, upper row orange yellow, others pinkish or lilac brown.

Shell length: 9.7 mm.

Remarks: This species is closely related to *T. loyaltiensis* (Hervier) in its sculpture and colour pattern, though differs in having 2 spiral keels on its protoconch in contrast with 1 keel of the latter. This is distributed in Okinawa and Amami Islands, and was formerly treated as *T. loyaltiensis* by Japanese authors.

Euthymella isaotakii Kosuge, 1962

Figure 54

Euthymella isaotakii Kosuge 1962b: 124, pl. 8, fig. 18, text figs 6, 8.

Type locality. Ankyaba, Setouchi-machi, Amami Islands.

Type material. Holotype: TZM Mo. 12094 (fide Kosuge 1962b; not seen, illustrated in Higo et al. 2001: 50,

G1685). Paratype: NHMUK 1966143: 1 specimen, Amami Islands, Japan.

Original description. Shell of medium size, broad conical and narrowed at the base. Colour very distinctive, protoconch light brown, early 3 whorls white and the next one brown, the remainder olive bistre. Protoconch of 4 whorls, conical with a spiral thread overridden by axial threads. Mature whorls 10, suture distinct but not deep, having a fine supra-sutural thread. Sculpture of 3 rows of granules, strongly connected spirally and axially, and latticed. Granules large and equal-sized, spirally elongate and apart from each other by one third of its diameter, 14 to a whorl. 2 extra rows of granules on the body whorl. Anterior canal tubular.

Length: 6.8 mm.

Remarks: This species is easily distinguished by its colour pattern, sculpture and shell feature. It is closely related to *E. regalis* Jousseaume and *E. pannata* Laseyron, though differing in number of rows of granules, shell feature and colour pattern.

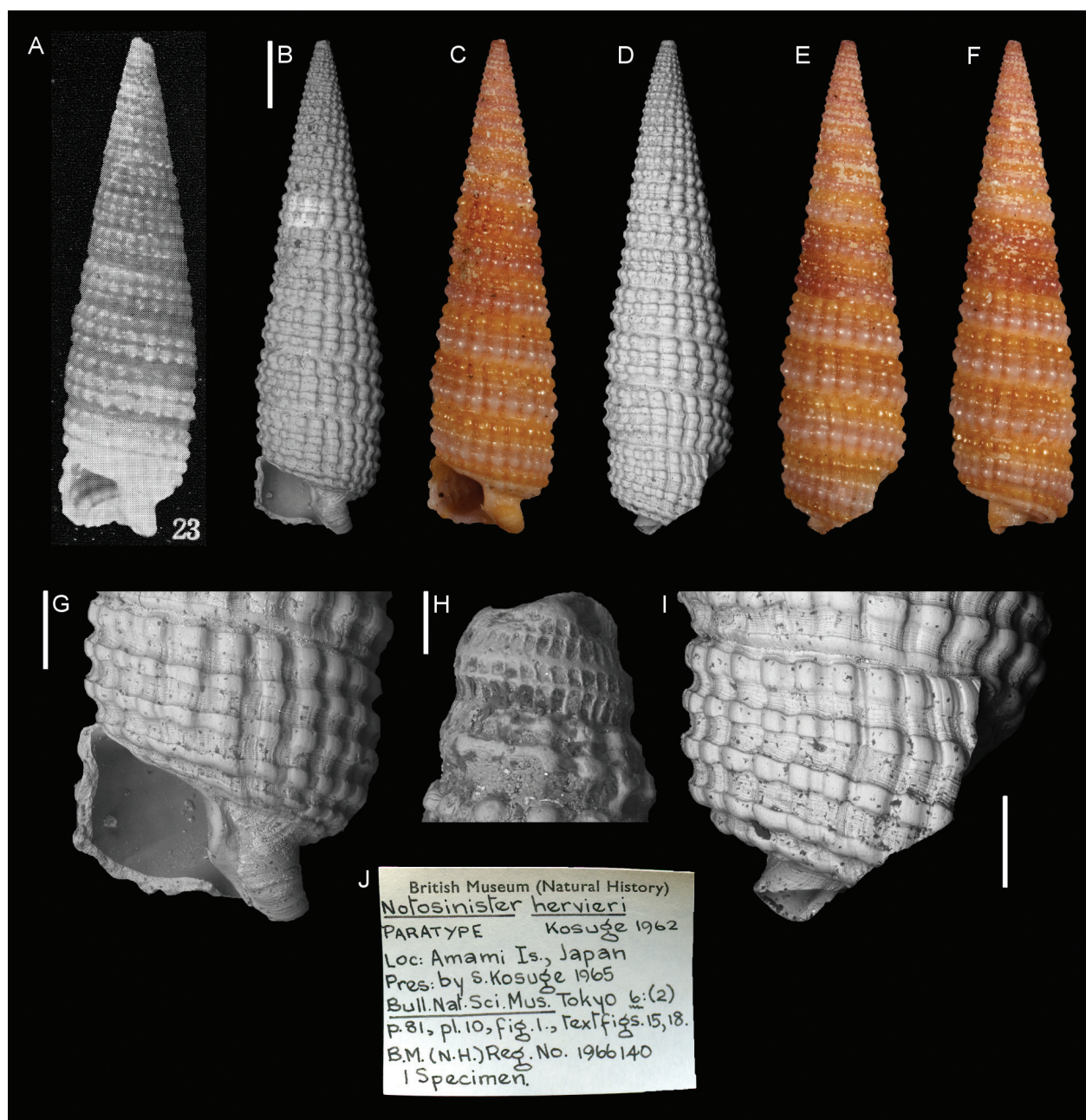


Figure 53. *Notosinister hervieri*, Kosuge, 1962, Amami Islands, Japan. **A** Original figure. **B–I** Paratype, NHMUK 1966140: front (**B**, **C**), side (**D**, **E**), back (**F**), aperture (**G**), protoconch (**H**), peristome (**I**). **J** NHMUK label. Scale bars: **B–F**: 1 mm; **G**, **I**: 0.5 mm; **H**: 0.1 mm.

This species is named in memory of the late Dr. Isao Taki, who was kind enough to guide me in malacology.

Notosinister iwaotakii Kosuge, 1963

Figure 55

Notosinister iwaotakii Kosuge 1963a: 246–247, pl. 16, fig. 27, text figs 3, 10.

Type locality. Ankyaba, Setouchi-machi, Amami Islands.

Type material. Holotype: TZM Mo. 13067 (fide Kosuge 1963a; not seen). Paratype: NHMUK 1966149: 1 specimen, Amami Islands, Japan.

Original description. Shell rather small, extremely inflated spindle-form, acuminate at the summit and narrowed at the body whorl. Protoconch of 4 whorls, tapering to the summit, bearing 2 spiral keels with crossed fine axial threads. Mature whorls 7, suture narrowly grooved and encircled by a fine supra-sutural thread. Sculpture of 3 rows of granules, each row almost equal-sized even in the early whorls, but median one slightly smaller than the other two; granules large, round, connected by broad axial columns and spiral costae which are finely latticed, forming fine square hollows, apart from each other by about half of its diameter and 18 to a whorl. Body whorl has 2 more rows of granules, viz. fourth row encircles the periphery and smaller than upper 3 rows, fifth slender

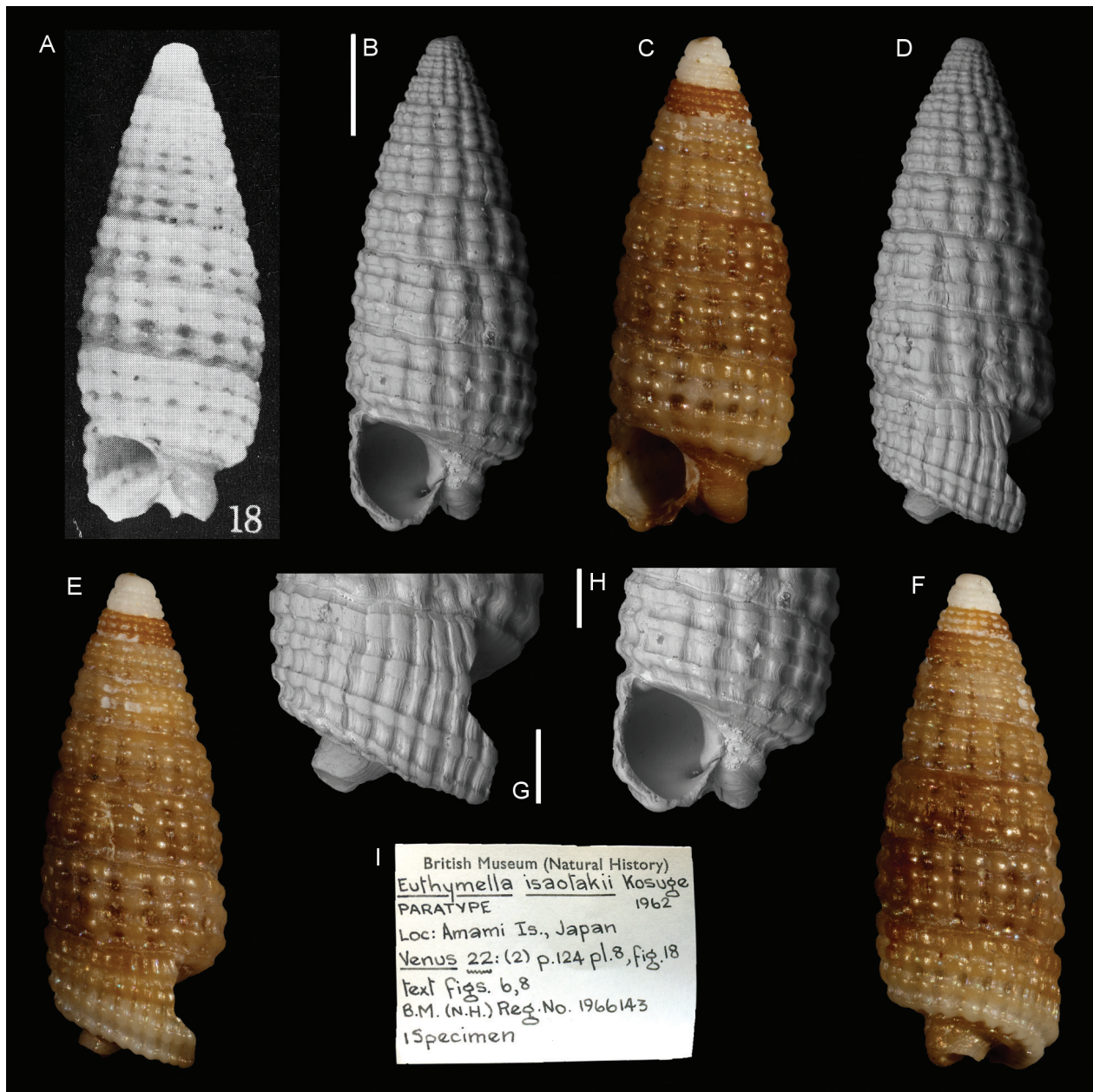


Figure 54. *Euthymella isaotakii* Kosuge, 1962, Amami Islands, Japan. **A** Original figure. **B–H** Paratype, NHMUK 1966143: front (**B**, **C**), side (**D**, **E**), back (**F**), peristome (**G**), aperture (**H**). **I** NHMUK label. Scale bars: **B–F**: 1 mm; **G**, **H**: 0.5 mm.

row on the base. Anterior canal somewhat elongated and recurved backward, posterior canal forming a deep sinus, shell aperture somewhat extended forward. Colouration slate purple, antepenultimate whorl pale or whitish, anterior canal orange yellow.

Shell length: 4.8 mm.

Remarks: This species is distinguished by its inflated spindle-form, sculpture and colouration, and closely related to *N. lucidulus* (Hervier), though differs in its shell shape and protoconch which is marked by double spiral keels in contrast to a single keel of the latter species, and also differs from *N. amoena* (Hervier) in its coloration and shell size. This species is dedicated to Prof. Iwao Taki of the Hiroshima University, who is kind enough to read my manuscript with valuable advices.

***Notosinister kawamurai* Kosuge, 1962**

Figure 56

Notosinister kawamurai Kosuge 1962a: 81, pl. 10, fig. 3, text figs 5, 6.

Type locality. Ankyaba, Setouchi-machi, Amami Islands.

Type material. Holotype: TZM Mo. 13035 (fide Kosuge 1962a; not seen, illustrated in Higo et al. 2001: 50, G1661s). Paratype: NHMUK 1966138: 1 specimen, Amami Islands, Japan.

Original description. Shell small, conical, tapering to the summit, lower part of spire somewhat cylindrical. Protoconch pale brown, with a single spiral keel and

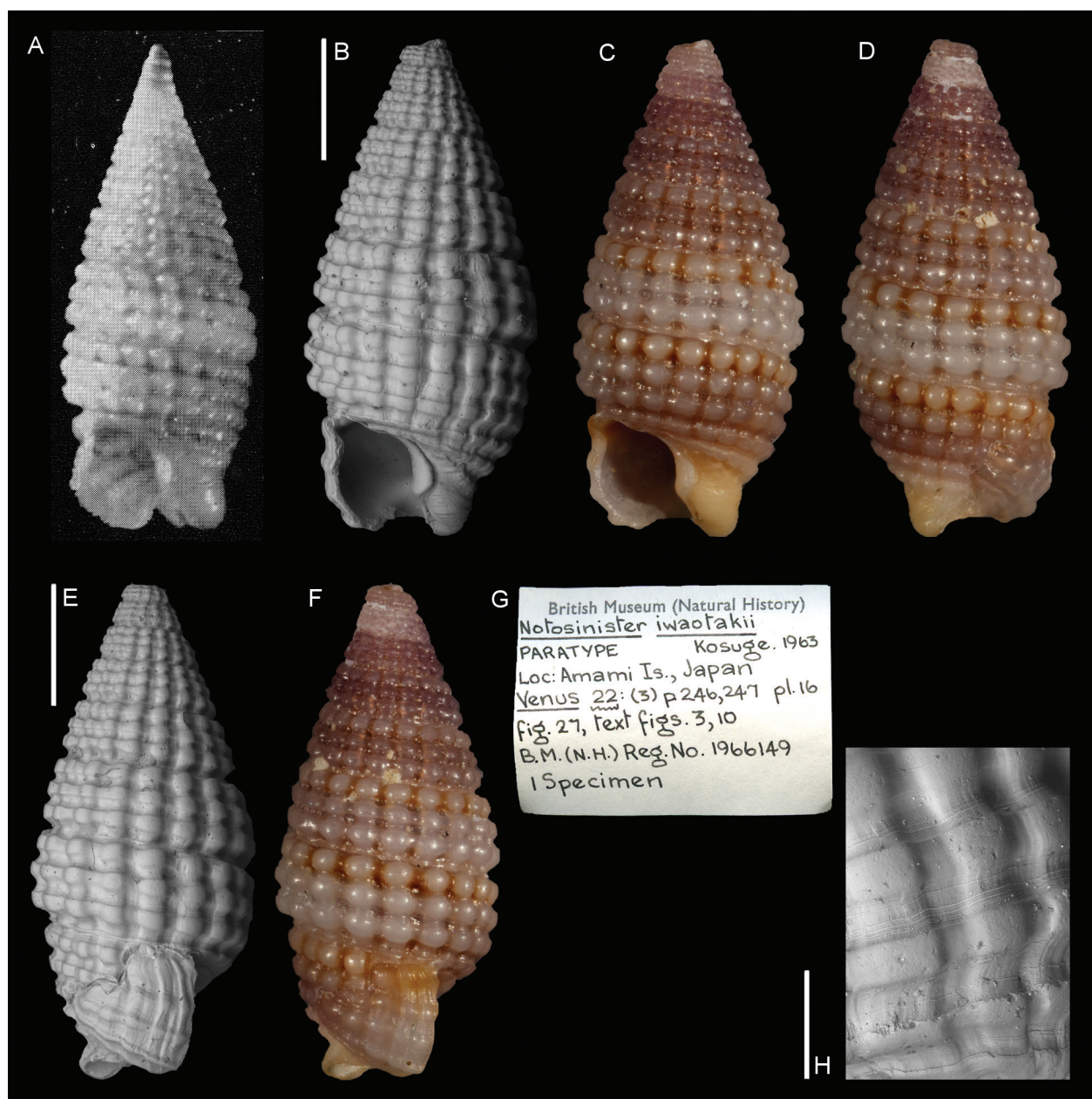


Figure 55. *Notosinister iwaotakii* Kosuge, 1963, Amami Islands, Japan. A Original figure. B–F, H Paratype, NHMUK 1966149: front (B, C), back (D), side (E, F), microsculpture (H). G NHMUK label. Scale bars: B–F: 1 mm; H: 0.3 mm.

crossed axial threads, mature whorls 10 or more, suture well defined with a supra-sutural thread. Sculpture 3 rows of granules, median row rapidly turns to a spiral thread at its earlier whorls. Colour pattern distinctive, upper row of granules and suprasutural thread reddish brown, remainder white, other 2 spiral colour bands on the body whorl. Granules small, somewhat squarish, apart by half of its diameter and 22 to a whorl. Each granule connected with slightly oblique, fine axial columns and faint spiral threads. Fourth row of granules encircles on the periphery of the body whorl and coloured reddish brown, fifth on the base, slightly granulated and also stained reddish brown, and sixth on the anterior canal, smooth. Anterior canal straight.

Shell length: 6.0 mm.

Remarks: This species is closely related to *N. sardonix* (Laseron) and *Cautor albozonatus* (Laseron), though differs from the former in having a distinct sutural groove and a supra-sutural thread, and from the latter in its protoconch and sculpture of body whorl, and also distinguished from *T. regina* Hedley in its colour pattern.

Isotriphora kurodai Kosuge, 1962

Figure 57

Isotriphora kurodai Kosuge 1962a: 84–85, pl. 10, fig. 7, text figs 11, 19.

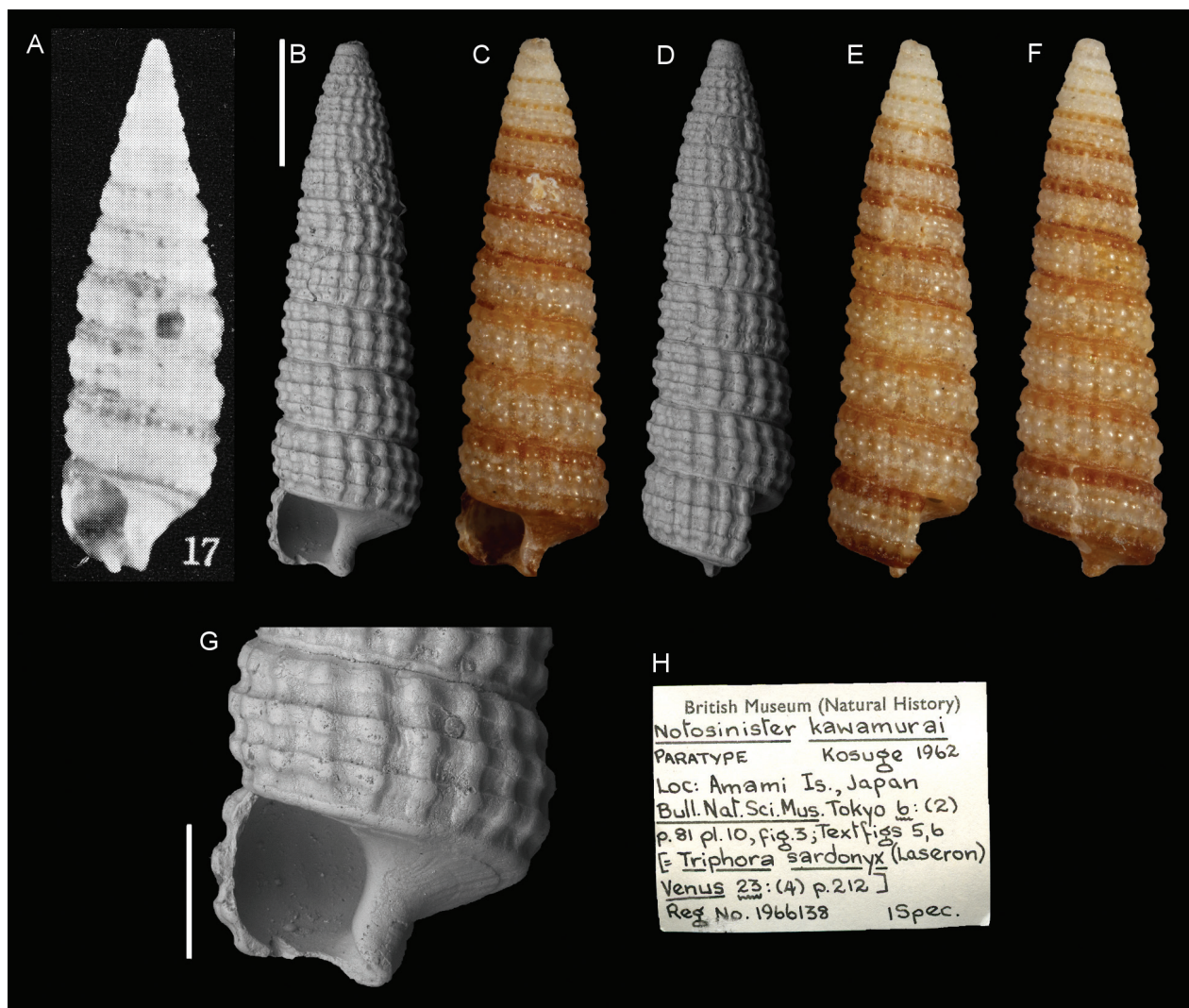


Figure 56. *Notosinister kawamurai* Kosuge, 1962, Amami Islands, Japan. **A** Original figure. **B–G** Paratype, NHMUK 1966138: front (**B**, **C**), side (**D**, **E**), back (**F**), aperture (**G**). **H** NHMUK label. Scale bars: **B–F**: 1 mm; **G**: 0.5 mm.

Type locality. Shirahama, Shimoda-machi, Shizuoka Prefecture, Central Japan.

Type material. Holotype: reported in the Dr. T. Kuroda collection (Kosuge 1962a) which is now in the Nishinomiya Shell Museum, Japan (not seen). Paratype: NHMUK 1966151: 1 specimen, Amami Islands, Japan.

Original description. Shell medium in size, conical, apex blunt, not narrowed at the base, somewhat conoidal rod in shape. Protoconch immersed at the summit, slightly appearing as a tip of the smooth nucleus. Mature whorls 13, with straight side, suture deep and widely channelled. Sculpture 3 rows of granules, each row equal in size at the lower two-third of the spire, median row diminished at the early whorls. Granules connected with both spiral keels and rather broad axial columns which are latticed with spiral keels, apart by about half

of its diameter and 22 to a whorl. On the body whorl, there are 3 smooth spiral keels on the periphery and base, anterior canal long and slightly recurved, aperture almost rounded. Colouration reddish brown and light brown in drifted materials.

Shell length: 7.4 mm.

Remarks: This species is easily recognized by its immersed protoconch, differing from *Is. tasmanica* (Ten-Wood) in its protoconch, of which the nucleus is slightly raised up, in contrast to the latter in which protoconch is completely immersed. This feature is taken natural as a generic character, therefore it may be necessary to give this species an appropriate subgeneric name.

This species is dedicated to Dr. Tokubei Kuroda of the Kyoto University, President of the Malacological Society of Japan, who is kind enough to help in both literature and material.

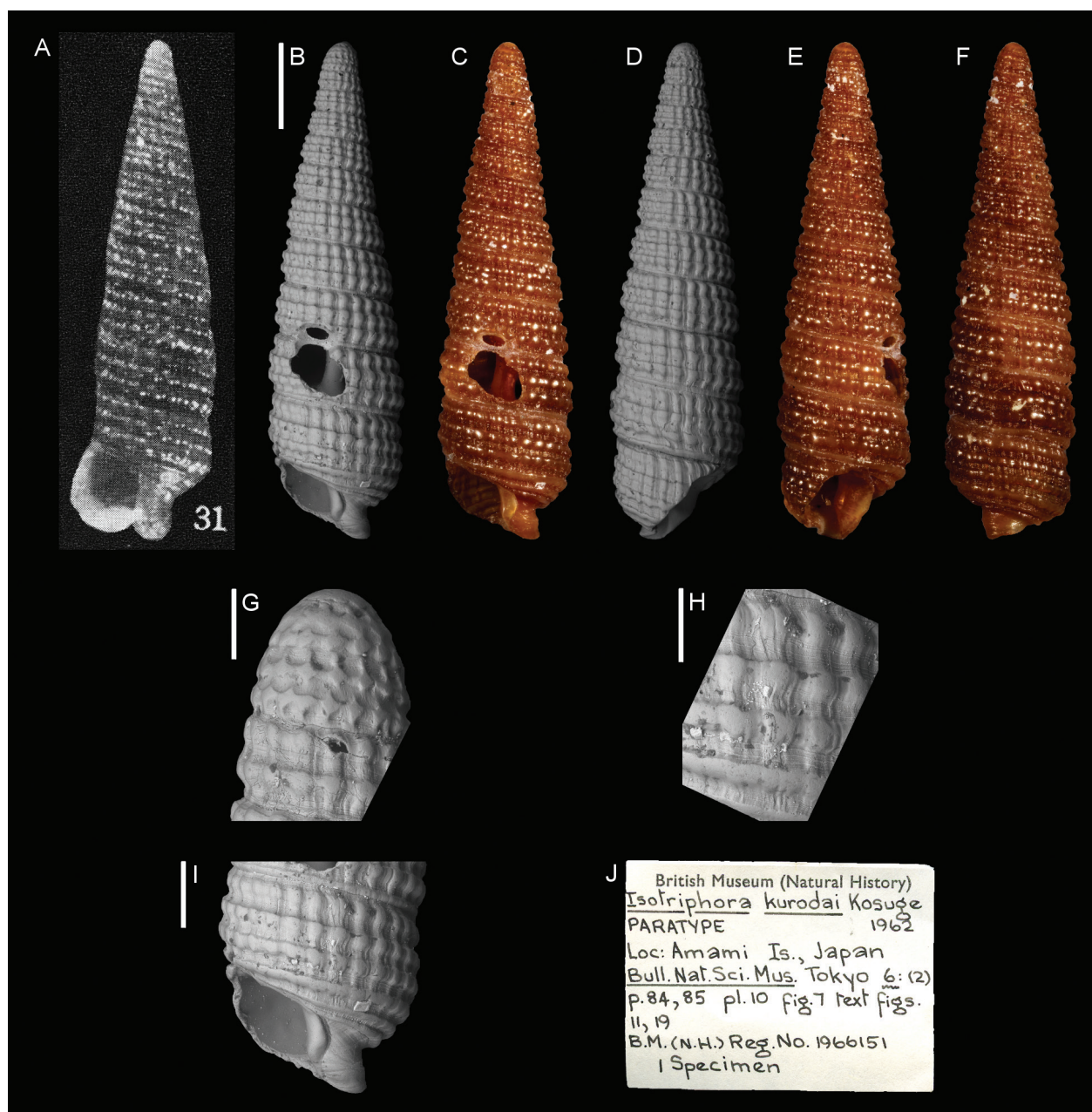


Figure 57. *Isotriphora kurodai* Kosuge, 1962, Amami Islands, Japan. **A** Original figure. **B–I** Paratype, NHMUK 1966151: front (**B**, **C**), side (**D**, **E**), back (**F**), protoconch (**G**), microsculpture (**H**), aperture (**I**). **J** NHMUK label. Scale bars: **B–F**: 1 mm; **G**: 0.2 mm; **H**: 0.3 mm; **I**: 0.5 mm.

Euthymella leucocephala Kosuge, 1963

Figure 58

Euthymella leucocephala Kosuge 1963b: 260–261, pl. 18, fig. 5, text figs 5, 8.

Type locality. Ankyaba, Setouchi-machi, Amami Islands.

Type material. Holotype: TZM Mo. 13064 (fide Kosuge 1963b; not seen, illustrated in Higo et al. 2001: 51, G1686). Paratype: NHMUK 1966139: 1 specimen, Amami Islands, Japan.

Original description. Shell medium in size, apex blunt, conical, somewhat inflated at the middle of the spire and slightly narrowed at the body whorl. Protoconch of a single whorl, mammillate and smooth. Mature whorl 9, each whorl convex and widely separated by a rather deep grooved suture, encircled by a fine supra-sutural thread. Sculpture consists of 3 rows of granules, median row somewhat larger than the others at the lower spire, equal in size at the early 2 or 3 whorls and rapidly diminished at its first whorl; each granule spirally elongate and well elevated from the crossing points of broad axial columns and spiral costae which are deeply latticed, apart

from each other by about its diameter and 14 to a whorl. On the body whorl, fourth row of granules encircles the periphery, the other 2 slender, smooth, spiral ridges the base and the anterior canal which is short and recurved backward. Protoconch and early 2 whorls white, remainder dark reddish brown.

Shell length: 6.8 mm.

Remarks: This species is easily distinguished by its protoconch, white apex and spirally elongated granules. It is somewhat related to *E. regalis* Jousseaume and *E. isaotakii* Kosuge, though differs in its protoconch, shell shape and colour-pattern, and also differs from *Notosinister atratus* Kosuge in its sculpture and protoconch.

***Cautor (Cautor) maculosus mcmichaeli* Kosuge, 1962**

Figure 59

Cautor (Cautor) maculosus mcmichaeli Kosuge 1962a: 85, pl. 10, fig. 8, text figs 7, 14.

Type locality. Ankyaba, Setouchi-machi, Amami Islands.

Type material. Holotype: TZM Mo. 13042 (fide Kosuge 1962a; not seen, illustrated in Higo et al. 2001: 51, G1745). Paratype: NHMUK 1966150: 1 specimen, Amami Islands, Japan.

Original description. Shell rather small, conical, lower spire somewhat cylindrical, not narrowed at the base. Protoconch of 3 whorls, apex blunt, second and third whorls have a single spiral keel overridden by axial threads, pure white in colour. Mature whorls 9, suture distinct as a deep groove with a fine supra-sutural thread. Sculpture 3 rows of granules, upper row largest, median one diminished and gradually disappears on the early whorls, each granule almost rounded, connected by axial columns and fine spiral keels, beset close together and 23 to a whorl. On the body whorl, there are other 2 rows of granules and 1 smooth keel on the base, anterior canal broad and slightly recurved, aperture rounded. Irregularly variegated with opaque white, buff and chocolate, usually maculated white and chocolate, base chocolate.

Shell length: 6 mm.

Remarks: This subspecies is closely related to *C. maculosus* (Hedley) in sculpture, colour and the nature of protoconch, though it is much more slender than that species and its whorls are much more squarishly angulated at the base.

***Notosinister millepunctatus* Kosuge, 1962**

Figure 60

Notosinister millepunctatus Kosuge 1962a: 83, pl. 10, fig. 4, text figs 12, 17.

Type locality. Ankyaba, Setouchi-machi, Amami Islands.

Type material. Holotype: TZM Mo. 13038 (fide Kosuge 1962a; not seen, illustrated in Higo et al. 2001: 51, G1707). Paratype: NHMUK 1966144: 1 specimen, Amami Islands, Japan.

Original description. Shell medium in size, conical, acuminate at the summit, narrowed at the base. Protoconch turritid conical, 5 whorls with 2 spiral keels overridden by axial threads, dark brown in colour. Mature whorls 13, suture shallow and not distinct. Sculpture 3 rows of granules at the lower part of the spire, median one smaller than the others, and gradually turns to a thread as it ascends the spire and finally disappears at the early whorls. Granules rather large, apart by half of its diameter and 18 or 20 to a whorl, connected both spirally and axially with each other. On the body whorl, fourth row of granules on the periphery and another spiral keel on the base, anterior canal short and strongly recurved backward. Colouration is white or pale brown with numerous irregular dark brown spots.

Shell length: 6.8 mm.

Remarks: This species is closely related to *T. dolicha* (Watson) and *T. turricula* (Hervier), though differs in having a protoconch with 2 spiral keels in contrast to 1 keel of the latter two species, and also differs in shell shape.

***Notosinister rufotinctus* Kosuge, 1963**

Figure 61

Notosinister rufotinctus Kosuge 1963a: 249, pl. 16, fig. 26, text figs 6, 7.

Type locality. Ankyaba, Setouchi-machi, Amami Islands.

Type material. Holotype: TZM Mo. 13065 (fide Kosuge 1963a; not seen, illustrated in Higo et al. 2001: 51, G1719). Paratype: NHMUK 1966146: 1 specimen, Amami Islands, Japan.

Original description. Shell rather small, somewhat spindle-form, tapering to the summit and narrowed at the base. Protoconch conical, acuminate, of 5 whorls, keeled by a single carina with crossed fine axial threads. Mature whorls 10, suture distinct and grooved in somewhat deep channel. Sculpture consists of 3 rows of granules; middle row slender, about half as large as the other two rows, turns to a thread and disappears at the early 3 or 4 whorls; upper and lower rows large and equal in size. Granules almost round, connected by broad axial columns and spiral keels which are regularly latticed, interspaces between them squarely excavated, apart from each other by about half of its diameter and 21 to a whorl. Body whorl has 5 rows of granules, upper-most row largest, next 2 rows nearly equal in size and about half as large as the upper one, fourth row on the periphery and fifth one

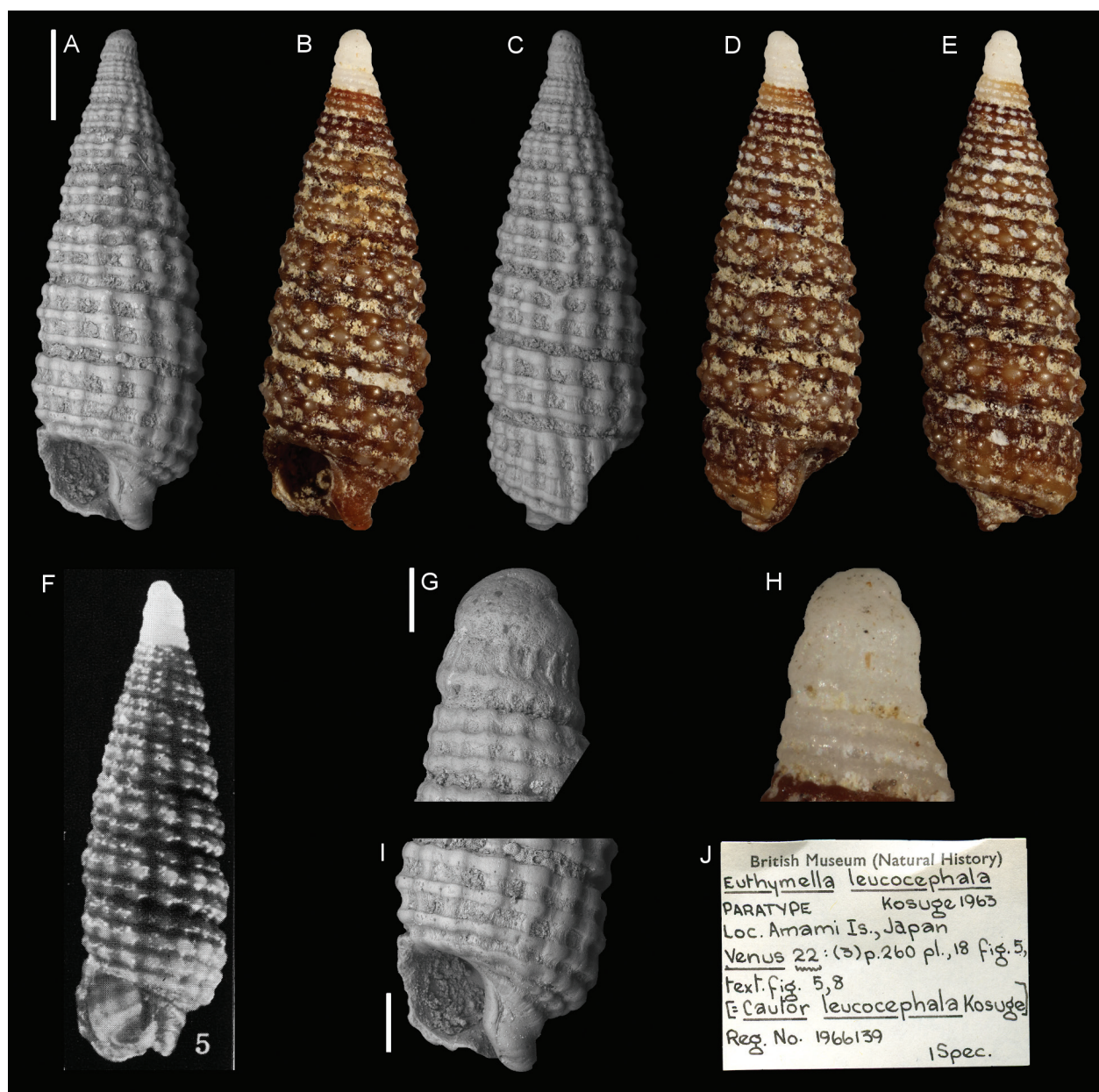


Figure 58. *Triphora leucocephala* Kosuge, 1963, Amami Islands, Japan. A–E, G–I Paratype, NHMUK 1966139: front (A, B), side (C, D), back (E), protoconch (G, H), aperture (I). F Original figure. J NHMUK label. Scale bars: A–E: 1 mm; G, H: 0.2 mm; I: 0.5 mm.

on the base more slender than the others. Anterior canal rather short and slightly recurved backward. Colouration olive ochre, tinted among the granules underside of lower spiral keel of each whorl with deep reddish brown and protoconch chocolate.

Shell length: 5.2 mm.

Remarks: This species is distinct by its spindle form and colouration, and somewhat related to *Triphora clemens* (Hinds), though differs in its sculpture.

***Mastonia squalida* Kosuge, 1962**

Figure 62

Mastonia squalida Kosuge 1962b: 126–127, pl. 8, fig. 19, text figs 12, 13.

Type locality. Ankyaba, Setouchi-machi, Amami Islands.

Type material. Holotype: TSM Mo. 12253 (fide Kosuge 1962b; not seen, illustrated in Higo et al. 2001: 51, G1695). Paratype: NHMUK 1966145: 1 specimen, Amami Islands, Japan.

Original description. Shell of medium size, conical, tapering to the summit and narrowed at the base. Protoconch with 2 spiral keels crossed with many axial threads. Mature whorls 12, suture not clear. 2 rows of granules beset in the upper and lower parts of each whorl, a fine spiral thread encircles upper part of its interstices and shell covered with many fine scale-like

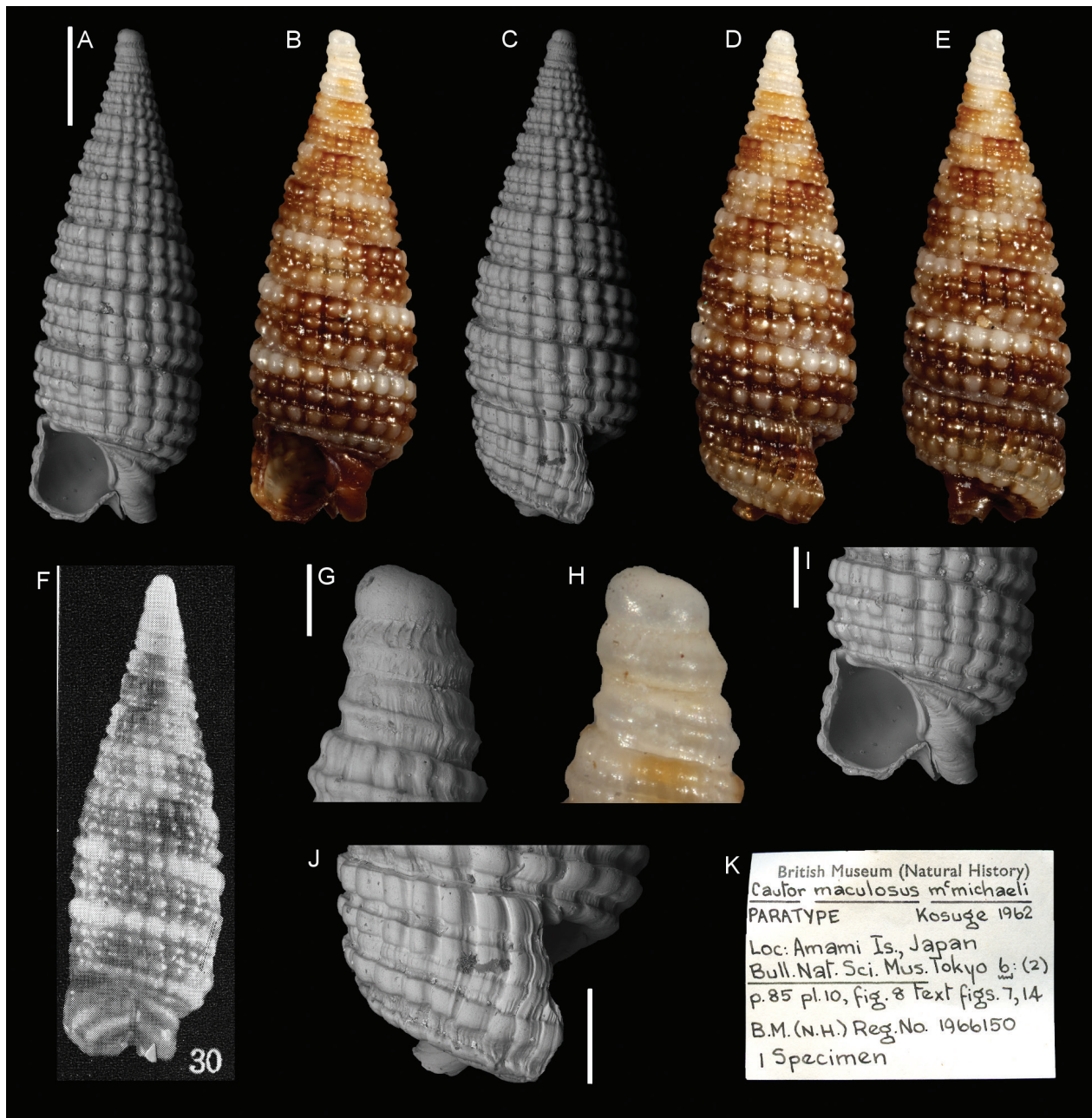


Figure 59. *Notosinister maculosus macmichaeli* Kosuge, 1962, Amami Islands, Japan. A–E, G–J Paratype, NHMUK 1966144: front (A, B), side (C, D), back (E), protoconch (G, H), aperture (I), peristome (J). F Original figure. K NHMUK label. Scale bars: A–E: 1 mm; G, H: 0.2 mm; I–J: 0.5 mm.

sculpture. Granules large and equal-sized, 16 to a whorl. Protoconch brown, early 4–5 whorls white, remainder dull reddish violet.

Shell length: 6.5 mm.

Remarks: This species is allied to *M. squamosa* in shell feature and sculpture, though differs from it in colour pattern and also from *T. albogranosa* in shell feature, details of sculpture and colour pattern.

Inella subfenestra Kosuge, 1962

Figure 63

Inella subfenestra Kosuge 1962b: 123, pl. 8, fig. 12, text fig. 1–2.

Type locality. Ankyaba, Setouchi-machi, Amami Islands.

Type material. Holotype: TSM Mo. 12125 (fide Kosuge 1962b; not seen, illustrated in Higo et al. 2001: 51, G1678 as *I. subfenestrata*). Paratype: NHMUK 1966148: 1 specimen, Amami Islands, Japan.

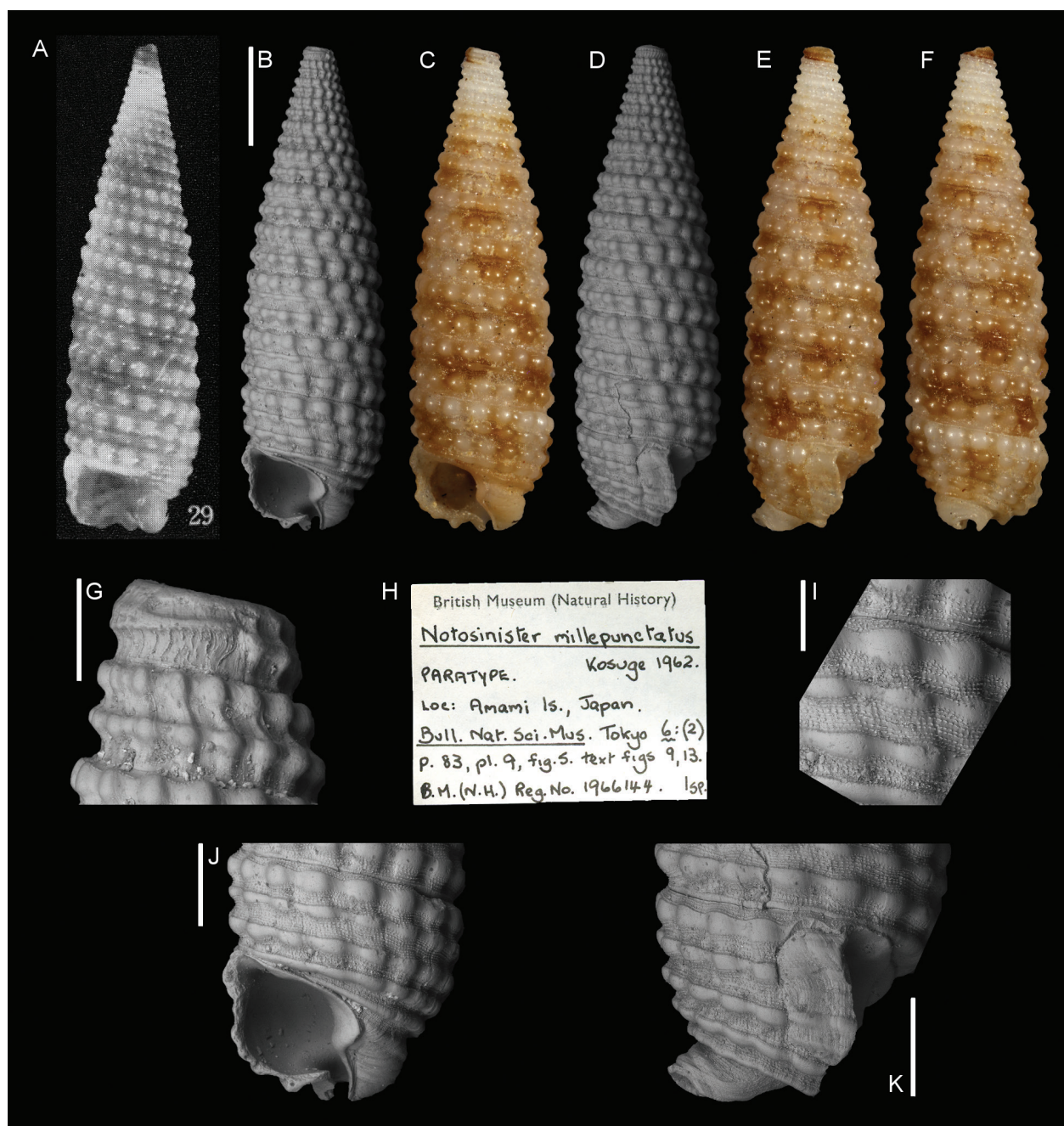


Figure 60. *Notosinister millepunctatus* Kosuge, 1962, Amami Islands, Japan. A Original figure. B–G, I–K Paratype, NHMUK 1966144: front (B, C), side (D, E), back (F), protoconch (G), microsculpture (I), aperture (J), peristome (K). H NHMUK label. Scale bars: B–F: 1 mm; G–I: 0.2 mm; J, K: 0.5 mm.

Original description. Shell large, slender with straight side. Colour of protoconch light brown, remainder purplish pink. Protoconch of 4 whorls, nucleus dome-shaped, each whorl has 2 spiral keels overridden by axial threads.

Mature whorls 16, suture not clear and has a fine supra-sutural thread. Sculpture of 3 rows of granules, latticed by spiral costae and axial columns, upper row more slender, and nearly equal-sized on the body whorl. Granules spirally elongate, each granule apart from each other by about its diameter and 19 to a

whorl. Supra-sutural thread becomes the fourth row of granules on the edge of body whorl and also fifth and sixth slender rows slightly appear on the interstices of main rows at the body whorl, two extra spiral costae at the base of body whorl and faintly granulated. Anterior canal not closed.

Shell length: 9.5 mm.

Remarks: This species is closely related to *T. episcopalis* (Hervier) in colour pattern, though in the latter species the median row of granules is diminished on the



Figure 61. *Notosinister rufotinctus* Kosuge, 1963, Amami Islands, Japan. A–E, G, I, J Paratype, NHMUK 1966146: front (A, B), side (C, D), back (E), protoconch (G), aperture (I), peristome (J). F Original figure. H NHMUK label. Scale bars: A–E, I, J: 0.5 mm; G: 0.2 mm.

penultimate whorl and gradually turns to spiral thread in contrast with the former's upper row, and somewhat like *T. nocturna* Hedley, though this new species differs in sculpture of both protoconch and mature whorls. Also this species is distinguished from *T. xystica* (Jousseume), *T. verrucosa* and *T. marginata* (Laseron) in details of sculpture and colour pattern.

Notosinister tessellatus Kosuge, 1963

Figure 64

Notosinister tessellatus Kosuge 1963a: 243 and 245, pl. 16, fig. 28, text fig. 4.

Type locality. Ankyaba, Setouchi-machi, Amami Islands.

Type material. Holotype: TSM Mo. 13070 (fide Kosuge 1963a; not seen, illustrated in Higo et al. 2001: 51, G1723). Paratype: NHMUK 1966147: 1 specimen, Amami Islands, Japan.

Original description. Shell of medium in size, conical, tapering to the summit, lower part of spire cylindrical. Protoconch with 2 spiral keels and many axial threads. Mature whorls 12, suture distinct as a rather prominent channel. Sculpture consists of 3 rows of granules,

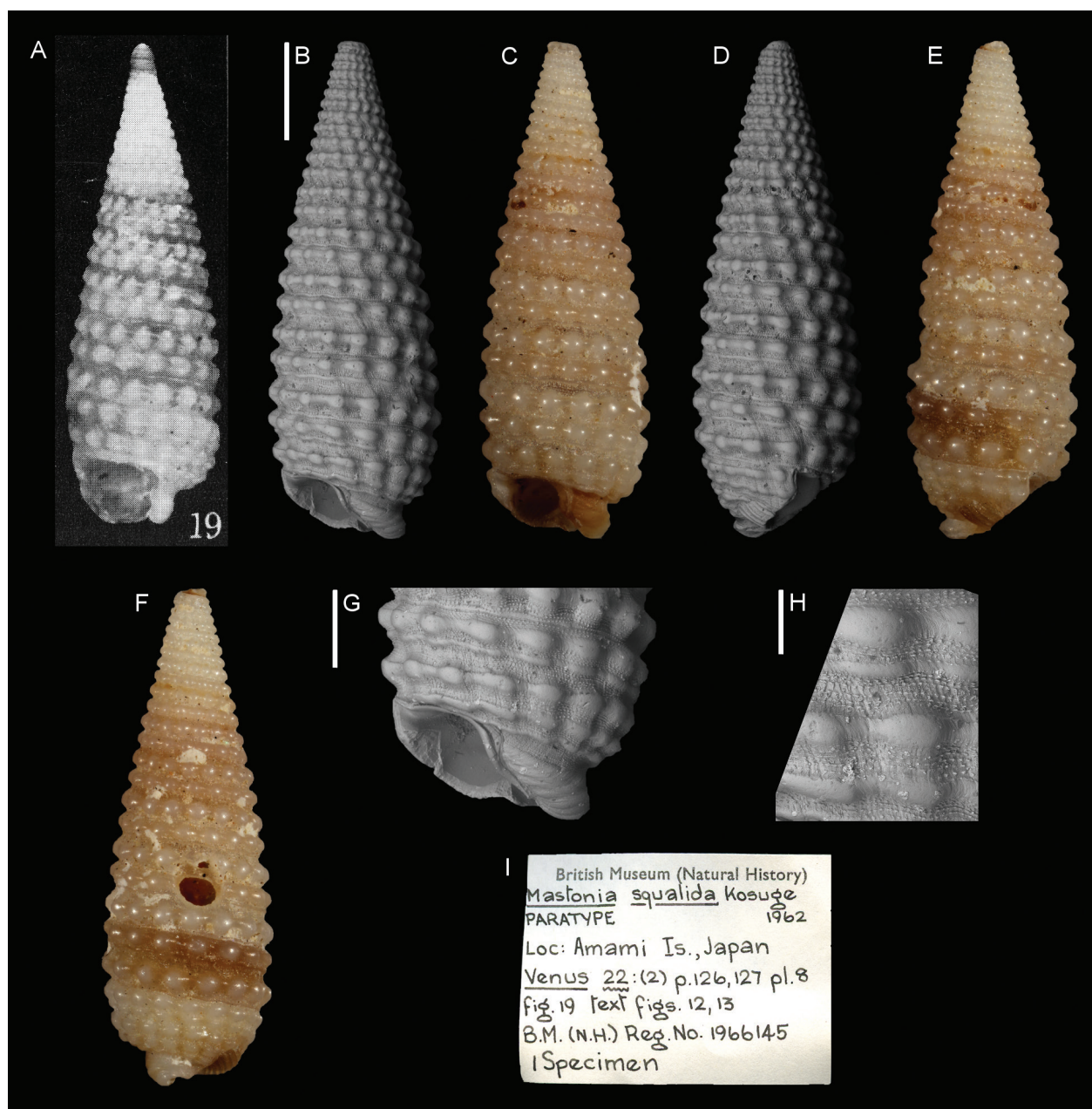


Figure 62. *Mastonia squalida* Kosuge, 1962, Amami Islands, Japan. A Original figure. B–H Paratype, NHMUK 1966145: front (B, C), side (D, E), back (F), aperture (G), microsculpture (H). I NHMUK label. Scale bars: B–F: 1 mm; G: 0.5 mm; H: 0.2 mm.

upper and lower rows large and equal in size, median row becoming nearly equal to the others on the body whorl and gradually turns to spiral thread as it ascends the spire. Granules small, well rounded, beset close together and 20 to a whorl, connected with oblique axial columns and weak spiral threads. On the body whorl, fourth row of granules encircles the periphery and fifth row the base. Anterior canal strongly recurved backward and encircled by a smooth spiral keel. Colouration of protoconch brown, mature whorl white with squarish brown piltches.

Shell length: 6.5 nun.

Remarks: This species somewhat likes *N. quadrimaculatus* (Hervier), though differs in colour pattern and shell shape, and also differs from *Triphora maculosus* Hedley and *Triphora ampulla* Hedley in colour pattern and protoconch, from *Triphora dolicha* (Watson) in its sculpture of protoconch.

Species described by B.A. Marshall

Bruce A. Marshall described 21 species of Triphoridae, most of them in his seminal work on South Australian species (1983). In the NHMUK, the paratype of a single species is deposited: *Metaxia kermadecensis*.

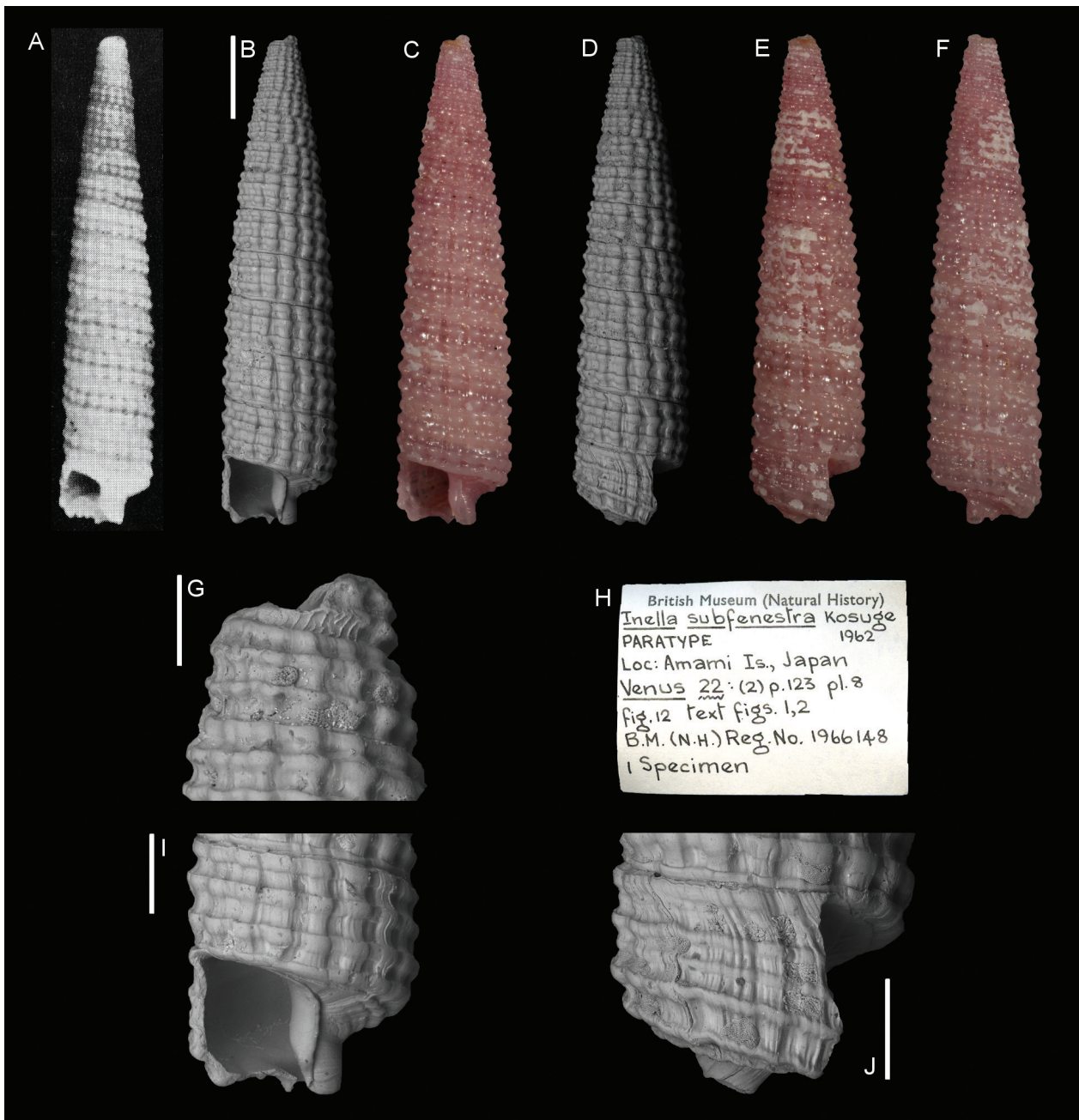


Figure 63. *Inella subfenestra* Kosuge, 1962, Amami Islands, Japan. A Original figure. B–G, I, J Paratype, NHMUK 1966148: front (B, C), side (D, E), back (F), protoconch (G), aperture (I), peristome (J). H NHMUK label. Scale bars: B–F: 1 mm; G: 0.2 mm; I, J: 0.5 mm.

Metaxia kermadecensis Marshall, 1977

Figure 65

Metaxia kermadecensis Marshall 1977: 116–117, figs 2D–F, H.

Type locality. Raoul (Sunday) Island, Kermadec Islands.

Type material. Holotype: MNZ MF 25922 (fide Marshall 1977; not seen). Paratypes: NHMUK 197844: 1 specimen, Sunday Island, Kermadec Islands; additional 19 specimens in AMS and USNM (fide Marshall 1977; not seen).

Species described by J.C. Melvill

James C. Melvill described five species of Triphoridae: *Triphora* (*Mastonia*) *coetiviensis* Melvill, 1909, *T. concatenata* Melvill, 1904, *T. incolumis* Melvill, 1918, *T. interpres* Melvill, 1918 and *T. persica* Melvill, 1918 from various localities. We found in the NHMUK type material of the first four. Syntypes of *T. persica* are in NMW (Trew 1987). Because large sets of syntypes are stored in the NMW, we refrained from selecting lectotypes pending their inspection.



Figure 64. *Notosinister tessellatus* Kosuge, 1963, Amami Islands, Japan. **A** Original figure. **B–H** Paratype, NHMUK 1966147: front (**B**, **C**), side (**D**, **E**), back (**F**), aperture (**G**), peristome (**H**). **I** NHMUK label. Scale bars: **B–F**: 1 mm; **G**, **H**: 0.5 mm.

***Triphora (Mastonia) coetiviensis* Melvill, 1909**

Figure 66

Triphora (Mastonia) coetiviensis Melvill 1909: 90, pl. 5, fig. 8.

Type locality. “Coetivy I.” (Coëtivy Island, Seychelles).

Type material. Lectotype: NHMUK 1910.3.17.1 (lectotype selection by inference of holotype by Trew (1987)).

Original description. *T. testa mediocri, compacta, solidula, pupoidea, cinereo-brunnea, versus apicem attenuata; anfractibus ad 14, quorum apicales ipsi duo asperi, albo-vitrei, quatuor his proximis duobus ordinibus tuberculatis, caeteris tribus, ultimo quinque spiraliter instructis, tuberculis rotundis, nitidis, albo-cinereis;*

apertura fere rotunda, labro crenulato, tenui, brunneo tincto, canali breviter rostrato.

Long. 13, lat. 4 mm.

Loc. Coetivy I.

An ashy-brown little *Triphora*, evenly spirally tubercled throughout with shining small gemmae, of a compact growth, attenuate towards the apex, otherwise robust; on the upper whorls the spiral rows are alternately straw-coloured and grey, the lower whorls, however, are of a uniform dull grey, the orifice being tinged with brown, as is the shortly beaked canal. From figures and descriptions this species must be near *T. funebris* Jous., from New Caledonia, and *T. intermedia* C.B. Ad., from the Antilles.

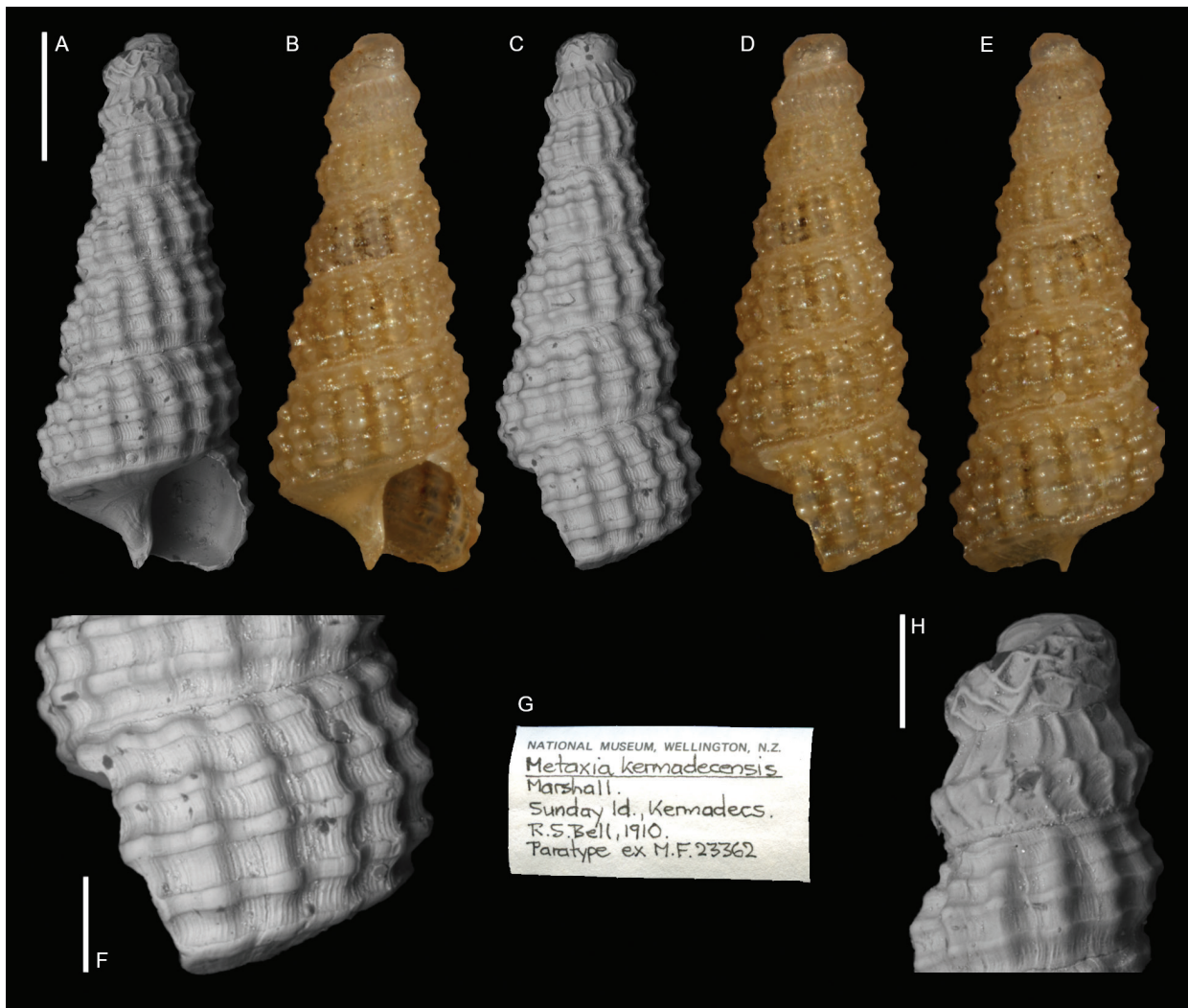


Figure 65. *Metaxia kermadecensis* Marshall, 1977, Sunday Island, Kermadec Islands. A–F, H Paratype NHMUK 197844: front (A, B), side (C, D), back (E), peristome (F), protoconch (H). G Original label. Scale bars: A–E: 0.5 mm; F, H: 0.2 mm.

Translation of the Latin text. Medium-sized shell, compact, rather solid, pupiform, brown-grey, narrowing towards its apex; up to 14 whorls, the two apical ones pointed, translucent white, the next four with two rows of tubercles, others with three rows and the last with five; bright, ash-white, round tubercles; aperture nearly rounded, crenulated brown thin lip, short bent anterior siphon.

Length 13 mm, width 4 mm.

Diagnosis. Lectotype 10.5 mm high. Shell cyrtocoid, with at least 12 teleoconch flat whorls that bear three spiral cords with tubercles at the intersection with arched axial ribs, a fourth suprasutural smooth cord is visible. The second spiral cord develops later but it is fully developed after one-third of shell height. Fine spiral threads and growth lines are present among the main elements of the sculpture. The peristome bears additional spiral cords and a shallow posterior sinus. Siphonal canal long; on the base, a fifth tuberculated spiral cord is present. Pro-

toconch missing. Teleoconch colour brown, with pearly tubercles and lighter background on the first spiral cord and on the siphonal canal; very first whorls white.

Remarks. Trew (1987) stated that this specimen is the holotype, but Melvill (1909) did not specify how many specimens he studied, nor we have found other evidence that the species was described on a single specimen.

Trifora concatenata Melvill, 1904

Figure 67

Trifora concatenata Melvill 1904: 162, pl. 10, fig. 9.

Type locality. “Gulf of Oman, lat. 24°58'N., long. 56°54'E., 156 fathoms”.

Type material. Syntypes: NHMUK 1905.7.14.32–4, 1 specimen (plus 2 belonging to another species, see Re-

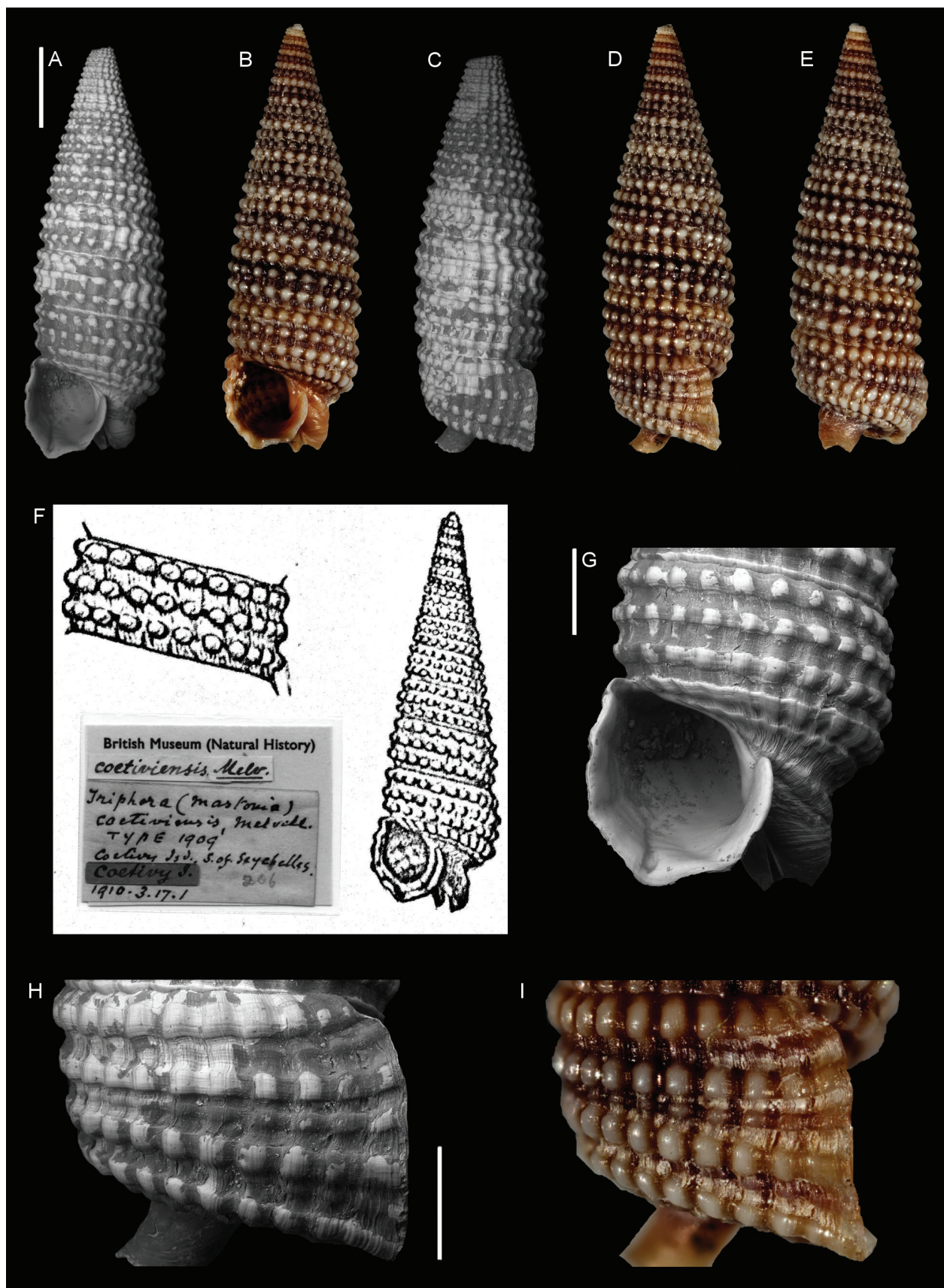


Figure 66. *Triphora coetiviensis* Melvill, 1909, Coëtivy Island, Seychelles. **A–E, G–I** Lectotype NHMUK 1910.3.17.1: front (**A**, **B**), side (**C**, **D**), back (**E**), aperture (**G**), peristome (**H**, **I**). **F** Original figures and labels. Scale bars: **A–E**: 2 mm; **G–I**: 1 mm.

marks), Gulf of Oman. Syntypes: NMW 1955.158.196, 18 specimens, Gulf of Oman (fide Trew 1987; not seen).

Original description. *T. testa pergracili, multum attenuata, albescente, albo-fusca, anfractibus ad 18, quorum apicales 4, ochracei, spiraliter unicarinati, arete et pulcherrime sub lente longitudinaliter lirati, liris sinuosis, caeteris rectis, suturis indistinctis, tribus gemmularum ordinibus concatenatis praeditis, gemmulis rotundis, nitentibus, ultimo anfractu quatuor ordinibus, circa basin angulato, apertura rotundo-ovata, labro simplice, canali brevi. Long. 5, lat. 1 mm., sp. max.*

A small, very gracefully attenuate species, white or whitish-drab, with ochreous apical whorls, these being once keeled spirally, the usual pattern being present on the remaining whorls of three rows of round, shining gemmae – four on the body-whorl, the lowest row being the largest; these spiral rows are more or less concatenate, leaving clear spaces between.

Translation of the Latin text. Very slender thin shell, whitish, white-brown, up to 18 whorls, four unicarinated ochraceous apical ones, with microscopical sinuous lirae then becoming straight, indistinct sutures, three rows of concatenated gemmulae which are round, bright; last whorl with four rows, angulated near the base, rounded-ovate aperture, simple lip, short anterior siphon. The largest specimen is 5 mm long, 1 mm wide.

Diagnosis. Syntype 5.6 mm high. Extremely slender shell with 14 flat teleoconch whorls bearing three spiral cords with tubercles at the intersection with prosocline axial ribs. The first spiral cord is smaller. The peristome is incomplete in the syntype, the siphonal canal appears short. On the base, three additional smooth cords are present. Protoconch incomplete, but clearly multispiral with the last three whorls bearing two spiral keels and axial riblets. Shell whitish.

Remarks. Lot NHMUK 1905.7.14.32–4 contains three shells belonging to two species. One shell clearly resembles the specimen figured by Melvill (1904) (NHMUK 1905.7.14.32, Fig. 67B–F), while the other two can be readily distinguished by one instead of two spiral keels on the protoconch (Fig. 67J) and the second spiral cord on the teleoconch appearing later than the other two (Fig. 67H, I); in the true *T. concatenata* all three spiral cords are present since the first teleoconch whorl. According to Trew (1987), the specimen shown in Figure 67B is the syntype figured by Melvill (1904). Therefore, upon inspection of the syntypes in NMW, it may be selected as lectotype.

Triphora incolumis Melvill, 1918

Figure 68

Triphora incolumis Melvill 1918: 149, pl. 4, fig. 18.

Type locality. Persian Gulf: Fao Cable (Fao was a small village at the confluence of Tigris and Euphrates).

Type material. Syntypes: NHMUK 1921.1.28.18–20, 3 specimens, Persian Gulf. Syntypes: NMW 1955.158.207, 13 specimens, Persian Gulf (fide Trew 1987; not seen).

Original description. *T. testa cylindrico-fusiformi, pallide straminea, solidula; anfractibus 16–17, quorum apicales 5 pulchre et minute longitudinaliter striati, paullum decussati, apice ipso laevi, deplanato, caeteris ad suturas profunde impressis, lateribus paullulum convexis, quatuor supernis bi-, his proximis triseriatis, ordinibus nodulato-gemmatis decoratis, ultimo anfractu serie quarta praedito, gemmis interdum versus basin evanidis, circa basin tribus liris succinctis; apertura quadrata, peristomate tenui, canali brevi, paullum recurvo.*

Long. 10, lat. 3 mm.

Hab. Persian Gulf; Fao Cable, and along the north coast; not rare.

A fine species, of pronounced character. Cylindro-fusi-form in shape, with channelled sutures, whorls (including the five nuclear, three of which are very finely striate) 16–17 in number, the lower whorls all ornamented with three equal spiral regular rows of gemmae, shining, round, large proportionately; the body-whorl possessing four, the lowest of them sometimes has the gemmae partly evanescent, the base being encircled with spiral plain ridges. Aperture somewhat squarrose, peristome thin, canal shortly recurved, pronounced. It may be compared with *T. rufula*, Watson, a somewhat smaller species * [footnote refers to: ‘Challenger’ Exp. xv. p. 566, pi. xlii. fig. 2] (long. 7.5 mm.) from Wednesday Island, Torres Straits. This is much of the same sculpture, with channelled suture, the shell being of a ruddy yellow tint throughout. It differs from *T. idonea*, M. & St., not only in the channelled sutures and greater breadth of contour, but in the mouth being more contracted. We have seen a live albino form from Fao; in this the fourth row of noded gemmae at the periphery of the basal whorl is extremely distinct and perfect.

Translation of the Latin text. Rather solid, pale yellow cylindro-fusiform shell; 16–17 whorls, the five apical ones with faint nice longitudinal striae, slightly decussated, the apex is delicate, rather flat; next whorls with deep sutures, a little convex; four apical whorls with two spiral cords, the next with three series of nodose gemmules, four in the last whorl with vanishing gemmules near the base which bears three smooth spiral cords; quadrate aperture, thin peristome, lightly recurved short anterior siphon.

Length 10, width 3 mm.

Diagnosis. Syntypes between 7.5 and 8.4 mm high. Shell conical with 12 whorls bearing three spiral cords with tubercles at the intersection with orthocline axial ribs. The second spiral cord appears on the sixth whorl and becomes quickly as strong as the others. A smooth suprasutural cord is also visible. Growth lines are present. The peristome bears additional, although short, spiral cords and a shallow posterior sinus. The siphonal canal is short. On the base, the fourth cord is tuberculated and

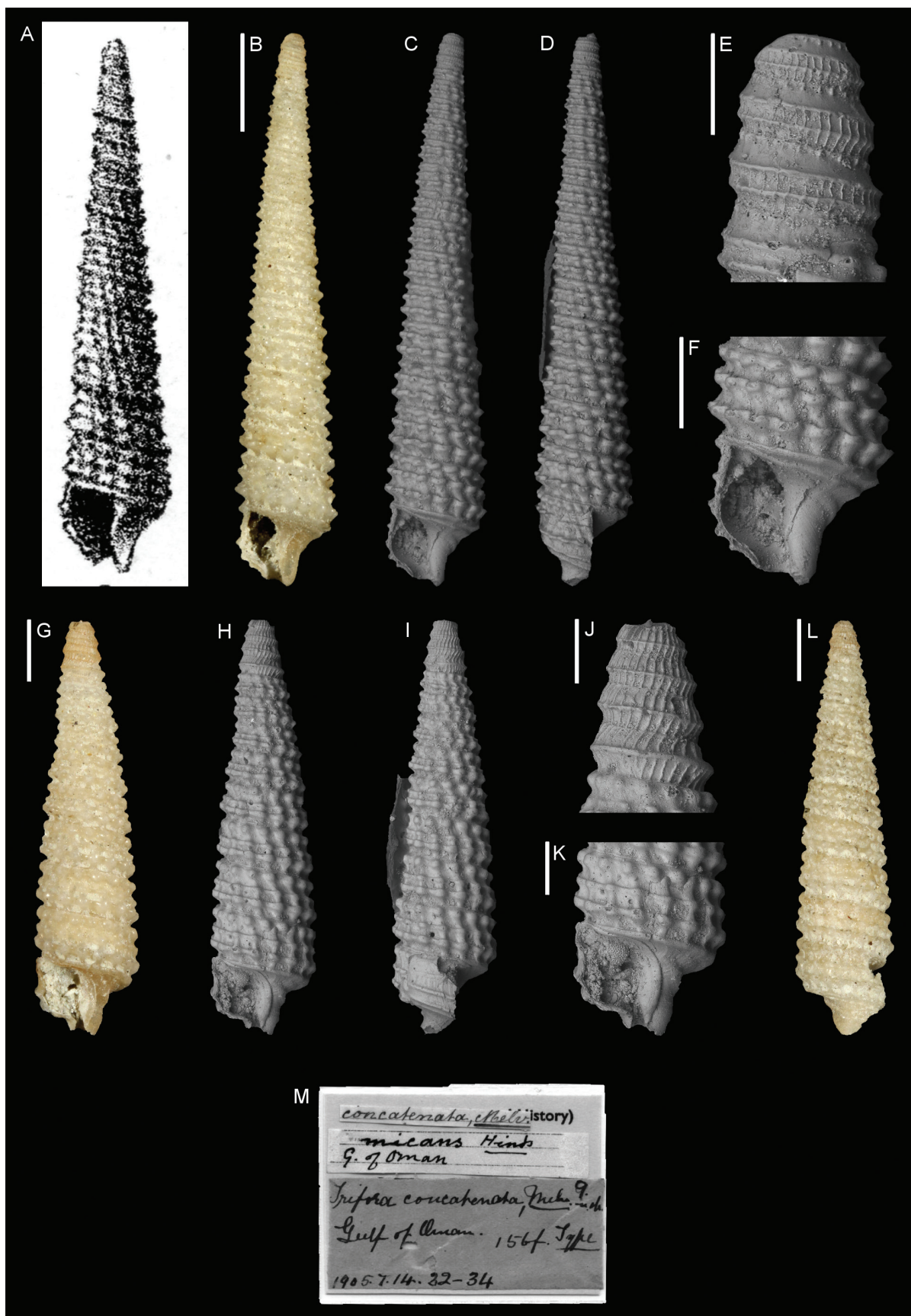


Figure 67. *Triphora concatenata* Melvill, 1904. A Original figure. B–F Syntype NHMUK 1905.7.14.32: front (B, C), side (D), protoconch (E), aperture (F). G–K *Triphora* sp. (not *concatenata*), NHMUK 1905.7.14.33, Gulf of Oman: front (G–H), side (I), protoconch (J), aperture (K). L *Triphora* sp. (not *concatenata*), NHMUK 1905.7.14.34, Gulf of Oman: side. M Original labels. Scale bars: B–D: 1 mm; F–I, L: 0.5 mm; E, J: 0.2 mm; K: 0.3 mm.

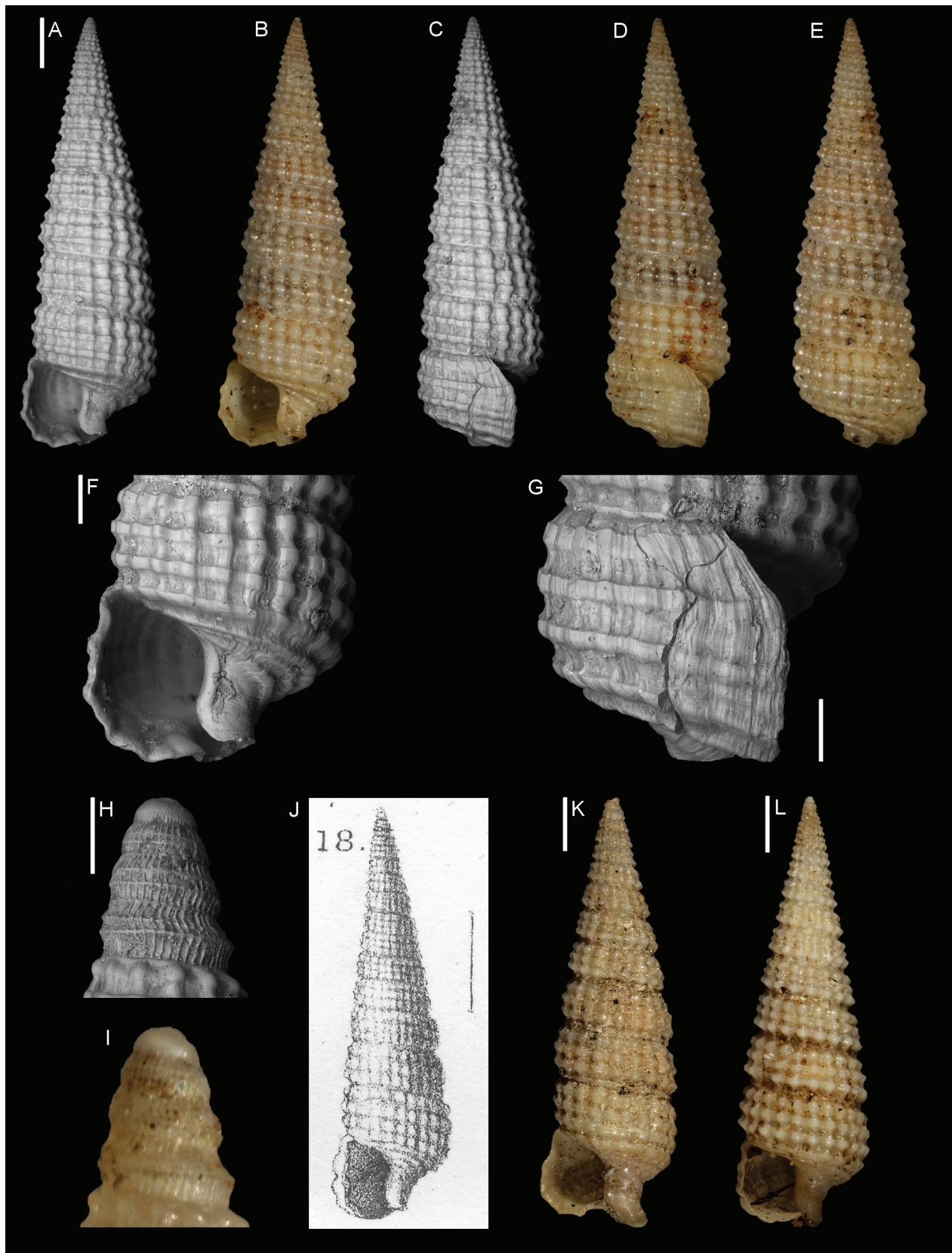


Figure 68. *Triphora incolumis* Melvill, 1918, Persian Gulf, Fao Cable. A–I Syntype NHMUK 1921.1.28.18: front (A, B), side (C, D), back (E), aperture (F), peristome (G), protoconch (H, I). J Original figure. K, L Syntypes NHMUK 1921.1.28.19–20: front views. Scale bars: A–E, K, L: 1 mm; F–G: 0.5 mm; H, I: 0.2 mm.

three more smooth cords are visible. The multispiral protoconch has four whorls: the first has abapically short axial riblets but it is too worn to be properly described, the other three have two spiral keels and axial riblets. Shell dirty white, with lighter tubercles.

Remarks. According to Trew (1987), lot NHMUK 1921.1.28.18–20 contains the specimens figured by Melvill (1918). Therefore, upon inspection of the syntypes in NMW, a lectotype may be selected.

Triphora interpres Melvill, 1918

Figure 69

Triphora interpres Melvill 1918: 150, pl. 5, fig. 23.

Type locality. “Persian Gulf, Mussandam, 55 fms” (Musandam, Oman).

Type material. Syntypes: NHMUK 1921.1.28.26, 1 specimen, Musandam, Oman. Syntypes: NMW 1955.158.208, 4 specimens, Musandam, Oman (fide Trew 1987; not seen).

Original description. *T. testa elegantula attenuato-fusiformi, gracili, cinerea; anfractibus ad 20, quorum 5 apicales, apice ipso pallide fusco, laevi, his proximis pulchre cancellatis, ochraceo-fuscis, caeteris leniter et anguste ad suturas impressis, lateribus fere rectis, tribus spirali-um gemmularum ordinibus arcte et regulariter praeditis, ordine medio minorum, superficie hic illic castaneo-tessellato, ultimo circa basin bilirato; apertura parva, semicirculari, canali conspicuo, brevi, recurvo.*

Long. 11, lat. 2.25 mm. (sp. max.).

Hab. Persian Gulf, Mussandam, 55 fathoms.

A rare species, very gracefully attenuate, many (20 or more) whorled, the apical being five in number, ochreous-brown and finely cancellate in young specimens, but soon getting worn, the remainder slightly impressed suturally, with three spiral bands of gemmuled nodules, those on either side of the sutures being the largest and most pronounced, the median row smaller; the body-whorl has but three gemmuled rows in all the examples we have examined, the fourth row, at the periphery, being a simple ridge. The colour is ashy-white, flecked with pale chestnut dashed over the whorls at certain intervals. Mouth small proportionately, semicircular; peristome thin, canal short, recurved.

Translation of the Latin text. Graceful light fusiform shell, slender, ash-grey; up to 20 whorls, of which 5 belong to the apex which is pale brown, smooth; the next whorls are finely cancellate and ochraceous brown; the others nearly straight, impressed at the sutures, with three spiral cords of regular gemmulated nodules, the middle one smaller; surface with brown spots, last whorl with two cords around the base; small semicircular aperture, remarkable, short bent anterior siphonal canal.

The largest specimen is 11 mm high, 2.25 mm wide.

Diagnosis. The studied syntype is 4 mm high. Shell conical, with nine teleoconch flat whorls with two main spiral cords with tubercles at the intersection with slightly prosocline axial ribs. A third fine thread appears around half teleoconch height between the two main cords and becomes a fully developed tuberculated cord only on the last whorl. A very fine smooth suprasutural cord is also visible and becomes a fully developed tuberculated cord on the last whorl too. The peristome is regrown after breakage in the syntype but the posterior sinus appears shallow. The siphonal canal is short. The base bears a fifth smooth cord. The protoconch is incomplete in the syntype but clearly multispiral. The last three whorls bear two main spiral keels and axial riblets. The teleoconch has a white background with orange-brown blotches. Siphonal canal and protoconch brown.

Remarks. There is a major discrepancy in size between this syntype (4 mm) and what stated in the original description (11 mm). Only the study of other syntypes will clarify the real identity of this taxon, because there are several species with this colour pattern which can be easily mixed together.

Species described by J.C. Melvill and R. Standen

James C. Melvill and Robert Standen described two species of Triphoridae: *T. excelsior* Melvill & Standen, 1899 and *T. idoneus* Melvill & Standen, 1901. Types of both species are present in the NHMUK. Because additional syntypes are present in the NMW and MSIM (Trew 1987), we refrain from selecting any lectotypes pending their inspection.

Triforis (Ino) excelsior Melvill & Standen, 1899

Figure 70

Triforis (Ino) excelsior Melvill and Standen 1899: 166, pl. 10, fig. 5.

Type locality. Torres Strait.

Type material. Syntypes: NHMUK 1899.2.23.18, 1 specimen, Torres Strait. Syntypes: NMW 1955.158.204, 1 specimen, Torres Strait and MSIM, 4 specimens, Torres Strait (fide Trew 1987; not seen).

Original description. *T. testa producta, multum attenuata, angusta, brunnea, hic illic rufo-maculata; anfractibus quinque- vel sex-et-viginti, tornatis, apud suturas elevatis, transversim arcte tricarinatis, laevibus; carina infra, juxta suturas, minore, duabus alteris magis conspicuis, interstitiâ interveniente planata, ultimo anfractu quadricarinato, carina bina ad peripheriam addita; apertura rotunda, parva, canali breviter recurvirostri, in uno specimine pone aperturam ipsam clausa. Long. 30, lat. 5 (sp. maj.) mm.*

Four or five, mostly imperfect, examples. The form is much acuminate and attenuate, narrow; colour light brown, here and there indistinctly flecked with rufous

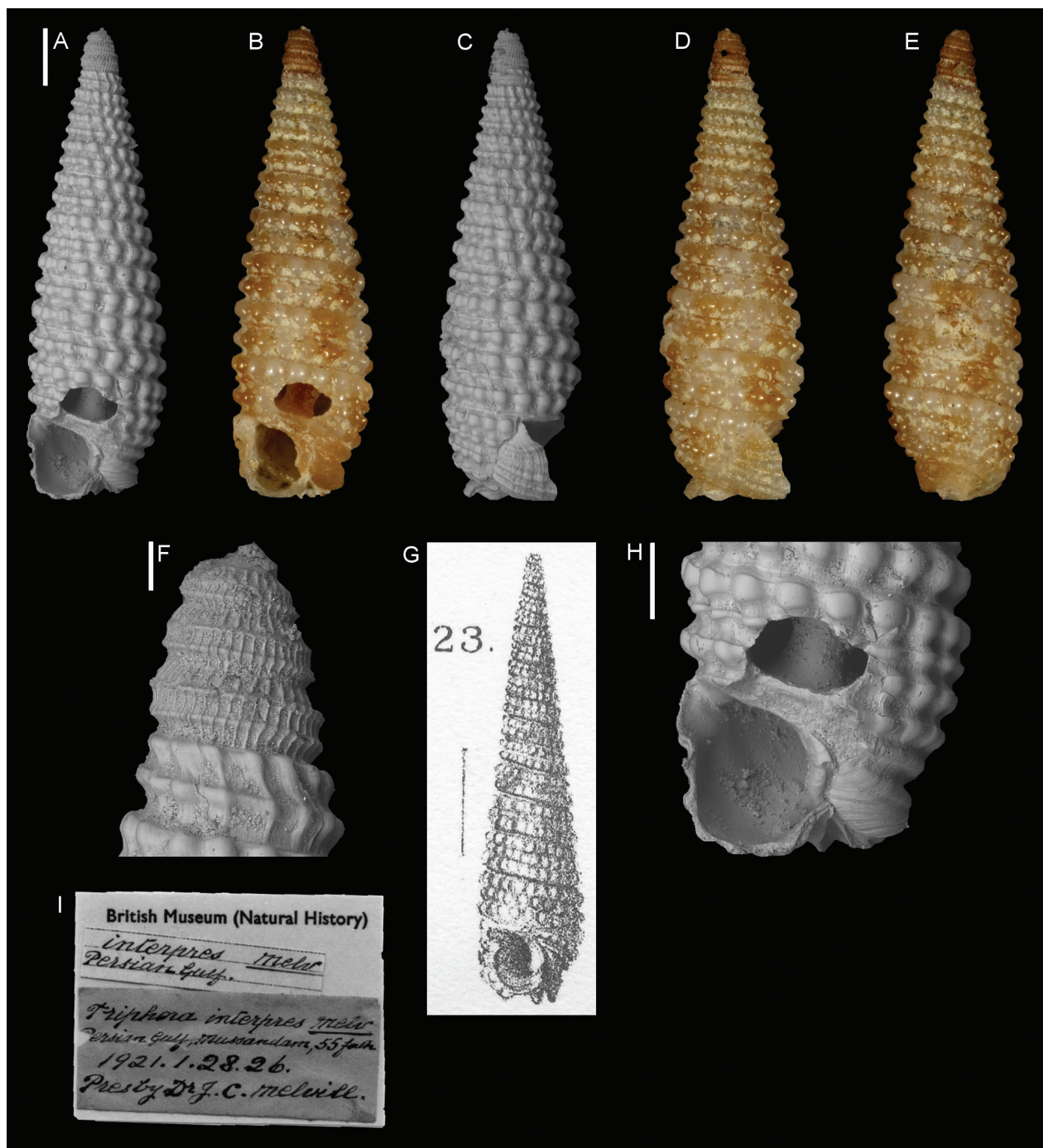


Figure 69. *Triphora interpres* Melvill, 1918, Musandam, Oman. **A–F, H** Syntype NHMUK 1921.1.28.26: front (**A, B**), side (**C, D**), back (**E**), protoconch (**F**), aperture (**H**). **G** Original figure. **I** Original label. Scale bars: **A–E**: 0.5 mm; **F**: 0.1 mm; **H**: 0.3 mm.

spotting; whorls 25 or 26, tornate, smooth, elevated at the sutures, closely thrice-keeled transversely, the keel just below the sutures is smaller and less conspicuous than the two lower, the last whorl is four-keeled, there being two on the periphery; the aperture is roundish, small; in one (the most perfect) specimen the recurved and beaked canal is closed with shelly matter behind the aperture.

The only species to which, in size, this very conspicuous *Triforis* could be referred is *T. gigas*, Hinds, also occurring in the same localities. The sculpture, as seen by the above description, is however totally different, being smooth, with no interstitial pitting or gemmuled ribs of any kind. Owing to no one specimen being in a state of absolute perfection, we have been compelled to estimate the number of whorls and the dimensions generally with

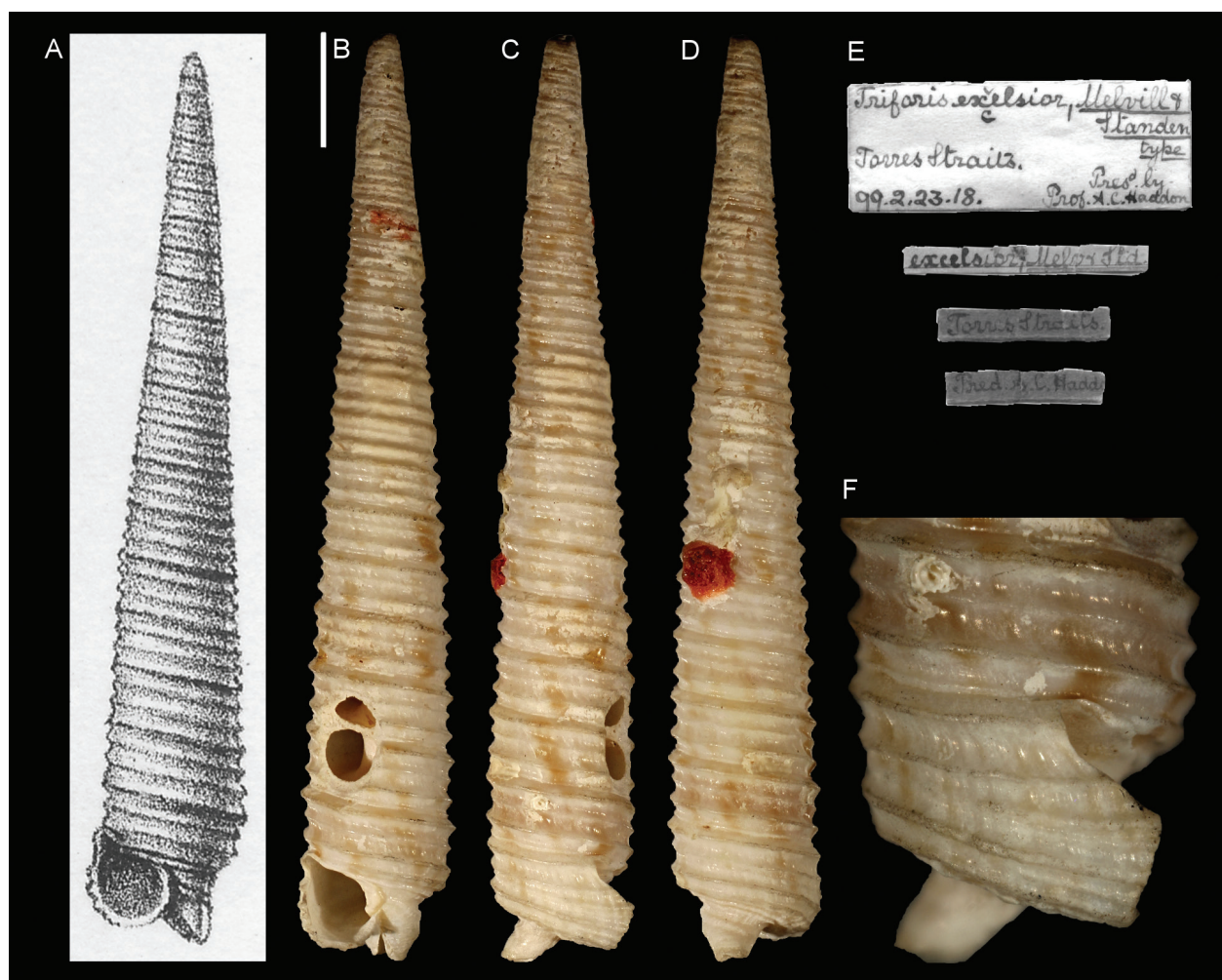


Figure 70. *Triforis excelsior* Melvill & Standen, 1899, NHMUK 1899.2.23.18, Torres Strait. **A** Original figure. **B–D, F** Syntype: front (**B**), side (**C**), back (**D**), peristome (**F**). **E** Original labels. Scale bar: **B–D**: 3 mm.

the aid of two or more examples, each complete in some one particular.

Translation of the Latin text. Much acuminate and slender narrow shell, brown in colour with reddish spots; twenty-five or twenty-six elegant whorls, elevated at the sutures, with three spiral keels; the keel just below the suture is smaller and less conspicuous than the other two, interspaces flat; the last whorl is four-keeled, a double keel is present at the periphery; the aperture is roundish, small; the bent and beaked anterior siphonal canal in one specimen is closed with shelly matter behind the aperture. The largest specimen is 30 mm high and 5 mm wide.

Diagnosis. Syntype 24 mm high. Shell narrowly pyramidal, very slender with 22 whorls bearing three smooth spiral cords, the second being smaller than the others. A fourth smooth suprasutural spiral cord is visible. Between the main cords, there are prosocline axial riblets. The peristome is a bit broken in the syntype, but clearly bears additional spiral cords. Base with a fifth smooth spira cord.

Siphonal canal long. Apex missing. Teleoconch whitish with few small brown blotches.

Triforis idoneus Melvill & Standen, 1901

Figure 71

Triforis idoneus Melvill and Standen 1901: 376, pl. 22, fig. 17.

Type locality. Linjah Anchorage (Iran).

Type material. Syntypes: NHMUK 1901.12.9.219, 1 specimen, Linjah, Iran.

Original description. *T. testa anguste fusiformi, solida, calcareo-alba; anfractibus forsan quatuordecim, quorum apicales ...?, caeteris (undecim) omnino regulariter spiraliter triseriatis, cancellatis, suturaliter impressis, ad juncturas nodulifero-gemmatas, nodulis regularibus, rectis, ultimo anfractu serie quarta praedito; apertura ovata; columella crassa; canali brevi, paullulum recurvo.*

Long. 10, lat. 2.50 mm.

Hab. Linjah Anchorage, 5 fathoms.

This *Triphoris*, distinguished by its uniform chalky whiteness and regular rows of gemmuled cancellations, coarse, uniform, three-ranked on all the upper whorls, four on the body-whorl, is of a graceful shape and fairly sized. It is unfortunate that all the specimens we have examined are without the apical whorls.

Translation of the Latin text. Narrow fusiform shell, solid, chalky white; probably fourteen whorls, apical ...?, others (eleven) with three regular spiral cords, cancellated and impressed sutures, noduliferous in their junction, straight regular nodules, last whorl with four rows; ovate aperture; thick columella; slightly recurved short anterior siphonal canal.

Height 10 mm, width 2.50 mm.

Diagnosis. Syntype 10.4 mm high. Shell conical, with 13 whorls bearing three spiral cords with tubercles at the intersection with orthocline axial ribs. The second cord appears later on the teleoconch and attains full size only on the penultimate whorl. A thin smooth suprasutural spiral cord is also visible and attains full size on the base which has a fifth smooth spiral cord too. The peristome is missing, the siphonal canal appears moderately long. The protoconch is missing. The shell is whitish to yellowish but is very worn and colours may have faded away.

Remarks. The original description refers to several specimens found, of which only this one has been located so far. The study of more syntypes would be precious to unambiguously identify this species: Melvill and Standen described “three-ranked on all the upper whorls”, but the syntype has the second spiral cord developing later along the teleoconch.

Species described by W.H. Pease

William H. Pease described 25 species of Triphoridae. He often sent shells to Hugh Cuming in London for identification; as a consequence of this correspondence, the types of eight species from the Hawaiian Islands are stored in the NHMUK (Kay 1965): *T. affinis*, *alternata*, *cingulifera*, *clavata*, *flammulata*, *fucata*, *incisa*, and *triticea*, all Pease, 1861. The types of most of the other species are stored in the MCZ (Johnson 1994), but those of two species, *T. cylindricus* and *punctatus*, have not been located so far. The species here treated were described in volume 28 (1860) of the Proceedings of the Zoological Society of London but the actual year of publication is 1861 (Duncan 1937; Dickinson 2005). Pease rarely specified the number of specimens studied to describe the new species. Therefore, it is not straightforward to establish the status of “holotype” as done by Kay (1965), when apparently a single specimen has been located so far.

Triphoris affinis Pease, 1861

Figure 72

Triphoris affinis Pease 1861: 434, not illustrated.

Type locality. “Sandwich Islands” (Hawaiian Islands).

Type material. Lectotype: NHMUK 1962808 (coll. H. Cuming) (lectotype selection by inference of holotype by Kay (1965)).

Original description. Shell elongately turreted, shining; whorls composed of three regular-sized rows of granules; canal short, tubular. Colour reddish brown.

Diagnosis. Lectotype 6.4 mm high. Shell conical with flat whorls. Teleoconch of 13 whorls with three tubercled spiral cords of which the first is weaker on the very first whorls. A very fine smooth suprasutural cord is also visible on the lower whorls. Almost orthocline axial ribs intersect the spiral cords to form the tubercles. Fine growth striae are visible in the interspaces. The last whorl has a fourth spiral cord between the second and the third. The peristome is broken. The siphonal canal is very short. The base has three smooth additional spiral cords. The holotype protoconch is clearly multispiral with at least three whorls, but it is apically very worn and thus it is difficult to precisely quantify the number of whorls. The last two are ornamented by two spiral keels and axial riblets. The shell is brown.

Remarks. This name is preoccupied by *T. affinis* Hinds, 1843. Therefore, Jousseaume (1884) introduced a new name, *Mastonia peasi*.

Triphoris alternata Pease, 1861

Figure 73

Triphoris alternata Pease 1861: 434, not illustrated.

Type locality. “Sandwich Islands” (Hawaiian Islands).

Type material. Lectotype: NHMUK 1962816, designated by Kay (1965) (coll. H. Cuming). Paralectotypes: NHMUK 1962817, 2 specimens (see Remarks), Hawaiian Islands (coll. H. Cuming).

Original description. Shell turreted; whorls composed of three regular-sized rows of granules, the middle one of dark reddish brown, the remaining two of a waxy-yellow colour; base longitudinally striated; canal closed, tubular.

Diagnosis. Lectotype 6.2 mm high. Shell slightly cyrtocoid, with very flat whorls. Teleoconch of ten whorls with three spiral cords bearing tubercles at the intersection with slightly prosocline axial ribs. The second cord develops later on the fifth whorl. Very fine growth lines are visible all along the shell. Peristome partly broken in

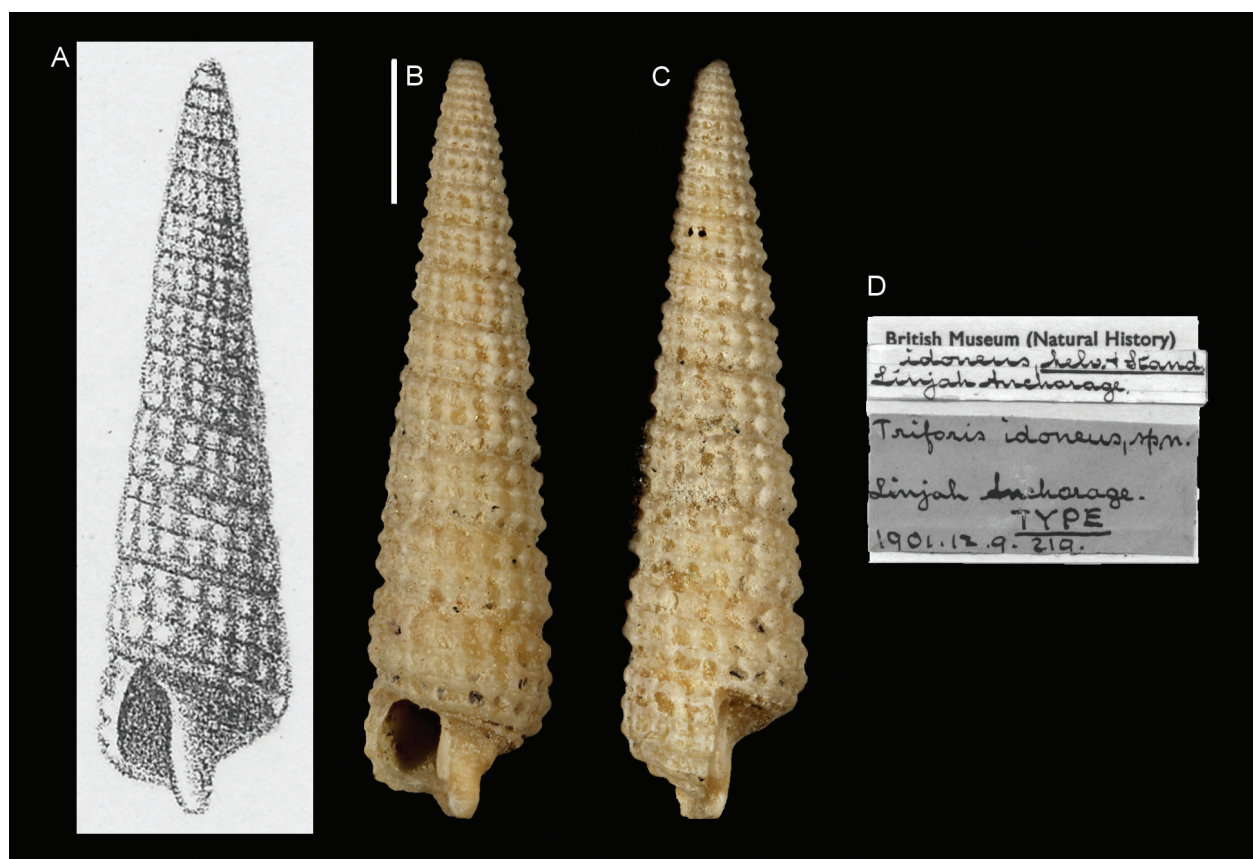


Figure 71. *Triphoris idoneus* Melvill & Standen, 1901, Linjah, Iran. **A** Original figure. **B, C** Syntype NHMUK 1901.12.9.219: front (**B**), side (**C**). **D** Original labels. Scale bar: **B, C**: 2 mm.

the type specimens, but it apparently bears at least one additional spiral cord between the second and the third. Siphonal canal short. The base has a fourth weakly tubercled spiral cord and two more smooth ones. The apex is missing in the type series. The teleoconch has the first spiral cord very light brown, the second and the third brown and the interspace in between dark brown. The last whorl is very light brown with three distinct dark brown spiral stripes.

Remarks. Lot NHMUK 1962817 contains two specimens. Both were listed as paralectotypes by Kay (1965), but they actually represent two species. The second (Fig. 73K) can be easily distinguished from *T. alternata* by its colour pattern (the first spiral cord and not the second is dark brown), the more numerous axial ribs and smaller tubercles. *Triphoris alternata* is a junior homonym of *T. alternatus* C.B. Adams, 1852 (ICZN 1999, Article 57). Therefore, Pease (1868) introduced *Triphoris bicolor* Pease, 1868 as a replacement name. A specimen with this name labelled as “holotype” is reported for the MCZ (50057). Jousseaume (1884) also later introduced *Mastonia harperi* to replace *T. alternata*.

Triphoris cingulifera Pease, 1861

Figure 74

Triphoris cingulifera Pease 1861: 434, not illustrated.

Type locality. “Sandwich Islands” (Hawaiian Islands).

Type material. Lectotype: NHMUK 1962812, designated by Kay (1965) (coll. H. Cuming). Paralectotypes: NHMUK 1962813, 4 specimens (see Remarks), Hawaiian Islands (coll. H. Cuming); MCZ 50056, 4 specimens, Hawaiian Islands; MCZ 50076, 1 specimen, Hawaiian Islands (see Remarks); MCZ 73737, 25 specimens, Hawaiian Islands.

Original description. Shell subulate; whorls about ten, ornamented by a row of granules at both margins, interstices concavely rounded, with a raised stria at the upper side, last whorl with three granulose ribs; canal short and tubular. Colour waxy-yellow, lower row of granules and ribs on last whorl purplish-red.

Diagnosis. Lectotype 5.6 mm high. Shell cyrtconoid with flat whorls. Teleoconch of nine whorls bearing three spiral cords. The second develops later and remains much thin-

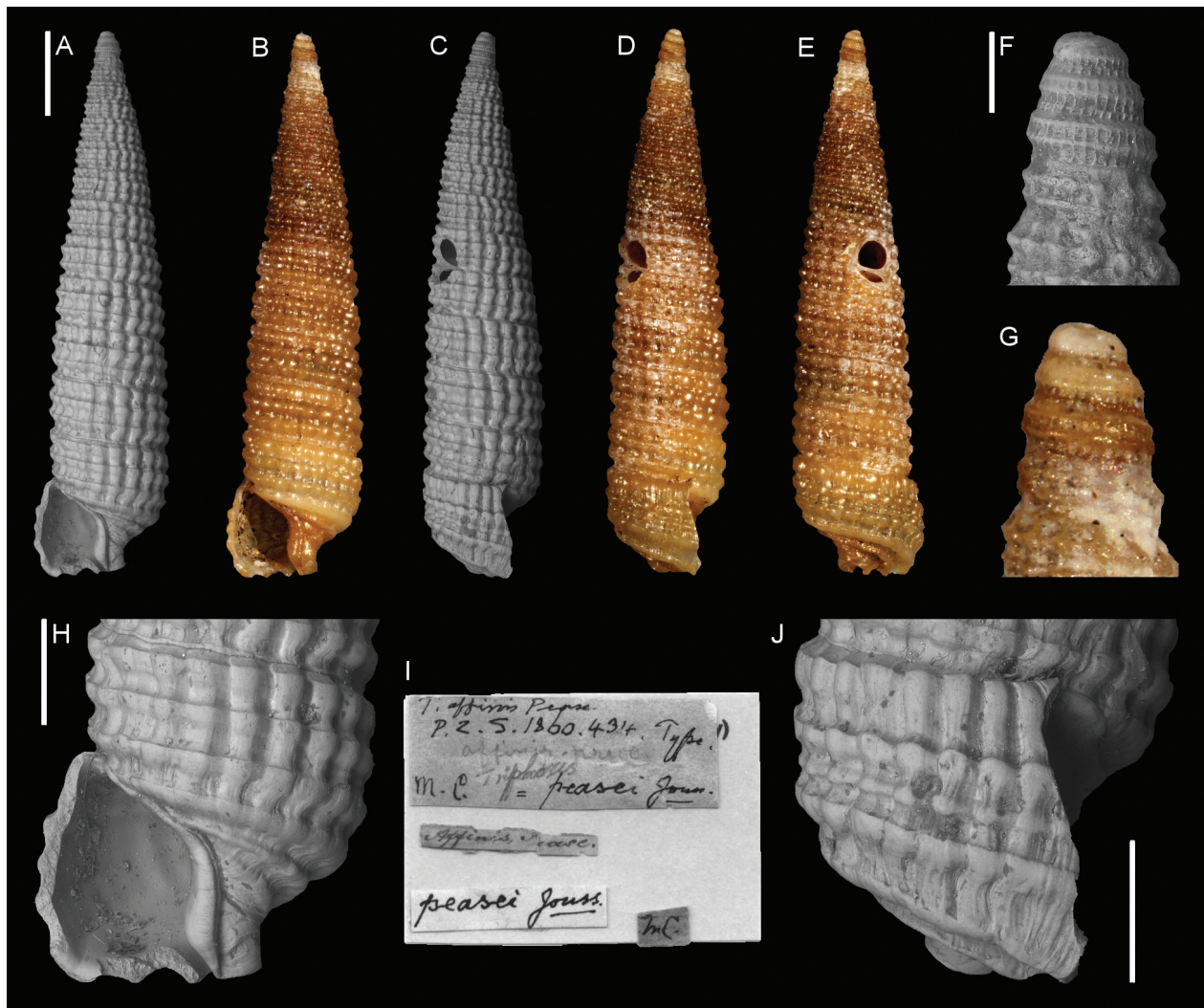


Figure 72. *Triphoris affinis* Pease, 1861, Hawaiian Islands, coll. H. Cuming. A–H, J Lectotype NHMUK 1962808: front (A, B), side (C, D), back (E), protoconch (F, G), aperture (H), peristome (J). I Original labels. Scale bars: A–E: 1 mm; F, G: 0.2 mm; H, J: 0.5 mm.

ner than the others all along the teleoconch. These cords bear tubercles and the intersections with the prosocline axial ribs. Growth lines are visible, especially between the ribs. The peristome bears numerous additional spiral cords and a deep posterior sinus. Siphonal canal relatively long. The base has a fourth tubercled spiral cord and two smoother ones. The apex is missing in the lectotype. The teleoconch background colour is yellowish-brown, the third, fourth and fifth spiral cord are dark brown.

Remarks. MCZ 50056 is erroneously identified as the holotype in the MCZ ledger and in the online catalogue. Pease (1861) did not specify on how many specimens he based his description, but the multiple specimens in the H. Cuming collection suggest that he had more than one on which he based the description. Thus, the “holotype” remark in the MCZ ledger has no support and Kay’s (1965) lectotype designation should be regarded as valid. Kay (1965) listed seven paratypes in lot 1962813, but

only four are currently present (as also noted by Kathie Way in 1983 on labels accompanying the shells).

Triphoris clavata Pease, 1861

Figure 75

Triphoris clavata Pease 1861: 434, not illustrated.

Type locality. “Sandwich Islands” (Hawaiian Islands).

Type material. Lectotype: NHMUK 1962814, designated by Kay (1965) (coll. H. Cuming). Paralectotype: NHMUK 1962815, 1 specimen, Hawaiian Islands (coll. H. Cuming).

Original description. Shell elongate subulate; whorls fifteen to eighteen, bordered on each side by a row of granules, interstices concavely rounded, finely striated

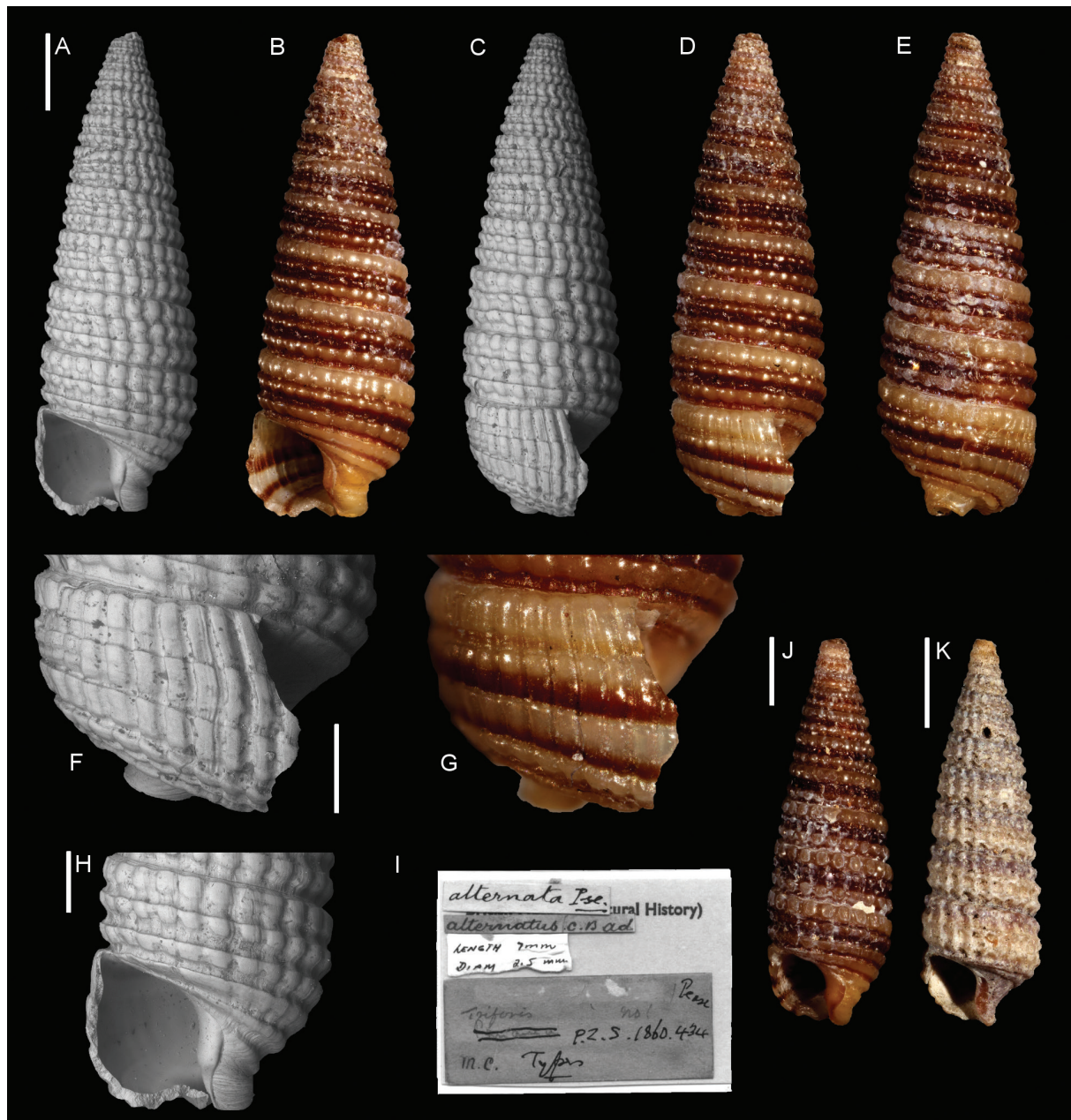


Figure 73. *Triphoris alternata* Pease, 1861. A–H Lectotype NHMUK 1962816, Hawaiian Islands (coll. H. Cuming): front (A, B), side (C, D), back (E), peristome (F, G), aperture (H). I Original labels. J Paralectotype, NHMUK 1962817, Hawaiian Islands (coll. H. Cuming): front. K *Triphora* sp., NHMUK 1962817, Hawaiian Islands (coll. H. Cuming): front. Scale bars: A–E, J, K: 1 mm; F–H: 0.5 mm.

spirally, and bordered against the upper row of granules by a light ridge, obsolete granulose; canal slightly recurved. Colour white or yellowish, interstices between the granules of a purplish or reddish brown, and spotted irregularly with the same.

Diagnosis. Lectotype 7.3 mm high. Shell weakly cyrtocoid with flat whorls. Apical whorls broken off. The remaining eight whorls bear two strong spiral cords and a weaker one in second position which develops around mid-shell height. The cords bear tubercles at the interstices

with prosocline axial ribs. A fine smooth suprasutural cord is also visible. Numerous very fine spiral cords are present in the interspaces of the main cords. The peristome is partly broken but likely bears weak additional spiral cords. The posterior siphonal sinus is deep and roundish. Siphonal canal rather long. The base has two additional tubercled spiral cords. The protoconch is missing. The shell has a whitish background colour with an orange-brown spiral band between the two main spiral cords with occasional darker blotches.

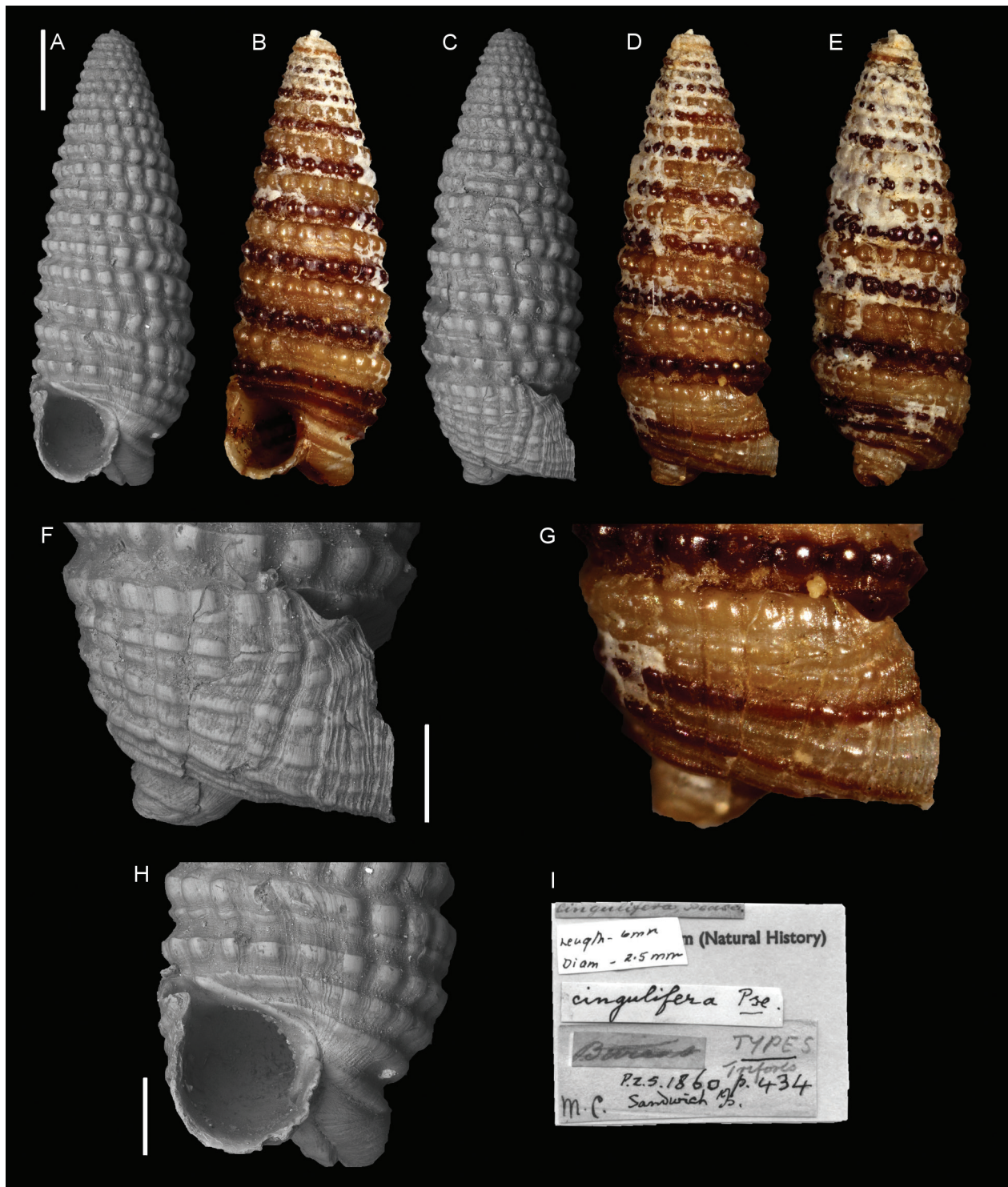


Figure 74. *Triphoris cingulifera* Pease, 1861, Hawaiian Islands, coll. H. Cuming. A–H Lectotype NHMUK 1962812: front (A, B), side (C, D), back (E), peristome (F, G), aperture (H). I Original labels. Scale bars: A–E: 1 mm; F–H: 0.5 mm.

Triphoris flammulata Pease, 1861

Figure 76

Triphoris flammulata Pease 1861: 434, not illustrated.

Type locality. “Sandwich Islands” (Hawaiian Islands).

Type material. Lectotype: NHMUK 1961175, designated by Kay (1965) (coll. H. Cuming). Paralectotypes: NHMUK 1961176, 3 specimens (see Remarks), Hawaiian Islands (coll. H. Cuming).

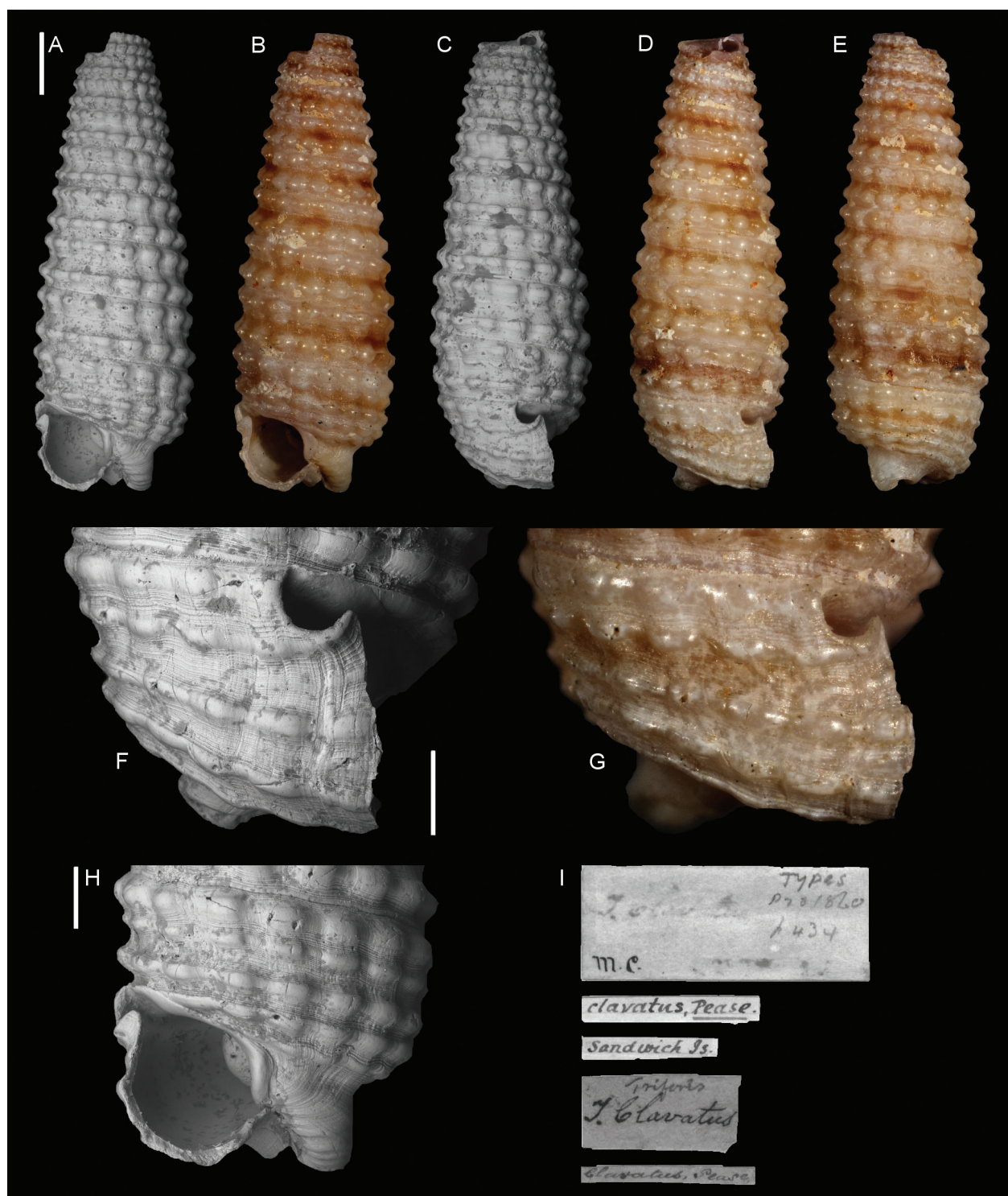


Figure 75. *Triphoris clavata* Pease, 1861, Hawaiian Islands, coll. H. Cuming. A–H Lectotype NHMUK 1962814: front (A, B), side (C, D), back (E), peristome (F, G), aperture (H). I Original labels. Scale bars: A–E: 1 mm; F–H: 0.5 mm.

Original description. Shell elongately pyramidal; whorls twelve to fourteen, spirally carinately ribbed, ribs three, central one much the smallest, a rib of same size at the sutures; canal tubular, enclosed. Colour white, marked with spots and longitudinal flammules of light yellowish-brown.

Diagnosis. Lectotype 13.5 mm high. Shell conical with flat whorls. Apical part of the lectotype broken off, the visible teleoconch has 14 whorls with three very weakly tubercles to smooth spiral cords. The second cord develops near mid-shell height and remains small until the last whorl. A fine smooth suprasutural cord is slightly visible.

Growth lines are visible in the interspaces. The peristome shows a posterior sinus and additional spiral cords. The base has three more weakly tubercled spiral cords. Protoconch missing. Teleoconch background colour white with brown flammulae, siphonal canal brown.

Remarks. Kay (1965) reported four paralectotypes in lot NHMUK 1961176, but only three are now present. A 9 mm specimen that was measured by Kay is missing, as also noted by Kathie Way in 1983 on labels accompanying the lot.

Triphoris fucata Pease, 1861

Figure 77

Triphoris fucata Pease 1861: 433–434, not illustrated.

Type locality. “Sandwich Islands” (Hawaiian Islands).

Type material. Lectotype: NHMUK 1961171, designated by Kay (1965) (coll. H. Cuming). Paralectotypes: NHMUK 1961172, 1 specimen (see Remarks), Hawaiian Islands (coll. H. Cuming), MCZ 73736, 1 specimen, Hawaiian Islands.

Original description. Shell elongate subulate; whorls sixteen to eighteen, with three granulose ribs and one much smaller at the suture; base subplanulate; canal short and recurved. Colour white, spotted irregularly with brown.

Diagnosis. Lectotype 9.5 mm high. Very elongated shell with flat whorls. Apical part broken off. The 17 visible teleoconch whorls have three spiral cords with tubercles and the intersections with slightly prosocline axial ribs. The second spiral cord appears later on the fourth teleoconch whorl. A suprasutural smooth cord is also clearly visible as well as numerous very fine spiral threads between the main cords. The posterior sinus is tubular and prominent. The peristome has additional spiral cords. The siphonal canal is long. The profile of the last whorl at the base is very angulated. The base has no additional cords after the fourth tubercled cord. Protoconch missing. Teleoconch background colour whitish with orange-brown blotches in the first shell half.

Remarks. Lot NHMUK 1961172 contains two fragments, probably belonging to the single specimen reported by Kay (1965). This species is very similar to *T. concors* Hinds, 1843 (page 193). The lack of protoconchs impedes a final decision on the synonymy between these two entities.

Triphoris incisa Pease, 1861

Figure 78

Triphoris incisa Pease 1861: 434, not illustrated.

Type locality. “Sandwich Islands” (Hawaiian Islands).

Type material. Lectotype: NHMUK 1961151, designated by Kay (1965) (coll. H. Cuming). Paralectotypes: NHMUK 1961152, 5 specimens, Hawaiian Islands (coll. H. Cuming), MCZ 73738, 12 specimens, Hawaiian Islands.

Original description. Shell subulate; whorls encircled by three prominent smooth and regular ribs, interstices deep and very finely striated longitudinally, irregularly spotted and marbled with yellowish-white, brown, and purple of various shades.

Diagnosis. Lectotype 15.7 mm high. Shell slightly cyrtconoid with flat whorls. Apical part broken off but the visible teleoconch (likely almost complete) has 15 whorls with three smooth spiral cords. The second develops later in the first whorls. The very first whorls have distinct tubercles on the cords. A smooth suprasutural cord is also clearly visible as well as growth lines between the cords. The peristome has additional spiral cords and a rather deep posterior sinus. The siphonal canal is long. The base has a fourth, fifth, sixth (narrow) and seventh spiral cord of which the fourth and the fifth are slightly tubercled, the others are smooth. Protoconch missing. Teleoconch brown, with the exception of the very first three whorls which are whitish to yellowish. The third spiral cord is usually lighter in colour. Small white blotches are randomly present on cords.

Triphoris triticea Pease, 1861

Figure 79

Triphoris triticea Pease 1861: 433, not illustrated.

Type locality. “Sandwich Islands” (Hawaiian Islands).

Type material. Lectotype: NHMUK 1962807 (coll. H. Cuming) (lectotype selection by inference of holotype by Kay (1965)).

Original description. Shell minute, fusiformly ovate, ornamented throughout by spiral rows of regular-sized granules; aperture oval and in a line with the axis of the shell, lip slightly recurved and thickened (plicate on the inner side?); canal posterior, enclosed, tubular. Colour dark purplish-red, granules dusky white.

Diagnosis. Holotype 2.7 mm high. Shell cyrtconoid, rather broad with flat whorls. The apex is broken off but the teleoconch (likely complete) has seven whorls with two spiral cords with large tubercles at the intersections with slightly opisthocline axial ribs. Growth lines are occasionally visible. The peristome has a deep posterior sinus and an additional tubercled spiral cord developing in second position on the last half of the last whorl. The siphonal canal is very short. The base has three additional tubercled spiral cords. The protoconch is missing. Teleoconch background colour dark brown, except the first two-three whorls which are yellowish. Tubercles progressively lighter along the shell until becoming pearl-grey on

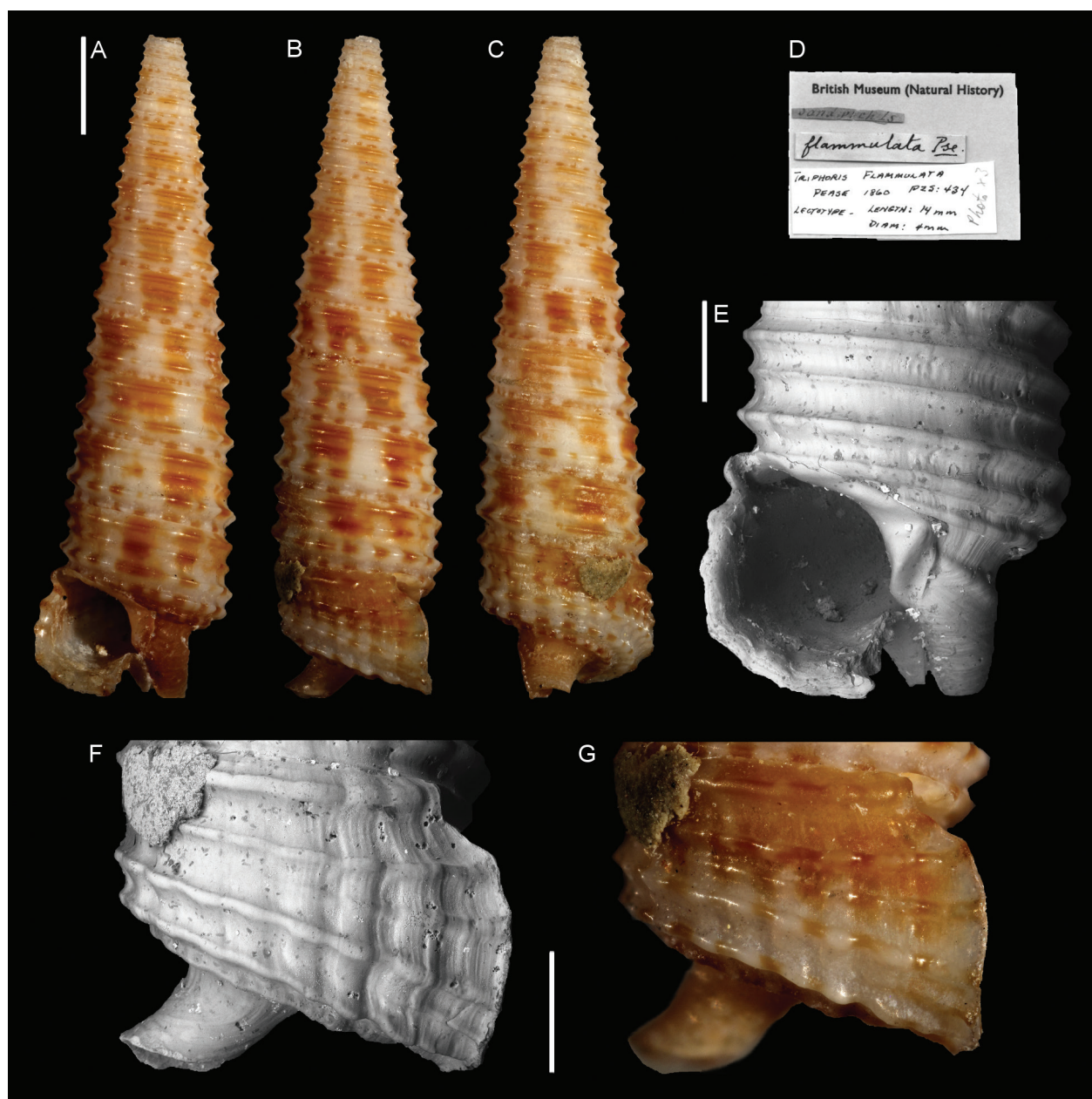


Figure 76. *Triphoris flammulata* Pease, 1861, Hawaiian Islands, coll. H. Cuming. A–C, E–G Lectotype NHMUK 1961175: front (A), side (B), back (C), aperture (E), peristome (F, G). D Original labels. Scale bars: A–C: 2 mm; E–G: 1 mm.

the last whorl. Interspaces usually darker except on the last whorl whose first spiral cord is entirely white.

Species described by E. Rolán and co-authors

Types of 15 species described by Emilio Rolán and his co-authors Cruz-Abrego, Espinosa, Fernandes, Fernández-Garcés are stored in the NHMUK (Fernández-Garcés and Rolán 1988; Rolán and Fernández-Garcés 1992, 1993, 1994, 1995, 2009; Rolán and Espinosa 1994; Rolán and Cruz-Abrego 1995) and listed in Table 2.

Species described by E.A. Smith

Edgar A. Smith described 14 species of Triphoridae. The types of *Triforis excellens* E.A. Smith, 1903 and *T. recta* E.A. Smith, 1890 have not yet been found in the NHMUK. Because Smith spent his whole career curating the Mollusca collection at the Museum and did not own a private collection, the types of the species he described are thought to be mostly in the NHMUK (Trew 1993). Still, pending any statement by Smith in his works on the number of specimens he examined, we consider them syntypes and select lectotypes when appropriate.

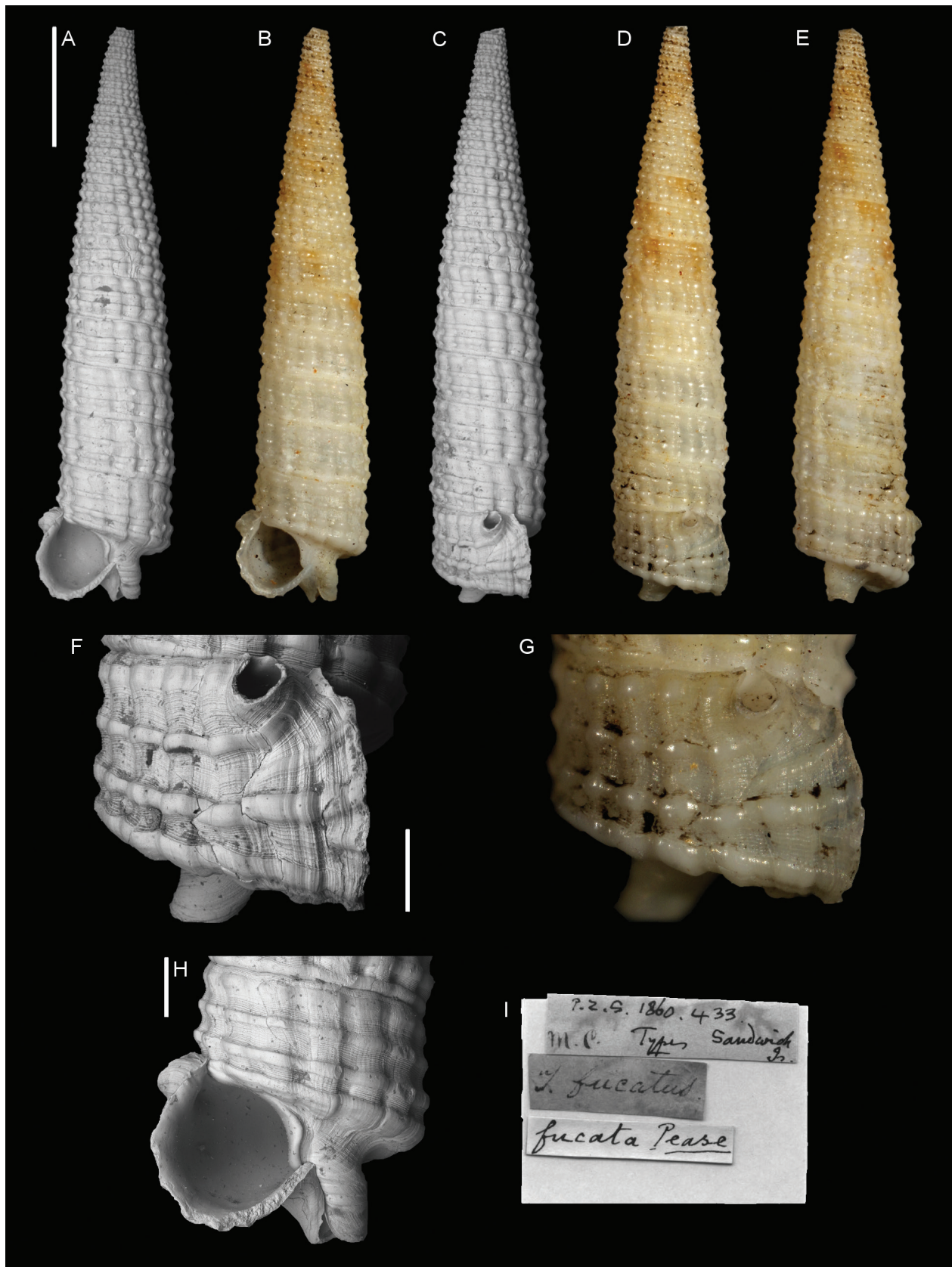


Figure 77. *Triphoris fucata* Pease, 1861, Hawaiian Islands, coll. H. Cuming. A–H Lectotype NHMUK 1961171: front (A, B), side (C, D), back (E), peristome (F, G), aperture (H). I Original labels. Scale bars: A–E: 2 mm; F–H: 0.5 mm

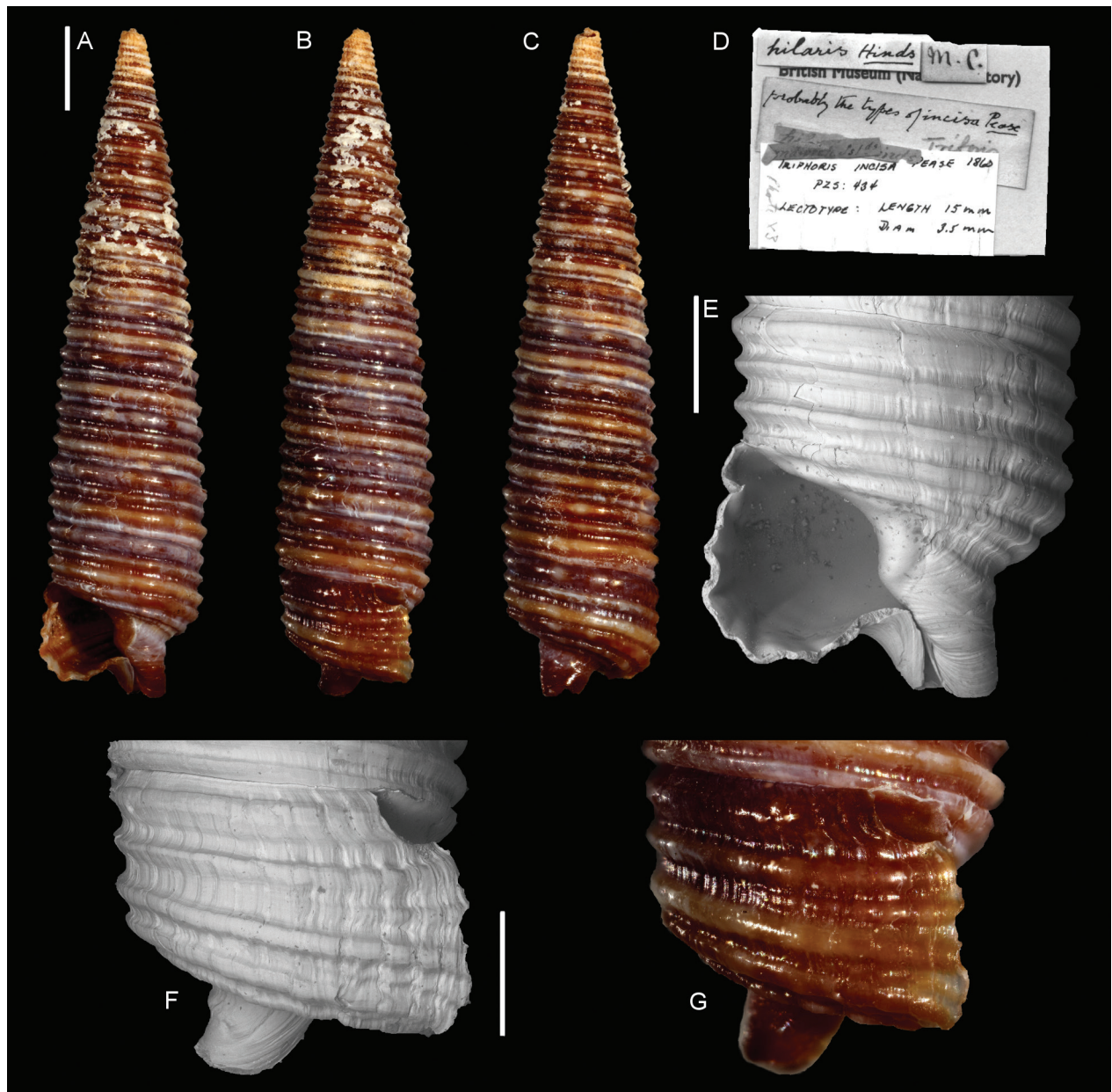


Figure 78. *Triphoris incisa* Pease, 1861, Hawaiian Islands, coll. H. Cuming. **A–C, E–G** Lectotype NHMUK 1961151: front (**A**), side (**B**), back (**C**), aperture (**E**), peristome (**F, G**). **D** Original labels. Scale bars: **A–C**: 2 mm; **E–G**: 1 mm.

Triforis atlantica E.A. Smith, 1890

Figure 80

Triforis atlantica Smith 1890: 292, pl. 21, fig. 26.

Type locality. Saint Helena.

Type material. Lectotype: NHMUK 1889.10.1.1374, designated by Rolán and Fernández-Garcés 2008). Paralectotypes: NHMUK 1889.10.1.1375–93, 18 specimens (two gold coated).

Original description. *Testa haud perelongata, alba, livido-fusco inferne zonata; anfractus 13, anguste turriti,*

supremi minute cancellati, ceteri plani, granulorum seriebus duobus vel tribus cincti, ultimus seriebus quinque, infima minus tuberculata, ornatus; cauda brevis, carina valida instructa, fuscescens; apertura obliqua, ovata, superne canaliculata; peristoma superne leviter incisum, inferne columellae callo crasso junctum.

Longit. 6 millim., diam. 2

The outlines of this species are a little convex. Only the penultimate and antepenultimate whorls have three distinct rows of granules, and of those the central one is the smallest. The granules of the lowermost series, or rather the interstices between them, are brown and the uppermost series is white.

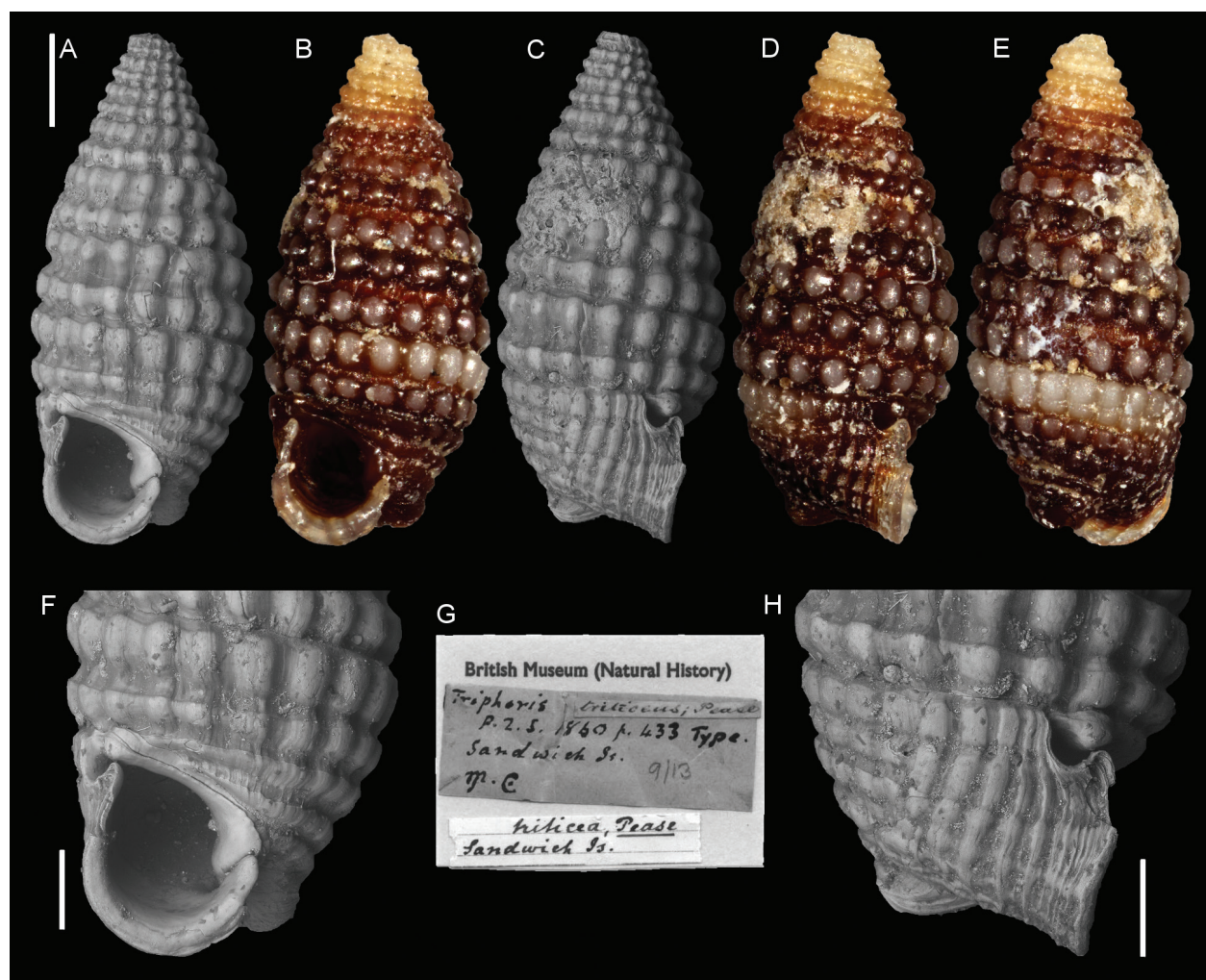


Figure 79. *Triphoris triticea* Pease, 1861, Hawaiian Islands, coll. H. Cuming. **A–F, H** Lectotype NHMUK 1962807: front (**A, B**), side (**C, D**), back (**E**), aperture (**F**), peristome (**H**). **G** Original labels. Scale bars: **A–E**: 0.5 mm; **F, H**: 0.3 mm.

Table 2. List of species described by Rolán and his co-authors Cruz-Abrego, Espinosa, Fernandes, and Fernández-Garcés whose type material is present in the NHMUK at the date of December 31, 2015, in alphabetic order by species name.

Species	Type locality	Inventory number	Number of paratypes
<i>Cheirodonta apexcrassum</i> Rolán & Fernández-Garcés, 1994	Jibacoa, in North of Cuba	1993061	1
<i>Marshallora bubistae</i> Fernández-Garcés & Rolán, 1988	Boavista Is., Cape Verde Archipelago	1988079	2
<i>Iniforis carmelae</i> Rolán & Fernández-Garcés, 1993	Cienfuegos Bay, Cuba	1992134	1
<i>Cheirodonta decollata</i> Rolán & Fernández-Garcés, 1994	Marianao Beach, La Habana, Cuba	1993062	2
<i>Metaxia espinosai</i> Rolán & Fernández-Garcés, 1992	Faro de los Colorados, Cienfuegos Bay, Cuba	1992093	1
<i>Marshallora gutta</i> Fernández-Garcés & Rolán, 1988	Boavista Is., Cape Verde Archipelago	1988081	2
<i>Metaxia incerta</i> Fernández-Garcés & Rolán, 1988	Sal Is., Cape Verde Archipelago	1988077	2
<i>Iniforis immaculata</i> Rolán & Fernández-Garcés, 1993	Cienfuegos Bay, Cuba	1992135	1
<i>Marshallora mariangelae</i> Fernández-Garcés & Rolán, 1988	Boavista Is., Cape Verde Archipelago	1988080	2
<i>Marshallora nichupte</i> Rolán & Cruz-Abrego, 1995	Bojórquez- Nichupté Lagoons, Cancún, Quintana Roo, México	1996045	2
<i>Triphora osclausum</i> Rolán & Fernández-Garcés, 1995	Jibacoa, in North of Cuba	1996051	1
<i>Iniforis pelorcei</i> Rolán & Fernández-Garcés, 2009	Caribbean, Saint Lucia, north of Grenadines Is.	20090255	1
<i>Iniforis pseudothomae</i> Rolán & Fernández-Garcés, 1993	Cienfuegos Bay, Cuba	1992133	1
<i>Isotriphora taenialba</i> Rolán & Espinosa, 1994	Cienfuegos Bay, Cuba	1993060	2
<i>Monophorus verdensis</i> Fernández-Garcés & Rolán, 1988	Boavista Is., Cape Verde Archipelago	1988078	2

Translation of the Latin text. Not very elongated shell, white, inferiorly with a dark brown zone; 13 whorls narrowly turreted, the uppermost minutely cancellated, the other flat with two or three rows of granules, five on the last with the lowest slightly tuberculated; anterior siphon short, with a strong brownish carina; oblique aperture, ovate, canaliculated above; slightly incised peristome in its upper part, joined below with the large columellar callus.

Height 6 mm, diameter 2 mm.

Diagnosis. Lectotype 4.5 mm high. Shell conical, with flat sides. Teleoconch of nine whorls (but apex missing) with two main spiral cords with tubercles at the intersection with prosocline axial ribs; a third cord develops in between at mid-shell height and attains full size only on the last whorl. Peristome broken and regrown in the lectotype; siphonal canal short. Base with two additional weakly tubercled cords and a smooth third. Protoconch absent in the lectotype, but reported to be multispiral (Rolán and Fernández-Garcés 2008). The first teleoconch whorls are white; the following with a white first and brown second spiral cord (with lighter tubercles). Base brown.

Remarks. Rolán and Fernández-Garcés (2008) erroneously reported the inventory numbers as 1889.10.1.1874–93.

Triforis bathyraphe E.A. Smith, 1890

Figure 81

Triforis bathyraphe Smith 1890: 292, pl. 24, fig. 4.

Type locality. Saint Helena.

Type material. Syntypes: NHMUK 1889.10.1.1413: 1 specimen, Saint Helena.

Original description. *Testa haud perelongata, albida vel pallide fusca; anfractus 11, convexiusculi, sutura profunda sejuncti, liris spiralibus tribus subaequalibus, lirisque longitudinalibus circiter 26 granose cancellati; anfr. ultimus liris sexcinctus; apertura rotunde ovata; labrum tenue, superne ad suturam anguste sinuatum, inferne columellae junctum; cauda brevis, leviter recurva. Longit. 5 3/4 millim., diam. 2.*

This species is peculiar on account of the deep suture and the distinct cancellation of the surface. The whorls, too, are convex, so that the central row of granules are most prominent. It is a much stouter shell than *T. recta* and has a different aperture.

Translation of the Latin text. Not very elongated shell, white or pale dark; 11 slightly convex whorls, separated by a deep suture, with three almost equal spiral cords and about 26 longitudinal tuberculated cancellate lirae; last whorl with six rows; roundish ovate aperture; thin lip with a posterior sinus at the suture, joined with columella on the underside; short slightly recurved anterior siphon.

Height 5 3/4 mm, diameter 2 mm.

Diagnosis. Syntype 5 mm high. Shell conical with seven slightly convex whorls. The teleoconch with three spiral cords with tubercles at the intersection with almost orthocline axial ribs. A fourth suprasutural smooth cord is visible on the lower whorls. Peristome with no additional spiral cords and an indented posterior canal. Siphonal canal of moderate length. The fourth spiral cord becomes tuberculated on the base which bears two additional weakly tubercled cords. Protoconch apparently paucispiral of two whorls but too worn to observe the sculpture. Shell yellowish.

Triphora burnupi E.A. Smith, 1910

Figure 82

Triphora burnupi Smith 1910: 196, pl. 7, fig. 8.

Type locality. Durban, Natal, South Africa.

Type material. Syntypes: NHMUK 1911.8.30.10: 1 specimen, Durban, South Africa.

Original description. *Testa parva, angusta, subulata, albida circa medium anfractuum linea saturate fusca cincta, et inter gemmules supra liras spirales dilute fusco notata; anfractus 17, superiores quatuor fusci, longitudinaliter tenuiter lirati, tertius et quartus circa medium liris spiralibus duo cincti, quintus ad octavus seriebus gemmarum duabus (serie infima majori) instructi, caeteri liris quatuor inaequalibus ornati, lira infra lineam fuscam distincte gemmata; anfr. ultimus ad peripheriam gemmato-carinatus, infra concavus, lira unica instructus; apertura rotunde piriformis; canalis obliquus, recurvus, praeter extremitatem clausus.*

Longit. 7, diam. 1.5 mm.

Hab.—Durban (H. Burnup).

Of the four lirae upon the later whorls, that below the brown line is the most conspicuous and most distinctly gemmate. The lira or thread above the brown line is the most slender and faintly gemmate, and the lira above that is the least gemmate of all, and exhibits here and there only very faint traces of the light brown dotting which occurs between the gemmules on the other lirae.

Translation of the Latin text. Small, narrow, subulate shell, white with a dark brown line in the middle of the whorls, and marked with light brown between the gemmules on the spiral rows; 17 whorls, upper four brown, slightly lyrate longitudinally, the third and the fourth with two median spiral rows, from the fifth to the eighth two series of gemmules (the lower the greater), other decorated by four unequal lirae, lira under the brown line clearly gemmate; last whorl gemmate-carinated at the periphery, concave at its underside, with only one lira; round pyriform aperture; anterior siphon slanting, curved, closed at its end.

Height 7 mm, diameter 1.5 mm.

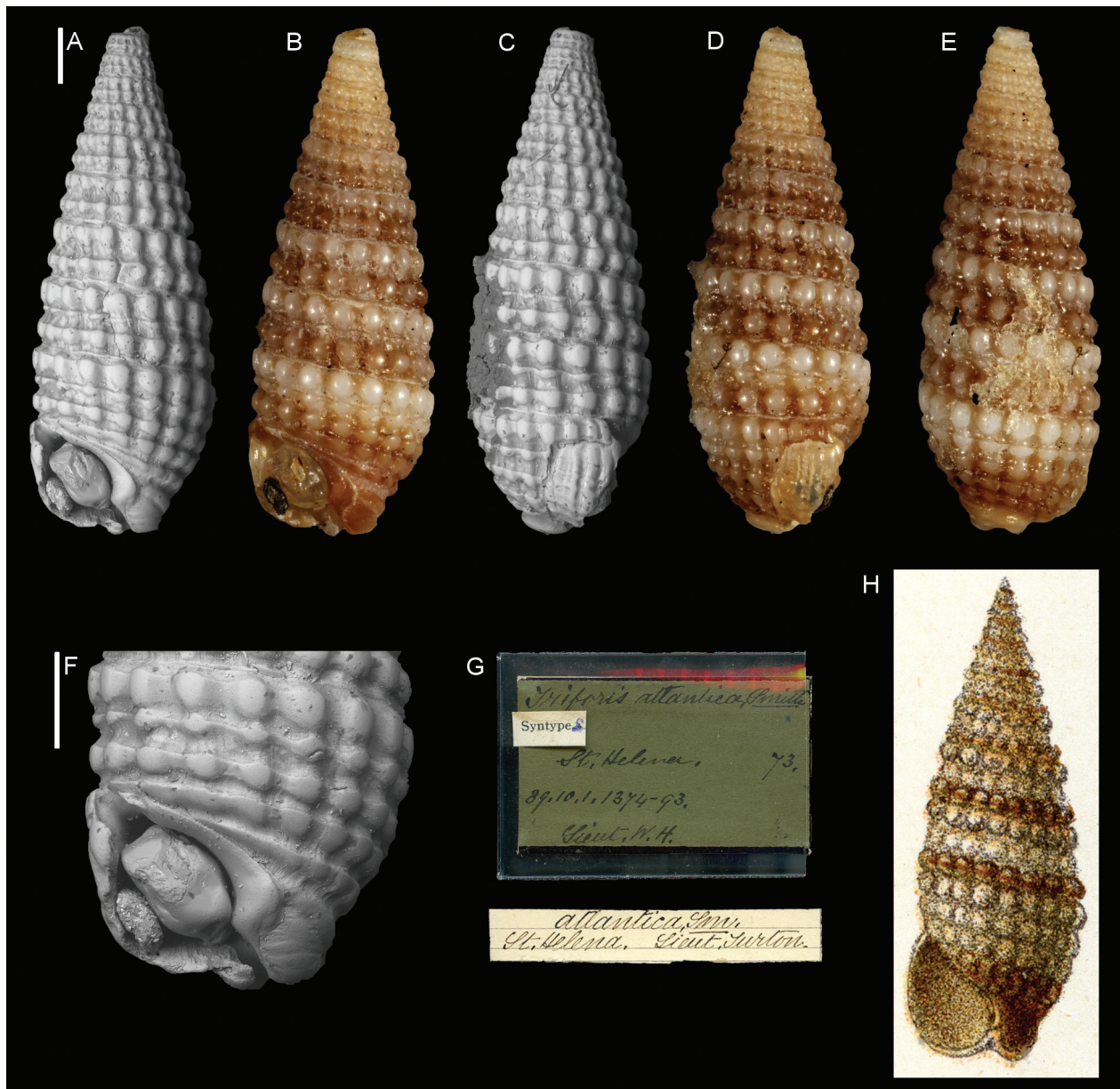


Figure 80. *Triphoris atlantica* E.A. Smith, 1890, Saint Helena. A–F Lectotype NHMUK 1889.10.1.1374: front (A, B), side (C, D), back (E), aperture (F). G Original labels. H Original figure. Scale bar: A–F: 0.5 mm.

Diagnosis. Syntype height 6.5 mm. Shell conical with flat sides. Teleoconch of 12 whorls bearing three main narrow and faintly tubercled spiral cords; a fourth is visible suprasuturally. The first four whorls bear better defined tubercles. Peristome with a quite deep slit-like posterior sinus and additional spiral cords appearing close to the lip. Base angular with a thick smooth spiral cord at the periphery. Siphonal canal long. Protoconch multispiral of probably four whorls but the apical part is worn in the syntype. The last three whorls bear axial riblets; a spiral keel is present on the third last whorl and two on the other whorls. Background colour pinkish-white with a brown mid-whorl band; protoconch brown.

Trifora cerea E.A. Smith, 1906

Figure 83

Trifora cerea E.A. Smith 1906: 43, pl. 7, figs 11, 11a.

Type locality. Port Shepstone, Natal, South Africa.

Type material. Syntypes: NHMUK 1906.6.23.13: 1 specimen, South Africa.

Original description. *Testa subulata, flavescens, nitida; anfractus 14 (?), convexi, costis spiralibus tuberculatis quatuor cincti, duobus medianis caeteris majoribus, inter costas oblique costulati, ultimus costis sex instructus, duobus inferioribus vix tuberculatis; columella supra arcuata, callo albo crassiusculo induta; canalis brevis,*

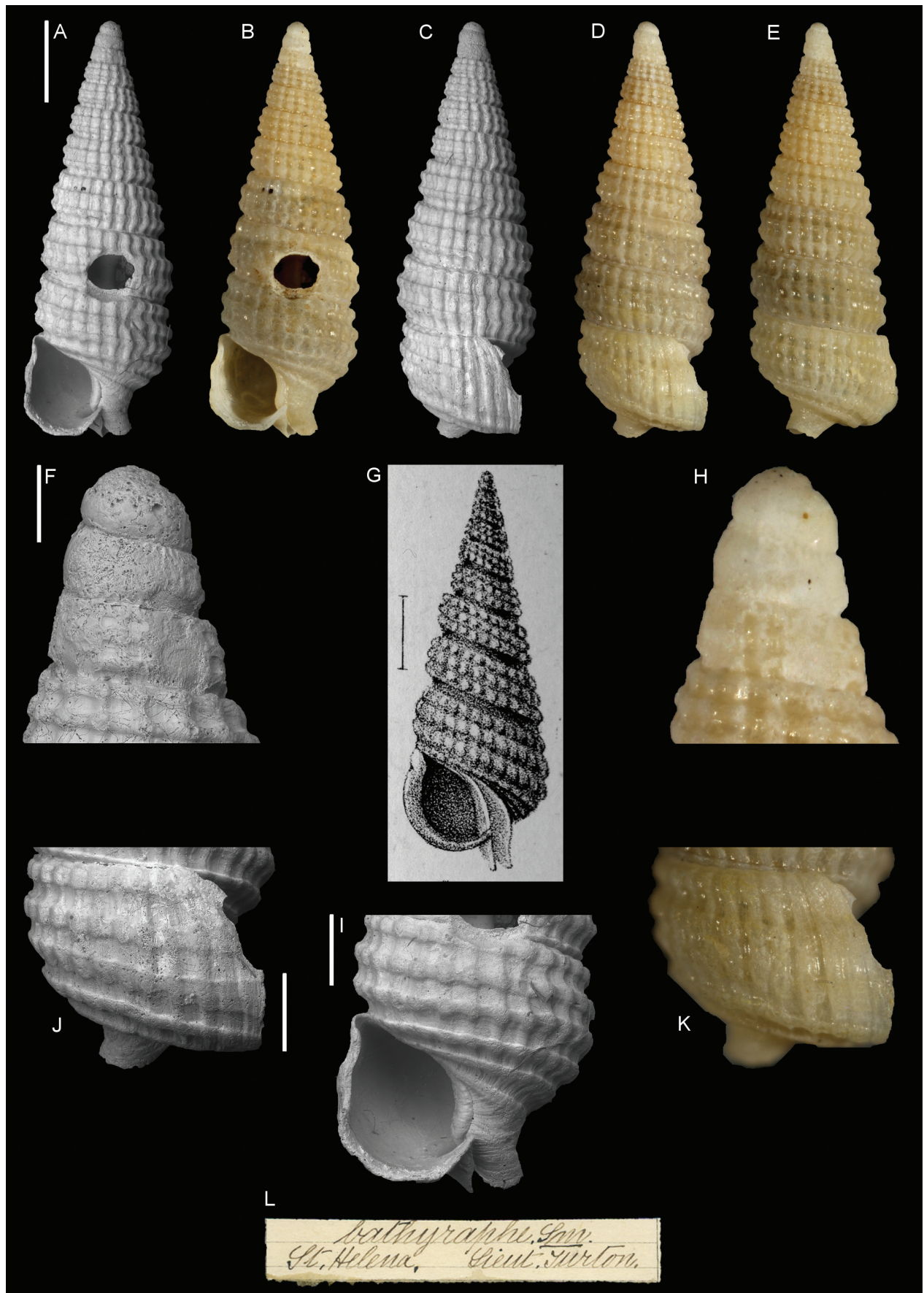


Figure 81. *Triphoris bathyraphe* E.A. Smith, 1890, Saint Helena. A–F, H–K Syntype NHMUK 1889.10.1.1413: front (A, B), side (C, D), back (E), protoconch (F, H), aperture (I), peristome (J, K). G Original figure. L Original label. Scale bars: A–E: 1 mm; F, H: 0.2 mm; I–K: 0.5 mm.

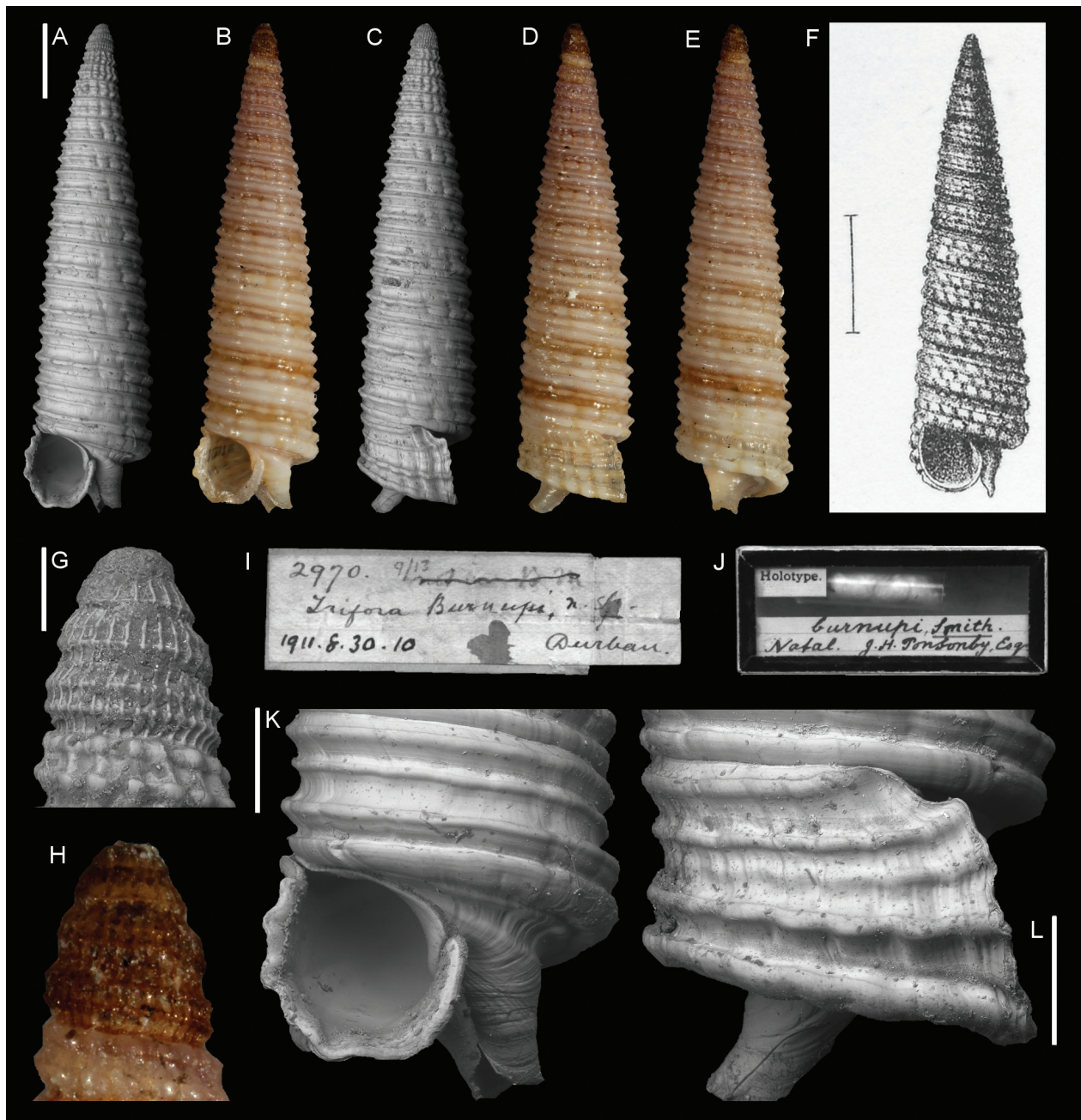


Figure 82. *Trifora burnupi* E.A. Smith, 1910, Durban, South Africa. A–E, G, H, K, L Syntype NHMUK 1911.8.30.10: front (A, B), side (C, D), back (E), protoconch (G, H), aperture (K), peristome (L). F Original figure. I, J Original labels. Scale bars: A–E: 1 mm; G, H: 0.2 mm; K, L: 0.5 mm.

obliquus, recurvus, haud clausus; labrum subpatulum, extremitatibus costarum leviter dentatum.

Longit. 10.5 mm., diam. 2.25. Apertura 1.25 longa.

Hab. —Port Shepstone (Burnup).

Of a uniform yellow wax colour, ornamented with four rows of granules on each whorl, the lowest row being the smallest, and the two central series rather more prominent than the uppermost row.

Translation of the Latin text. Subulate shell, yellowish, bright; 14 (?) whorls, convex, encircled by four tubercu-

lated spiral cords, the greater two in the middle, costulated obliquely between cords; last with six cords, the two lower ones barely tuberculated; columella arched above, covered by a rather large callus; short anterior siphon, slanting, curved, not closed; extended lip, slightly dentate at the end of the cords.

Height, 10.5 mm, diameter 2.25. Aperture length 1.25 mm.

Diagnosis. Syntype 7.1 mm high (but apical part missing). Shell conical with slightly convex sides. Teleoconch

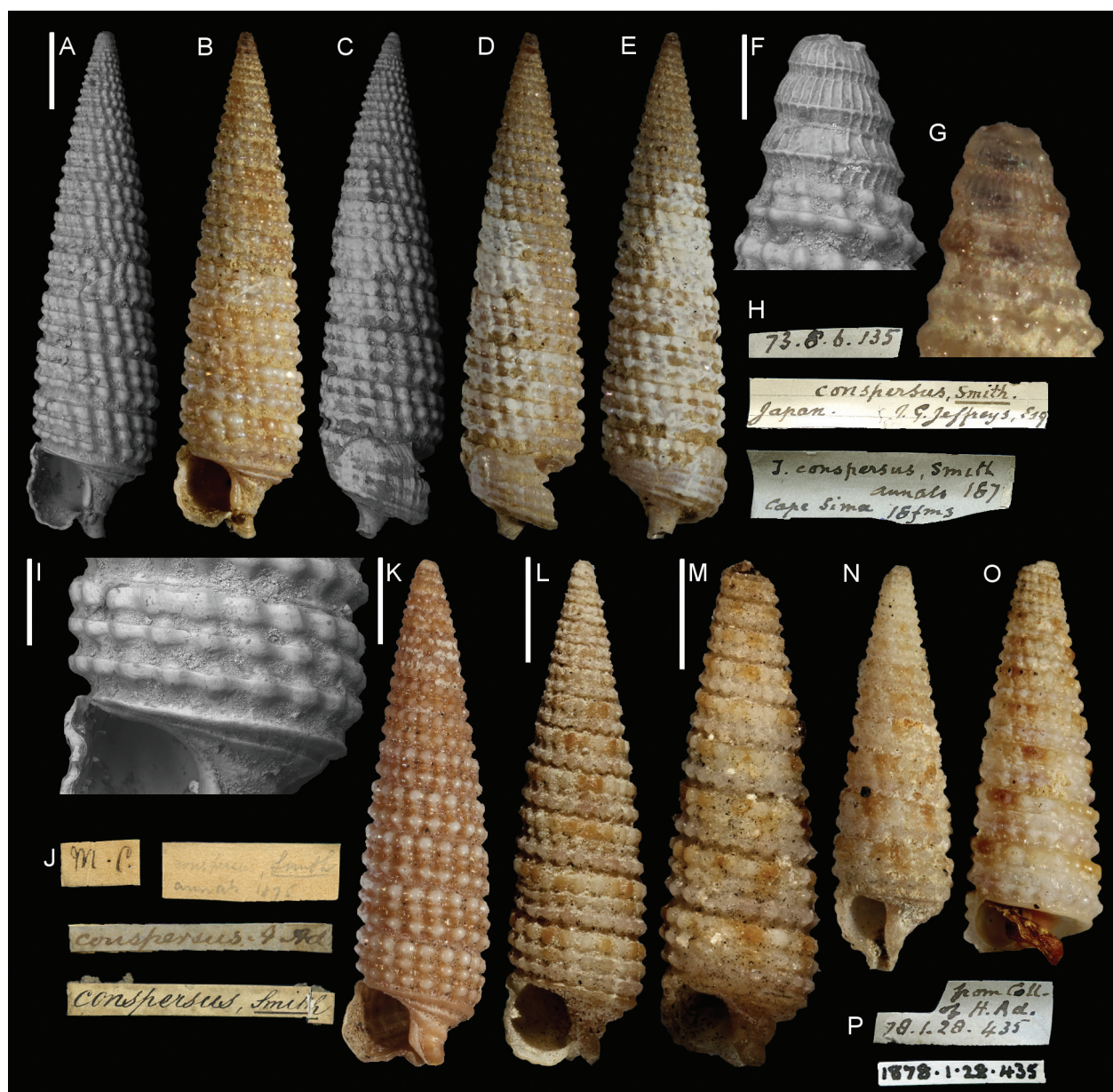


Figure 83. *Trifora cerea* E.A. Smith, 1906, South Africa. A–E, G, J Syntype NHMUK 1906.6.23.13: front (A, B), side (C, D), back (E), peristome (G), aperture (J). F Original figures. H Original box. I Original label. Scale bars: A–E: 1 mm; G, J: 0.5 mm.

with at least nine whorls bearing three spiral cords with tubercles at the intersection with slightly prosocline axial ribs. The second cord is less pronounced in the first whorl of the type specimen, suggesting that the second cord develops later than the others. A fourth smooth spiral cord is visible suprasuturally. Peristome showing a faint additional spiral cord between the second and the third, but too worn to enable the description of the posterior sinus. Siphonal canal short. The fourth spiral cord is smooth on the base, which bears a fifth, again smooth, cord. The periphery of the last whorl is quite angulated. Protoconch absent in the syntype. Teleoconch yellow to light orange.

Remarks. The date of publication of this paper follows Trew (1993).

***Triphoris conspersus* E.A. Smith, 1875 ex A. Adams ms**

Figure 84

Triphoris conspersus E.A. Smith 1875: 106, not illustrated.

Type locality. “Cape Sima” (Shima Peninsula, Mie Prefecture), Japan.

Type material. Syntypes: NHMUK 1873.8.6.135, Cape Sima, Japan: 1 specimen; NHMUK 196545, Japan: 3 specimens (ex H. Cuming coll.).

Additional material. NHMUK 1878.1.28.435, Japan: 2 specimens (ex A. Adams coll.); *Triphora* sp. (not *conspersus*), NHMUK 1878.1.28.450, Japan (ex A. Adams coll.).

Original description. *Testa parva, elongata, lateribus levissime convexis; anfractus circiter 16 granulorum seriebus tribus cincti (suprema albida, hic illic fusco-maculata, mediana quam caeteris longe tenuiore, albida, infima pallide violacea); sutura distincta, canaliculata; anfr. ultimus infra granula carinis tribus cinctus; apertura rotunde ovata; canalis brevis recurvus.*

Long. 8½ mill., diam. 2.

Hab. Cape Sima, 18 fathoms, sand and broken shells.

This is a very pretty species, and appears to be undescribed hitherto, the above name being probably but a manuscript one attached to specimens in Cuming's collection.

Translation of the Latin text. Small shell, elongated, slightly convex; about 16 whorls encircled by three series of granules (the apical whitish and brownish spotted, the intermediate fainter than the others, whitish, the abapical light violet); distinct suture, canaliculated; last whorl with three carinae under the rows of granules; aperture round ovate; anterior siphon short, curved.

Height 8½ mm, diameter 2 mm.

Diagnosis. Syntypes ranging between 4.5 and 6.5 mm high. Shell conical, with flat whorls. Teleoconch up to 13 whorls bearing three spiral cords bearing tubercles at the intersection with prosocline axial ribs. The second cord develops on the seventh whorl and attains full size only on the last whorl. Suture impressed. Not a single specimen of the type series bears a complete peristome which can be described. Base with two additional smooth thin spiral cords. Siphonal canal long. Protoconch multispiral. The last three whorls present in a specimen of the type series bear a single strong spiral keel and axial riblets. Background teleoconch colour white with orange-brown blotches and the third spiral row which can tend to purple. Protoconch brown.

Remarks. E.A. Smith stated that this name was “a manuscript one attached [by A. Adams] to specimens in the Cuming's collection”. Only lot NHMUK 196545 comes from the Cuming's collection, as reported on a modern label; it bears only “Japan” as the locality. However, the lot NHMUK 1873.8.6.135 bears an old label with the same locality data as stated in the original description (“Cape Sima, 18 fms”, Fig. 84H) and another one with the name of J.G. Jeffreys on it. Two additional lots come from the H. Adams collection: 1878.1.28.435 and 1878.1.28.450. Their inventory numbers suggest they were deposited in the NHMUK after the species was described. Moreover, the latter at least (Fig. 84K) does not seem to be *T. conspersus* because of its smaller tubercles, which are whitish on a brown teleoconch background colour instead of white with brown spots (“*suprema albida, hic illic fusco-maculata*”). Due to the uncertainty about what material E.A. Smith had examined at the time of preparing the species' description, we refrain from selecting a lectotype.

Trifora convexa E.A. Smith, 1904

Figure 85

Trifora convexa E.A. Smith 1904: 37, pl. 3, fig. 9.

Type locality. “Port Alfred, Cape Colony” (Cape of Good Hope, South Africa).

Type material. Syntypes: NHMUK 1903.12.19.1084–1086: 3 specimens (glued on cardboard), Port Alfred, South Africa.

Original description. *Testa parva, fusca, ad apicem albida; anfractus 10 convexi, supremi duo pallidi, laeves, caeteri tricingulati, cingulis granosis, duobus inferioribus magis conspicuis, sutura filiformi sejuncti, ultimus ad peripheriam rotundatus, cingulis sex instructus; labrum subpatulum; columella callo crasso pellucido induta, supra incurva.*

Longit. 5.5 millim., diam. fere 2.

The suture is marked by the lira which encircles the periphery of the body-whorl, and winds up the spire at, but above the actual suture.

Translation of the Latin text. Small shell, brown, with whitish apex; 10 convex whorls, the uppermost two pale, light, the other with three granulated cords, the lower two more conspicuous, separated by a threadlike suture, the last rounded at its periphery, with six cords; extended lip; columella covered by a large translucent callus, curved above.

Height 5.5 mm, diameter about 2 mm.

Diagnosis. Syntype NHMUK 1903.12.19.1084 (Fig. 85A–F) 5 mm high. Shell conical with seven rounded whorls bearing three solid spiral cords with weak nodules at the intersection with orthocline axial ribs. A fourth thin smooth cord can be seen suprasuturally. Peristome incomplete, apparently without additional spiral cords. Base with three large flat spiral cords similar in appearance to those on the whorls. Siphonal canal short. Protoconch paucispiral. The transition between protoconch and teleoconch is very difficult to recognize because the apex is worn, but the protoconch is apparently less than two whorls, the first being smooth and the second with a fine suprasutural smooth spiral cord. Teleoconch brown to orange; protoconch lighter, almost white.

Trifora fuscescens E.A. Smith, 1904

Figure 86

Trifora fuscescens E.A. Smith 1904: 37, pl. 3, fig. 6.

Type locality. “Port Alfred, Cape Colony” (Cape of Good Hope, South Africa).

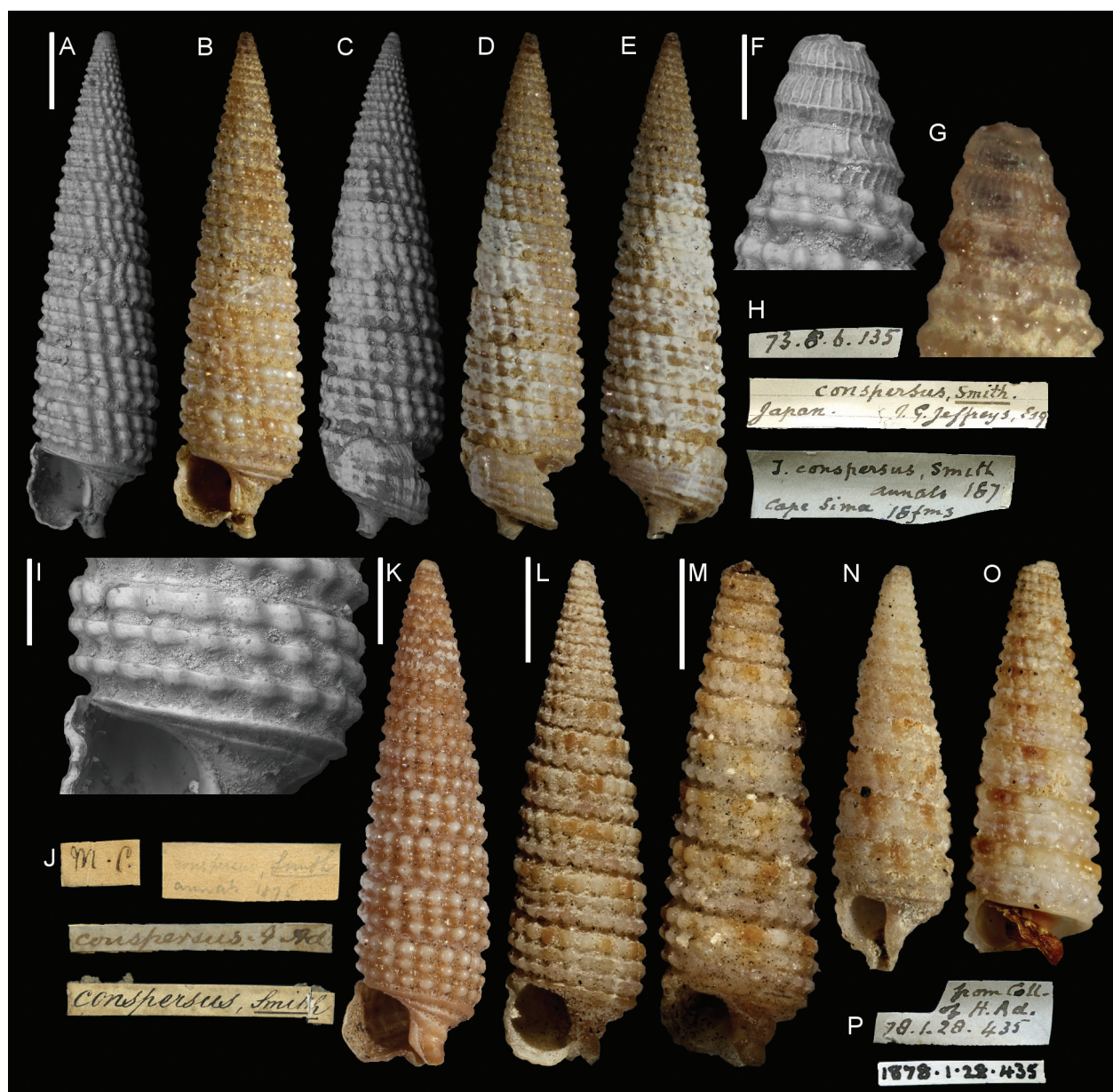


Figure 84. *Triphoris conspersus* E.A. Smith, 1875. A–I Syntype NHMUK 1873.8.6.135, Cape Sima, Japan: front (A, B), side (C, D, the apex seems bent in C but it is a deformation due to SEM imaging), back (E), protoconch (F, G), original labels (H), microsculpture (I). J, L, M Syntypes NHMUK 196545, Japan (coll. H. Cuming): original labels (J), front views (L, M). K *Triphora* sp. (not *conspersus*), NHMUK 1878.1.28.450, Japan (H. Adams coll.): front. N–P *T. conspersus*, NHMUK 1878.1.28.435, Japan (H. Adams coll.): front views (N–O), original labels (P). Scale bars: A–E, K–M: 1 mm; F, G: 0.2 mm; I: 0.5 mm.

Type material. Syntypes: NHMUK 1903.12.19.1087–1092: 6 specimens, Port Alfred, South Africa.

Original description. *Testa parva, gracilis, fuscescens, quadricingulata, cingulo supremo aliis majori, planiusculo, caeteris subaequalibus rotundatis; anfractus circiter 18, fere plani, ultimus cingulis septenis prope aperturam lineis incrementi sectis et subgranosis cinctus; apertura parva, rotunde quadrata, antice brevissime oblique canaliculata; labrum tenue, postice ad suturam sinuatum, in medio subpatulum, ad marginem leviter crenulatum.*

Longit. 11.5 millim., diam. 2.25.

Some of the specimens named *T. cingulatus*, A. Ad., by Mr. Sowerby (Marine Shells of S. Africa, p. 36), belong to the present species. None of them agree with Adams' species, which was described from the Red Sea, and has strong longitudinal sculpture between the spirals.

Translation of the Latin text. Small shell, slender, brownish, with four spiral cords; the uppermost row larger than the others, almost flat, the others rather similarly rounded; about 18 whorls, nearly flat, the last with seven weakly granulated cords crossed by growth lines near

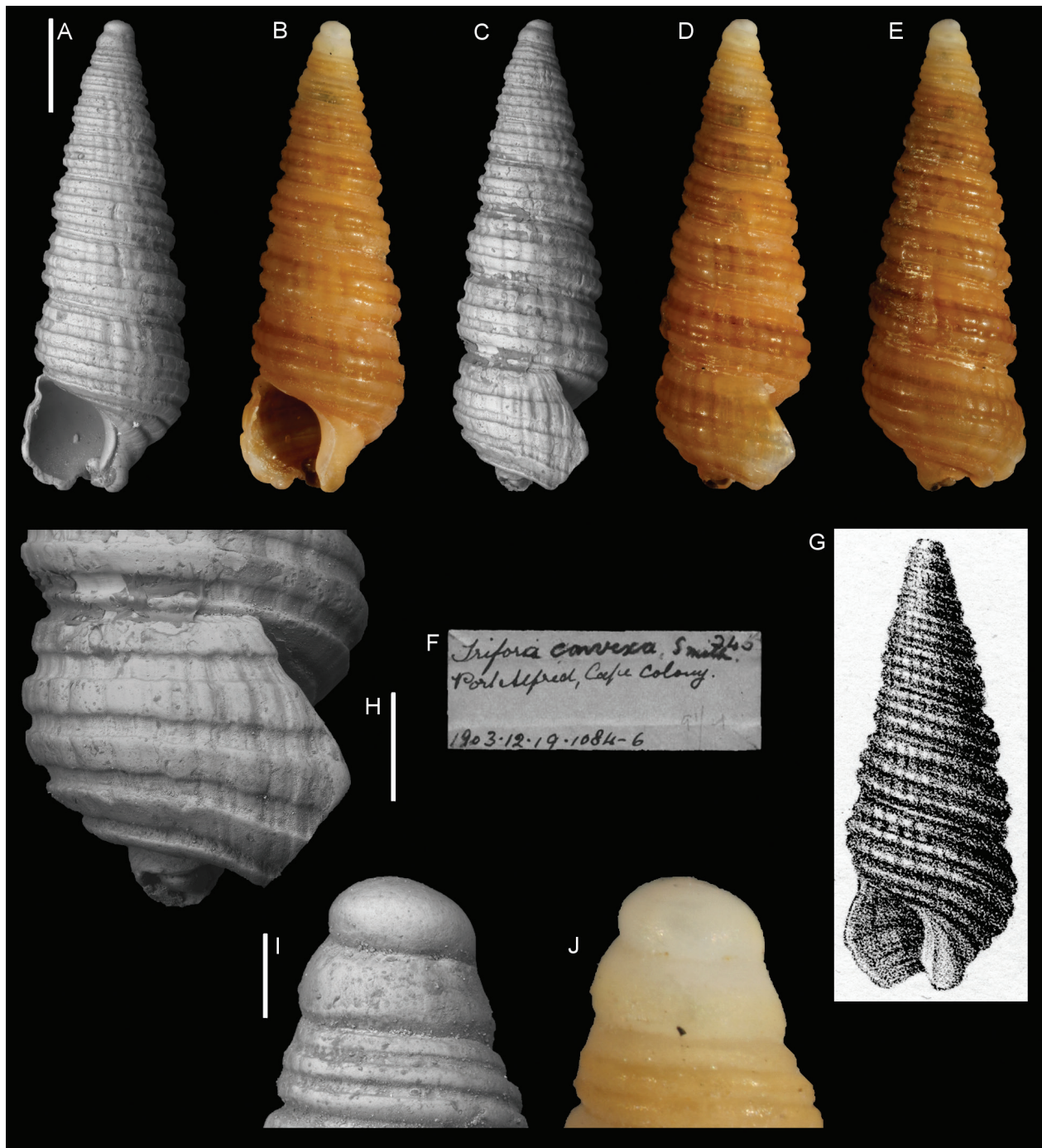


Figure 85. *Trifora convexa* E.A. Smith, 1904, Port Alfred, South Africa. A–F, H–J Syntype NHMUK 1903.12.19.1084: front (A, B), side (C, D), back (E), original label (F), peristome (H), protoconch (I, J). G Original figure. Scale bars: A–E: 1 mm; H: 0.5 mm; I, J: 0.2 mm.

the aperture; small subquadrate aperture, anteriorly with a very short oblique sinus; thin lip, posteriorly indented near the suture, in the middle lightly flared, with faint marginal crenulations.

Height 11.5 mm, diameter 2.25 mm.

Diagnosis. Syntype NHMUK 1903.12.19.1087 (Fig. 86A–E) 9.1 mm high. Very slender shell, slightly cyrtocoid. Teleoconch of 14 flat whorls bearing four thick flat spiral cords made up of coalescent tubercles. A fifth

thin smooth cord is visible between the second and the third on the last few whorls but never attains full size. A thin smooth cord is also visible suprasuturally. Base with three additional cords similar in appearance to those on the whorls. Peristome with a deep posterior sinus. Siphonal canal short. Protoconch paucispiral with a large smooth first whorl followed by two whorls with three smooth spiral cords. Transition with teleoconch poorly marked. Teleoconch orange to brown; protoconch white.

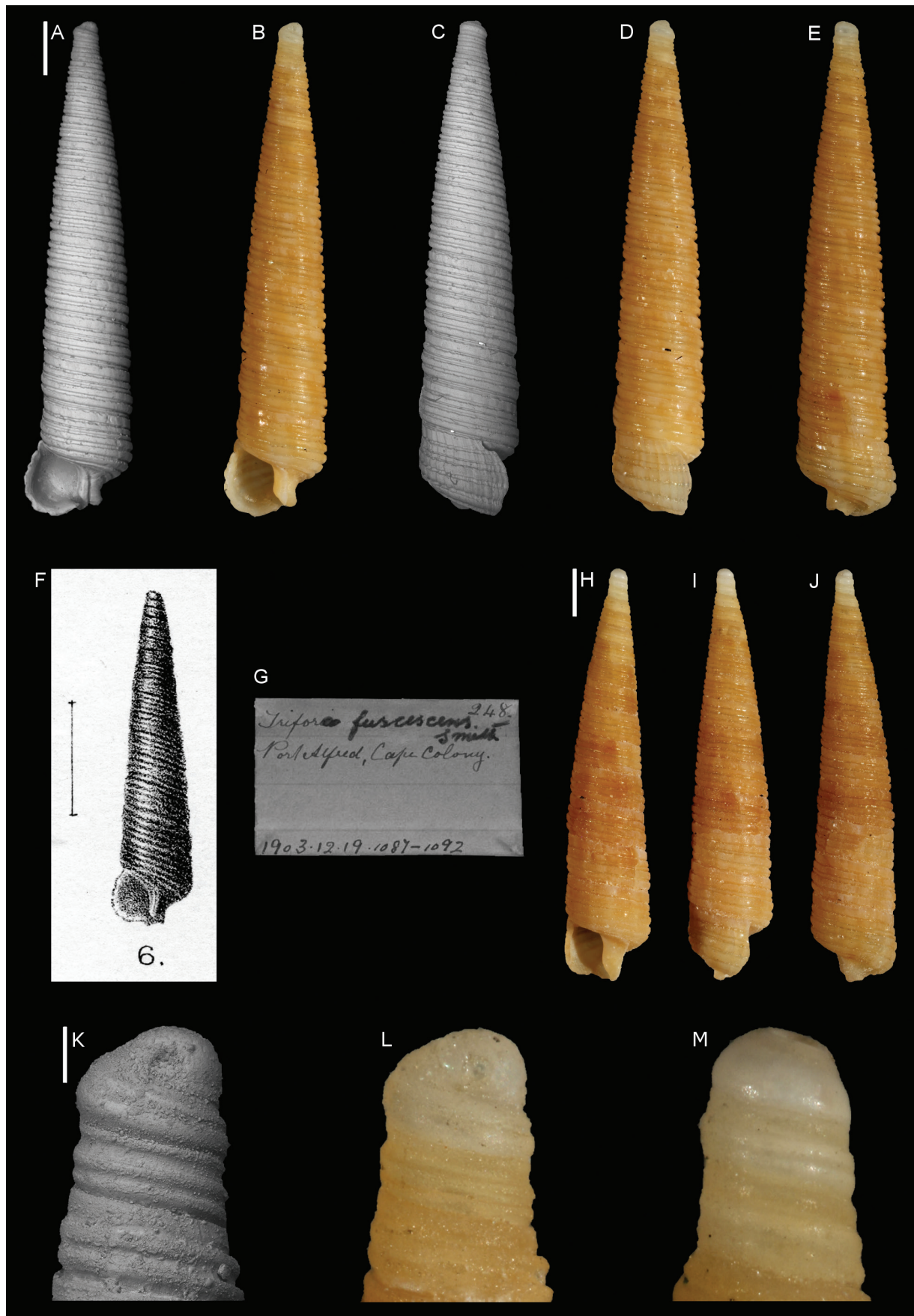


Figure 86. *Triphora fuscescens* E.A. Smith, 1904, Port Alfred, South Africa. A–E, K, L Syntype NHMUK 1903.12.19.1087: front (A, B), side (C, D), back (E), protoconch (K, L). H–J, M Syntype NHMUK 1903.12.19.1088: front (H), side (I), back (J), protoconch (M). F. Original figure. G Original label. Scale bars: A–E, H–J: 1 mm; K–M: 0.2 mm.

Trifora fuscomaculata E.A. Smith, 1904

Figure 87

Trifora fuscomaculata E.A. Smith 1904: 37, pl. 3, figs 7, 8.

Type locality. “Port Alfred, Cape Colony” (Cape of Good Hope, South Africa).

Type material. Lectotype: NHMUK 1903.12.19.1078, here designated. Paralectotype: NHMUK 1903.12.19.1079, 1 specimen, Port Alfred, South Africa.

Additional material. *Triphora* sp. (*T. fuscomaculata* var. of E.A. Smith, but not conspecific), NHMUK 1903.12.19.1080–1083, 4 specimens, Port Alfred, South Africa.

Original description. *Testa elongata, gracilis, alba, fusco irregulariter maculata; anfractus circiter 20 planiusculi, lente accrescentes, quadricingulati, cingulis tuberculatis, duobus medianis aliis majoribus, longitudinaliter sulcati, subcancellati, ultimus infra peripheriam cingulis tribus haud granosis ornatus; apertura rotunde quadrata, antice breviter oblique canaliculata; columella supra arcuata, callo tenui induta.*

Longit. 17 millim., *diam.* 3.5.

Var. (Pl. iii, fig. 8) *Testa angustior, minor, cingulis tribus, superioribus aequalibus, distinctius et confertim tuberculatis.*

Longit. 15 millim., *diam.* 3

The typical form is more distinctly blotched with brown than the variety.

Translation of the Latin text. Elongated shell, slender, white, with irregular brown spots; about 20 nearly flat whorls, growing slowly, with four tuberculated cords, the two in the middle larger than others, longitudinally grooved, subcancellated, the last with three granulated cords under its periphery; aperture subquadrate, anteriorly with a very short oblique sinus; columella superiorly arched covered by a thin callus.

Height 17 mm, diameter 3.5 mm.

Variety in pl. iii, fig. 8, shell more slender, smaller, with three cords. The uppermost of the same size, clearly tightly tuberculated.

Diagnosis. Lectotype 14.4 mm high. Shell conical with flat sides and obsolete sutures. The lectotype lacks the apical part. The remaining teleoconch has 12 whorls bearing four thin spiral cords with faint tubercles at the intersection with faint prosocline axial ribs. Numerous fine spiral striae are visible in the wide interspaces. Peristome badly damaged. Periphery angulated at the base, which bears four additional weakly sculptured spiral cords. Siphonal canal damaged but apparently short. Protoconch missing. Teleoconch white with orange blotches.

Remarks. In the box of this lot there is a capsule with two specimens of *T. fuscomaculata* s.s. and a second capsule with four specimens of a variety that E.A. Smith cited but not fully described in his work (1904). These four shells (Fig. 87K–N) have well-defined tubercles and an impressed suture which qualify them as a distinct species. Therefore, we have designated a lectotype which closely matches the original figure to stabilize the nomenclature.

Triforis gracilior E.A. Smith, 1903

Figure 88

Triforis gracilior E.A. Smith 1903: 614, pl. 35, figs 18, 19.

Type locality. S. Nilandu Atoll, 1–36 fathoms, Maldives.

Type material. Syntypes: NHMUK 1903.9.17.16: 1 specimen, Maldive Islands.

Original description. *Testa T. excellenti similis, sed gracilior; cingulis duobus inferioribus subundulatis, alba, hic illic fusco maculata.*

Longit. 28 mm., *diam.* 5½ mm.

Like *T. excellens*, this species has three keels upon each whorl, but they are not so equal, the uppermost being a trifle more slender than the others. The latter also are slightly affected by faint longitudinal depressions giving them an obscurely beaded appearance. The body-whorl is bicarinate at the periphery and has three or four lirae beneath. As in the preceding species, the space between the second and third keel is a little broader than that which separates the first and second, and the suture is filo-lirate.

Translation of the Latin text. Shell similar to *T. excellens*, but more slender, the two lower cords are slightly undulated, white with irregular brown spots.

Height 28 mm, diameter 5½ mm.

Diagnosis. Syntype 29.4 mm high. Shell conical, very elongated; apical part missing. The remaining teleoconch has 23 whorls bearing two main thin weakly tubercled spiral cords; two more thin ones are visible sub- and suprasuturally. Base with three additional faint spiral cords. Peristome with a shallow posterior sinus. Siphonal canal slightly elongated. Protoconch missing. Teleoconch white with narrow orange vertical flecks.

Remarks. The general appearance and sculpture is very similar to *T. smithi* G.B. Sowerby III, 1904, although the latter lacks the orange flecks observable in *T. gracilior*. E.A. Smith (1916) suggested that *T. smithi* is a synonym of *T. gracilior*.

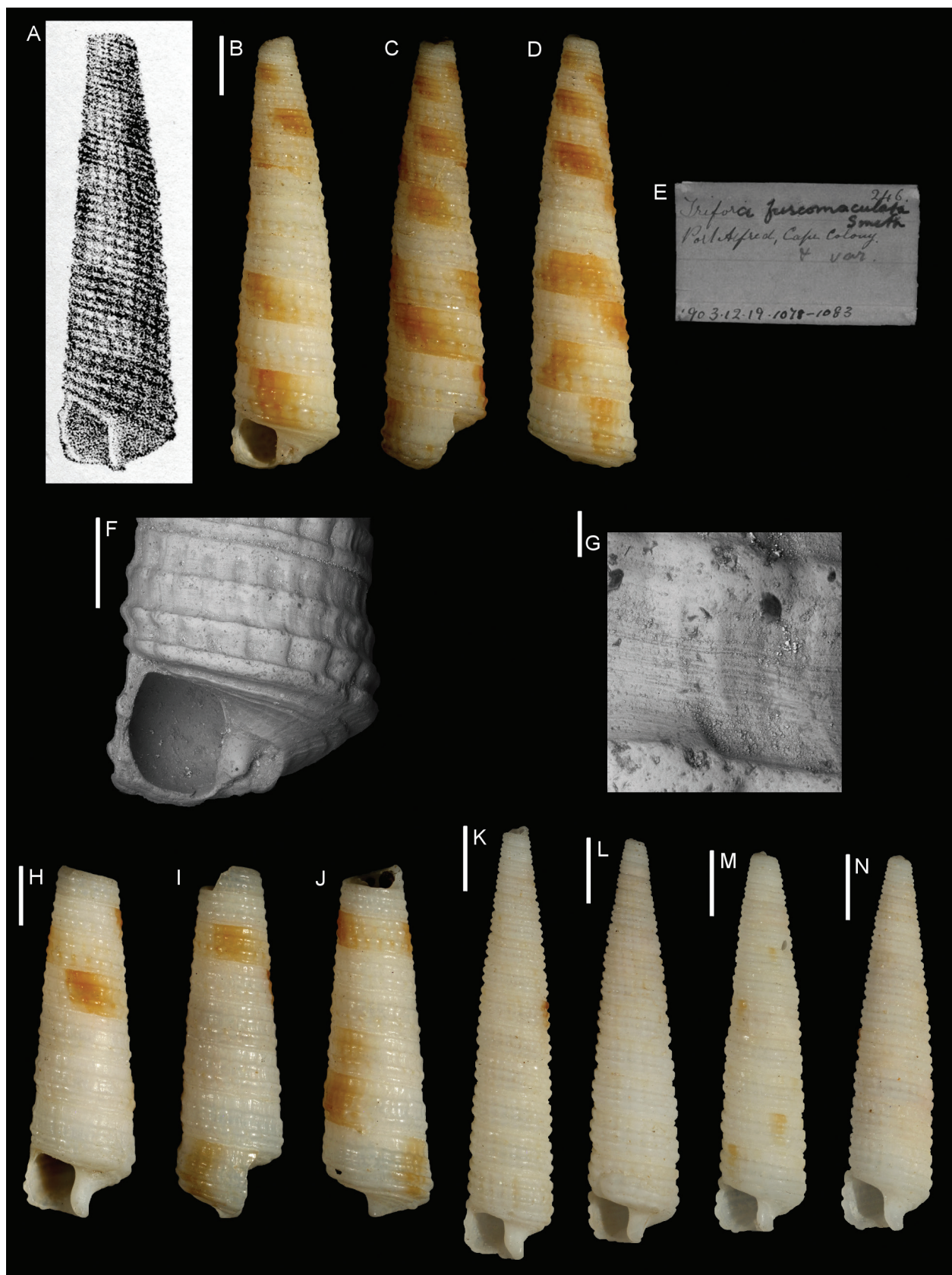


Figure 87. *Triphora fuscomaculata* E.A. Smith, 1904. **A** Original figure. **B–D, F, G** Lectotype NHMUK 1903.12.19.1078, Port Alfred, South Africa: front (**B**), side (**C**), back (**D**), aperture (**F**), microsculpture (**G**). **E** Original label. **H–J** Paralectotype, NHMUK 1903.12.19.1079, Port Alfred, South Africa: front (**H**), side (**I**), back (**J**). **K–N** *Triphora* sp. (*fuscomaculata* var., sensu E.A. Smith 1904), NHMUK 1903.12.19.1080–1083, Port Alfred, South Africa. Scale bars: **B–D, H–N**: 2 mm; **F**: 0.2 mm; **G**: 0.1 mm.

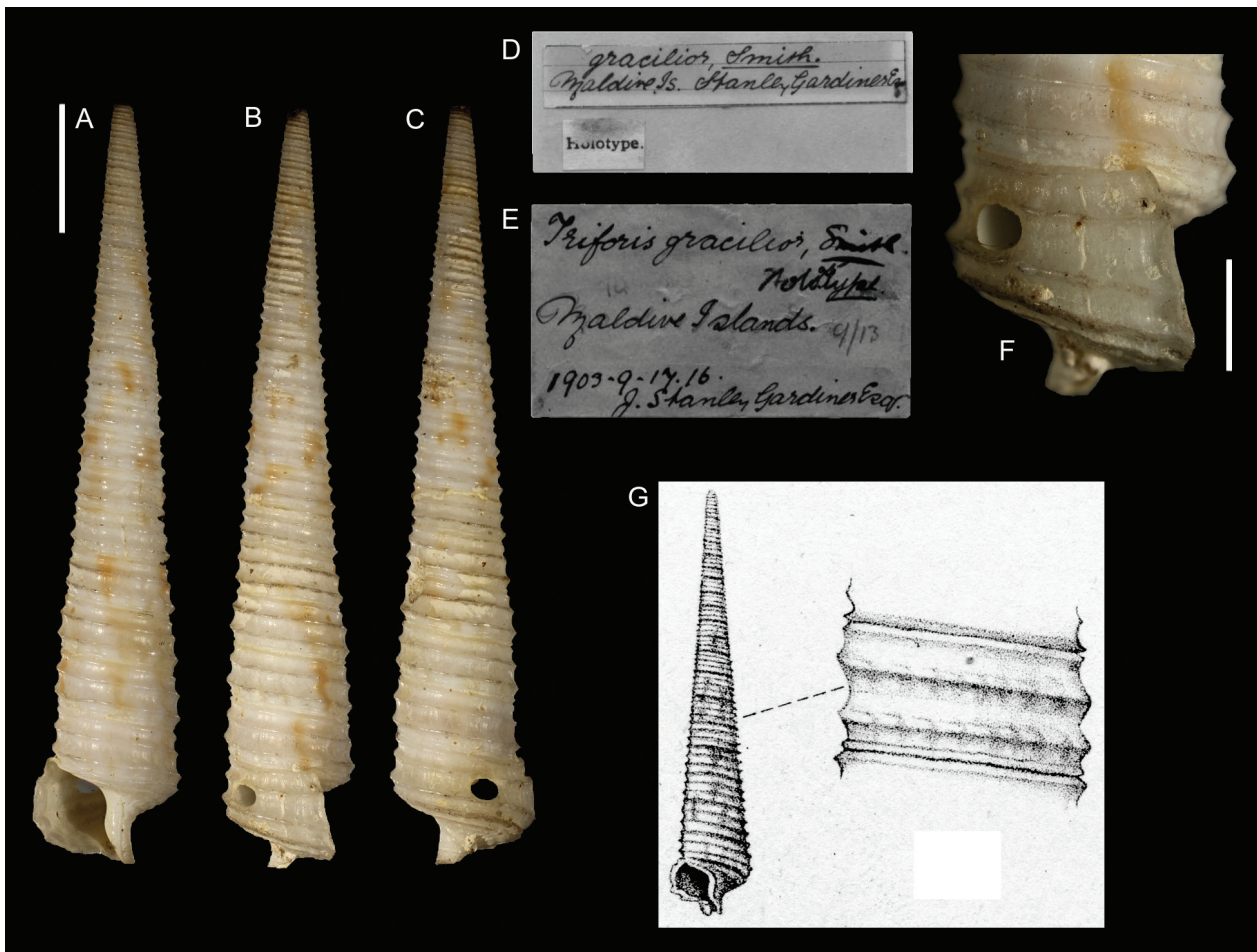


Figure 88. *Triforis gracilior* E.A. Smith, 1903, South Nilandu Atoll, Maldives. A–F Syntype NHMUK 1903.9.17.16: front (A), side (B), back (C), original labels (D, E), peristome (F). G Original figures. Scale bars: A–C: 4 mm; F: 2 mm

Triforis lilaceocinctus E.A. Smith, 1903

Figure 89

Triforis lilaceocinctus E.A. Smith 1903: 613, pl. 35, fig. 15.

Type locality. Miladumadulu Atoll, 3–28 fathoms, Maldives.

Type material. Syntypes: NHMUK 1903.9.17.13: 1 specimen, Maldives Islands.

Original description. *Testa elongato-pupoidea, supra acuminata, granulis flavescens et albis, lirata, inter granula rufo punctata; anfractus circiter 15, superiores liris duabus granosis aequalibus instructi, pauci anteriores lira graciliore mediana, dilute lilacea, vix granulata ornata, sutura lineari sejuncti, microscopice spiraliter striati, ultimus circa basim lilaceus, liris aliis tribus nodulosis, rufo punctatis, instructis; apertura obliqua, piriformis; canalis parvus, dextrorsus, semiclausus.*

Longit. 10½ mm., *diam.* 3½ mm.

A general glance at this pretty species gives the impression that the whorls have each two adjacent rows of large granules. Such however is not the case. It is the lower row in one whorl being adjacent to the upper one in another (the linear suture being between) that gives this appearance, the unspotted and more slender median lirae also lending to the effect. This lira gradually dies out as it ascends the spire, so that the upper whorls have only two rows of equal sized granules. This species also occurs at the Mauritius (Brit. Mus.).

Translation of the Latin text. Shell pupoid-elongate, pointed at the top, yellowish and white tuberculated cords, spotted with red among tubercles; about 15 whorls: the upper ones with two equal tuberculated cords; a few lower ones with a median thin cord, lightly lilac and barely granose, separated by a linear suture, microscopically spirally striated; the last lilac near the base, which has three additional nodose cords, spotted by red; oblique aperture, pyriform; small anterior siphon, dextral, semiclosed.

Length 10½ mm, diameter 3½ mm.

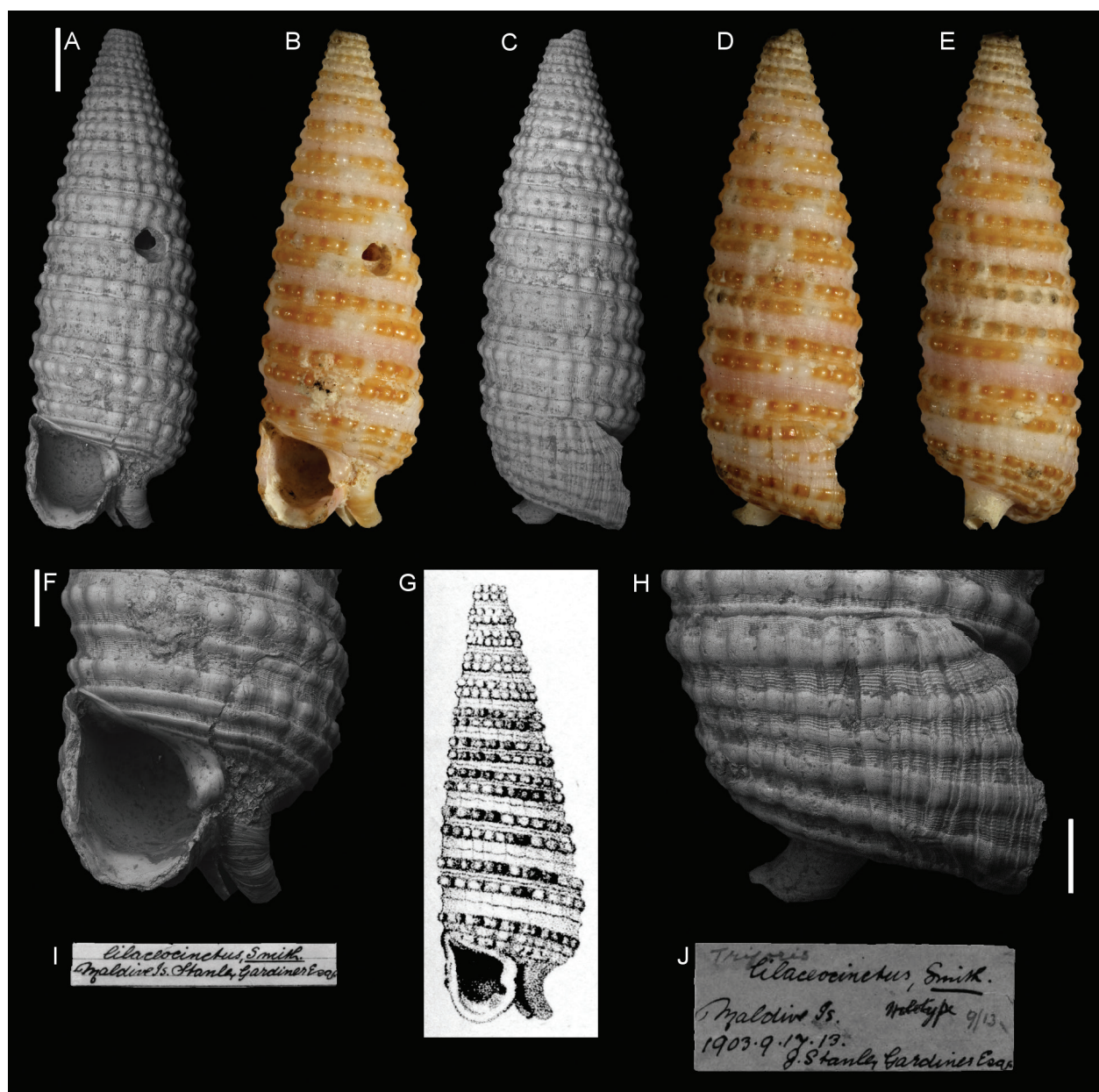


Figure 89. *Triphoris lilaceocinctus* E.A. Smith, 1903, Miladumadulu Atoll, Maldives. A–F, H Syntype NHMUK 1903.9.17.13: front (A, B), side (C, D), back (E), aperture (F), peristome (H). G Original figure. I, J Original labels. Scale bars: A–E: 1 mm; F, H: 0.5 mm.

Diagnosis. Syntype 7.8 mm high. Shell cyrtocoid, apex missing in the syntype. Teleoconch with 11 flat whorls with two main spiral cords bearing tubercles at the intersection with orthocline axial ribs. Another spiral cord develops at mid shell height in the wide interspace between the main two, but remains much thinner than the others. An additional fourth narrow smooth cord is visible suprasuturally. The interspaces are filled by numerous thin spiral and axial threads giving a cancellate microsculpture until the penultimate whorl, where the axial sculpture fades away. Peristome with one additional spiral cord and a deep posterior sinus. Siphonal canal long. Base showing a fifth and sixth weakly sculptured spiral cords. Protoconch missing. Teleoconch white to pink with the main

spiral cords with orange blocks with interspaces between tubercles usually darker.

Triphoris pura E.A. Smith, 1903

Figure 90

Triphoris pura E.A. Smith 1903: 614, pl. 35, figs 20, 21.

Type locality. Mahlos Atoll, 4–24 fathoms, Maldives.

Type material. Syntypes: NHMUK 1903.9.17.14: 1 specimen (glued on paper), Maldives Islands.

Original description. *Testa elongata, alba, clathrata, granulata; anfractus circiter 20, fere plani, costis spiralibus tribus granosis inaequalibus (costa mediana minima) cincti, inter costas longitudinaliter costati, ultimus costis senis (prope labrum duabus intercalatis) ornatus; canalis dextrorsus, clausus, laevis; apertura irregulariter ovata, obliqua; labrum antice prominens, postice recedens; columella callo crassiusculo reflexo induta.*

Longit. 14 mm., diam. 3.

Of the three spirals the uppermost is a little stouter than the lowermost and the central one is rather finer than the latter. The granules form oblique rows of three, being connected by the longitudinal costae. The suture is thread-like.

Translation of the Latin text. Elongated shell, white, cancellated, granose; about 20 whorls, nearly flat, encircled by three unequal tuberculated spiral rows (the intermediate the least), ribbed longitudinally among the rows, the last whorl with six cords (with two additional ones near the lip); anterior siphon dextral, closed, slender; aperture irregularly ovate, oblique; lip anteriorly projecting, posteriorly retracting; columella covered by a rather thick bent callus.

Height 14 mm, diameter 3 mm.

Diagnosis. Syntype 14.1 mm high. Shell slightly cyrtocoid, syntype without the apex. Teleoconch of minimum 13 flat whorls with three spiral cords with faint tubercles at the intersections with prosocline axial ribs; the first cord is remarkably thicker than the other two. A fourth smooth suprasutural cord is easily visible. Peristome with an additional spiral cord and a shallow posterior sinus. Base with two weakly tubercled spiral cords and an additional narrow one between the fourth and the fifth. Siphonal canal long. Protoconch missing. Teleoconch pure white.

***Trifora shepstonensis* E.A. Smith, 1906**

Figure 91

Trifora shepstonensis E.A. Smith 1906: 43–44, pl. 7, figs 12, 12a.

Type locality. Port Shepstone, Kwa-Zulu Natal, South Africa.

Type material. Lectotype: NHMUK 1906.6.23.11, here designated. Paralectotype: NHMUK 1906.6.23.12.

Additional material. *Triphora* sp. (not *shepstonensis*), NHMUK 1927.2.9.323–325, 3 specimens, Port Alfred, South Africa (coll. Turton).

Original description. *Testa elongata, subulata, fuscescens; anfractus circiter 15, plani, tricingulati, cingulis plus minus moniliformibus, mediani caeteris minori, in sulcis liris longitudinalibus decussati, ultimus liris*

5 ornatus; apertura parva, albida; labrum tenue interdum productum, columellam antice attingens; columella supra arcuata, callo crassiusculo reflexo induta; canalis brevis, obliquus, recurvus. Longit. 10 mm., diam. 2.5.

Hab.—Port Shepstone (Burnup).

The spiral ridges are crossed by oblique shallow sulci so as to produce a somewhat beaded appearance.

Translation of the Latin text. Elongated shell, subulate, brownish; about 15 flat whorls, with three cords more or less moniliform, the intermediate less than the others, crossed by longitudinal striae inside the cord interspaces, last whorl with 5 cords. Small aperture, white; lip thin sometimes projecting, reaching anteriorly the columella; columella arched above, covered by a rather thick bent callus; anterior siphon short, oblique, curved. Height 10 mm, diameter 2.5 mm.

Diagnosis. Lectotype 7.9 mm high. Shell slightly cyrtocoid. Teleoconch of 11 whorls with three spiral cords bearing coalescent tubercles. A very fine smooth spiral cord is visible suprasuturally. Peristome damaged and repaired in the lectotype. Siphonal canal short. Base with a fifth weakly sculptured spiral cord. The apex is very worn in the lectotype, but based on the very broad first teleoconch whorl, the species may bear a paucispiral protoconch. Teleoconch pinkish with a brown suture.

Remarks. The date of publication of E.A. Smith's (1906) paper follows Trew (1993). The type collection contained also lot NHMUK 1927.2.9.323–325 (Fig. 91I–K) whose specimens lack the typical coalescent tubercles of *T. shepstonensis* and certainly belong to a different species. Therefore, we designated a lectotype which closely matches the original figure to stabilize the nomenclature.

Species described by G.B. Sowerby III

George B. Sowerby III described eight species of *Triphoridae*, of which only *Triforis innocens* G.B. Sowerby III, 1921 was not found in NHMUK; this species was described from Port Alfred, South Africa, and based on the material from W.H. Turton. Sowerby also described *Triforis abnormalis* in 1903, which is a member of the Newtoniellidae (currently: *Ataxocerithium abnormale*).

***Triphora eupunctata* G.B. Sowerby III, 1907**

Figure 92

Triphora eupunctata G.B. Sowerby III 1907: 301, pl. 25, fig. 7.

Type locality. New Caledonia.

Type material. Lectotype: NHMUK 1907.8.28.46, here designated. Paralectotype: NHMUK 1907.8.28.47: 1 specimen, New Caledonia. A third specimen NHMUK 1907.8.28.48 may not belong to this species; see Remarks.

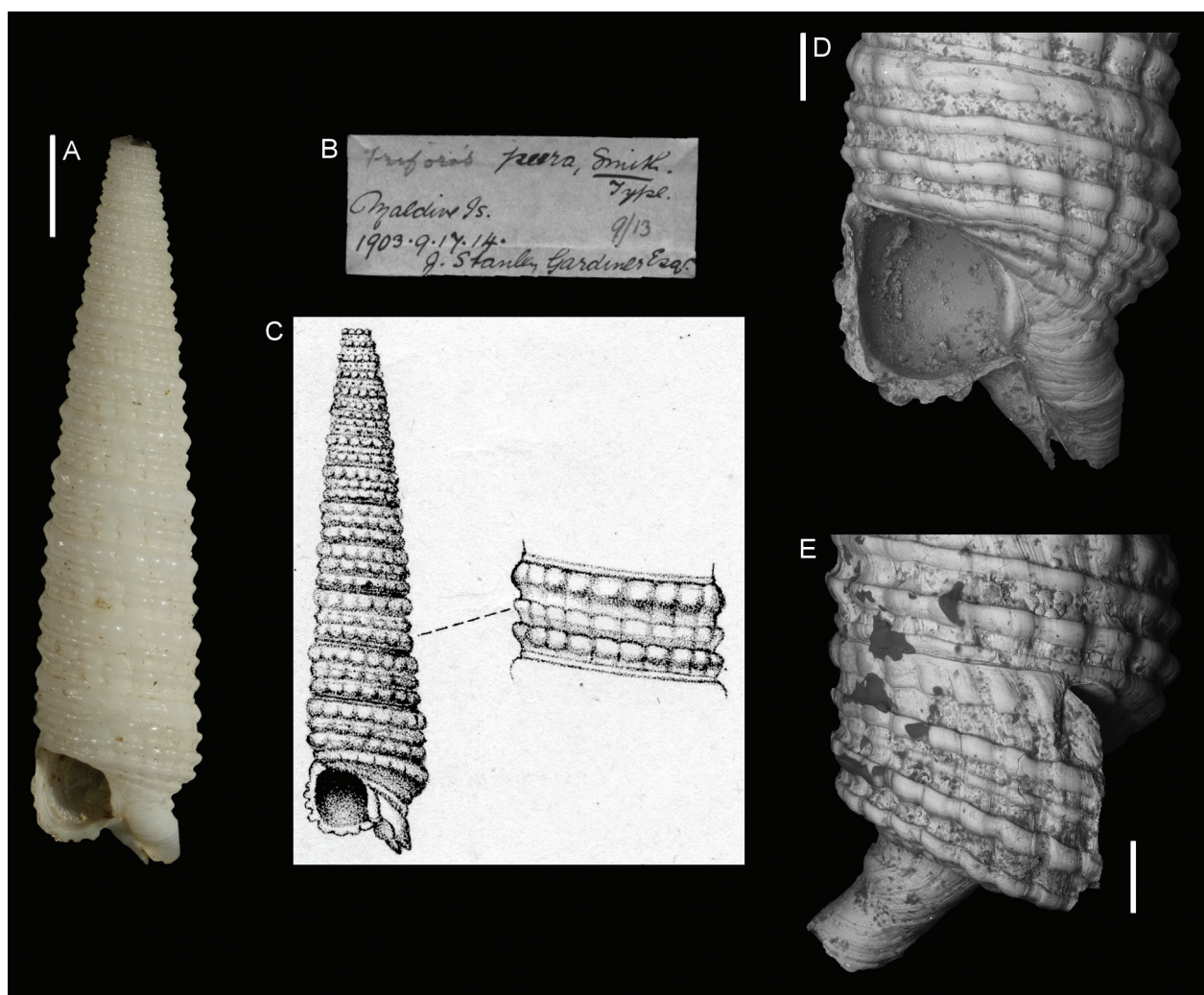


Figure 90. *Triforis pura* E.A. Smith, 1903, Maldives Islands. **A, D, E** Syntype NHMUK 1903.9.17.14: front (**A**), aperture (**D**), peristome (**E**). **B** Original label. **C** Original figures. Scale bars: **A**: 1 mm; **D, E**: 0.5 mm.

Original description. Testa sinistrorsa, elongata, convexiuscula, ad apicem acuminata, pallide rufo-fusca, nitens, fusco seriatim punctate; anfractus 16–17, planati, vix convexi, cingulis 3 eximie gemmiferis, cingula tertia gemmis fusco interpunctatis ornati, sutura canaliculata creno-lirata discreti; ultimus brevis, infra obtuse angulatus, ad basin liris 2 angustis crenulatis munitus; rostrum breve, crassum, obliquum; apertura oblique subquadrata. Long. 10, diam. 2.5 mm.

Hab.—New Caledonia (Bouge).

Shell light reddish brown, shining, closely and beautifully beaded in three rows on each whorl, spotted with brown between the beads of the lower rows; the whorls are separated by a channelled suture, in which may be observed a crenulated ridge; the last whorl has two narrow crenulated keels at the base.

Translation of the Latin text. Elongated and rather convex sinistral shell with acuminate apex, shining, light reddish brown spotted with brown; 16–17 strongly convex whorls with three strong beaded rows, with the third row spotted with brown between the beads, channelled suture with a crenulated ridge; last whorl obtusely angulated and with two narrow crenulated keels at the base; siphonal ca-

nal short, large, deviate; subquadrate, oblique peristome. Length 10, diameter 2.5 mm.

Locality: New Caledonia (Bouge)

Diagnosis. Lectotype height 7.6 mm. Shell slightly cyrtoconoid with flat whorls. Teleoconch of 12 whorls with three spiral cords with tubercles at the intersection with orthocline axial ribs. The second cord starts on the fifth whorl as a fine thread and is fully developed on the last three whorls only. A fourth smooth suprasutural cord is visible as well as very fine spiral and faint axial threads in interspaces. An additional spiral cord runs on the peristome between the second and the third. Siphonal canal short. The base has one additional weakly granulated spiral cord and an obsolete one running on the siphonal canal. Protoconch missing in the type series. Background colour yellowish to light brown; the third spiral cord bears a characteristic colouration of white tubercles and brown interspaces.

Remarks. The lot NHMUK 1907.8.28.46–48 contains three specimens: the lectotype (1907.8.28.46) and the paralectotype (1907.8.28.47), here designated, and a

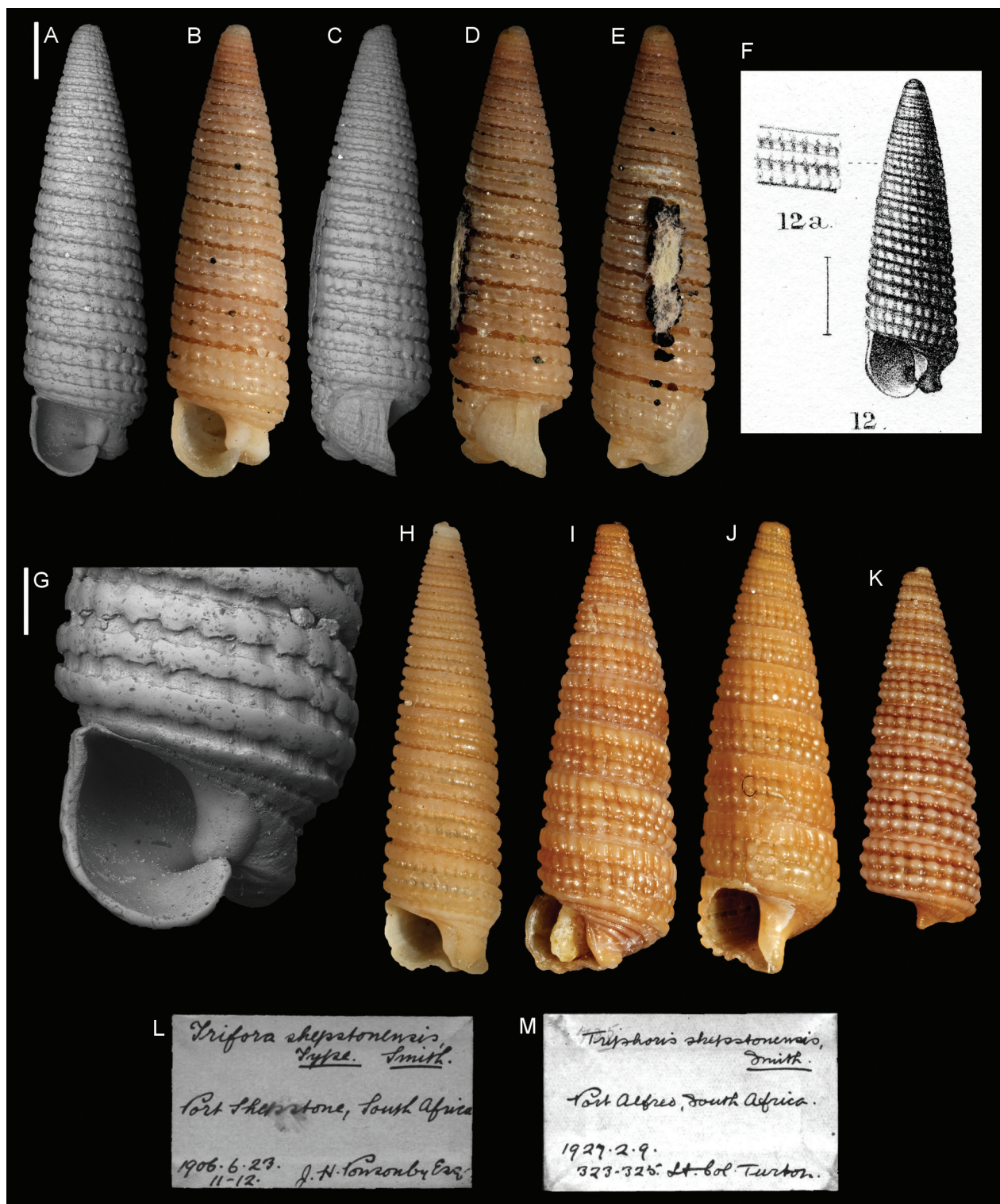


Figure 91. *Trifora shepstonensis* E.A. Smith, 1906. A–E, G Lectotype NHMUK 1906.6.23.11, Port Shepstone, South Africa: front (A, B), side (C, D), back (E), aperture (G). F Original figures. H Paralectotype, NHMUK 1906.6.23.12, Port Shepstone, South Africa: front. I–K *Trifora* sp. (not *shepstonensis*), NHMUK 1927.2.9.323–325, Port Alfred, South Africa (coll. Turton). L, M Original labels. Scale bars: A–E: 1 mm; G: 0.5 mm.

third specimen (1907.8.28.48) very similar in overall shape and sculpture, but with a thin brown line on the third spiral cord rather than white tubercles with brown interspaces. It is unclear if this difference has relevance to discriminate between species, but because Sowerby

clearly specified the presence of brown spots between the tubercles rather than a continuous line, we have selected a lectotype fitting the original description to stabilize the nomenclature.

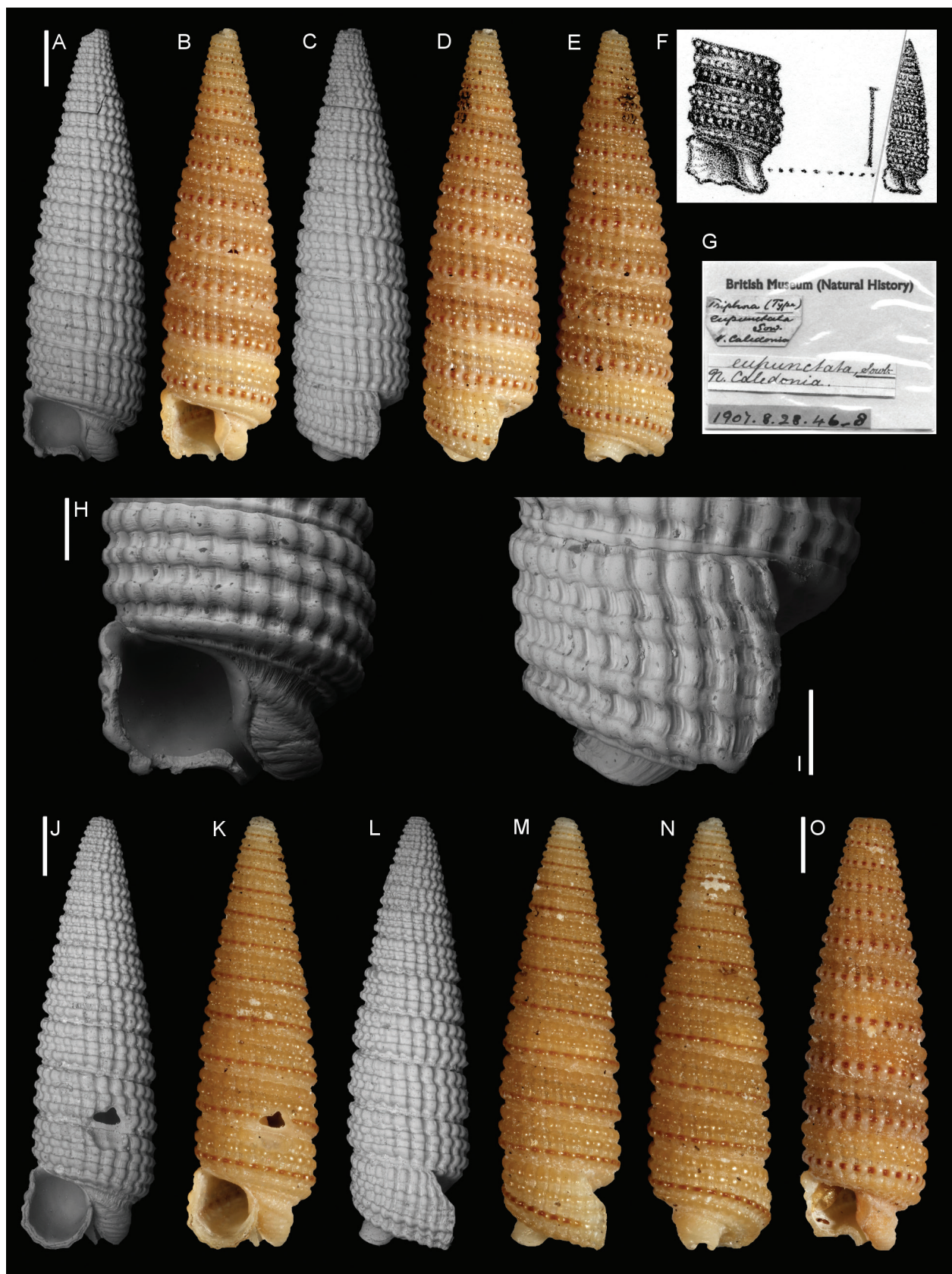


Figure 92. *Triphora eupunctata* G.B. Sowerby III, 1907, New Caledonia. A–E, H, I Lectotype NHMUK 1907.8.28.46: front (A, B), side (C, D), back (E), aperture (H), peristome (I). F Original figures. G Original labels. J–N NHMUK 1907.8.28.48 (probably not *T. eupunctata*): front (J, K), side (L, M), back (N). O Paralectotype, NHMUK 1907.8.28.47: front. Scale bars: A–E, J–O: 1 mm; H, I: 0.5 mm.

***Triphora fuscoapicata* G.B. Sowerby III, 1907**

Figure 93

Triphora fuscoapicata G.B. Sowerby III 1907: 301, pl. 25, fig. 9.**Type locality.** Cebu Island, Philippines.**Type material.** Syntypes: NHMUK 1907.8.28.38–40: 3 specimens, Cebu Island, Philippines.

Original description. Testa sinistrorsa, elongato-acuminata, ad apicem acutissima, albida, hic illic fusco minute punctata, ad apicem brunnea; anfractus circa 18, embryonales 5–6 planato-declives, leaves, sequentes cingulis spiralibus gemmates 2 (interdum lira minuta interveniente) ornate, sutura impressa discreti; ultimus quadriseriatim gemmatus, infra angulatus, prope aperturam tubulatum forato munitus, ad basin depressus; rostrum crassiusculum, oblique recurvum; apertura parva, subcircularis; labrum tenue. *Long.* 5.5, *diam.* 1.12 mm.

Hab.—*Island of Cebú, Philippines.*

The principal feature distinguishing this species is that the embryonic whorls, numbering 5 or 6, are dark brown, showing conspicuously against the whiteness of the subsequent whorls.

Translation of the Latin text. Elongate slender sinistral shell with a very sharp apex, whitish with sparse small brown dots, and with a brown apex; about 18 whorls, 5–6 flat-sloping away embryonic, subsequent with two beaded spiral rows (sometimes with a fine lira in between), impressed suture; last whorl with four rows, angulated at the base, with a tubular aperture near the peristome, with a depressed base; rather obtuse, recurved siphonal canal; small subcircular aperture, thin external lip. Length 5.5, diameter 1.12 mm.

Locality: Island of Cebú, Philippines.

Diagnosis. Syntypes ranging between 4.6 and 5.9 mm high and show considerable variation in adult shell size. Shell cyrtocooid with flat whorls. Teleoconch of 10–13 whorls, with three spiral cords bearing tubercles at the intersections with prosocline axial ribs. The second cord appears on the fifth whorl as a narrow thread and always remains smaller than the other cords. A fourth smooth suprasutural cord is visible throughout the shell. Between the main cords run numerous fine finely tubercled spiral ribs. The peristome is well developed with additional spiral cords between the main ones. Posterior sinus well developed and protruding as a very short canal. Anterior canal quite long. Base almost flat, with a sharp angle at the periphery marked by a faint smooth spiral cord. Multispiral protoconch of six whorls; the first almost smooth, the second with numerous pustules abapically and short axial riblets apically, and the third with numerous riblets and a single spiral keel which become two in the remaining whorls. Teleoconch whitish to very light brown, first two or three whorls pure white; protoconch brown.

***Triphora fuscozonata* G.B. Sowerby III, 1907**

Figure 94

Triphora fuscozonata G.B. Sowerby III 1907: 301, pl. 25, fig. 8.**Type locality.** New Caledonia.**Type material.** Syntypes: NHMUK 1907.8.28.36: 1 specimen, New Caledonia.

Original description. Testa sinistrorsa, elongata, acute acuminata, nigro-fusco fasciata; anfractus 18, leviter convexi, gemmis rotundatis confertis biseriatis (lira angusta interveniente) ornate, sutura impressa discreti; ultimus curtus, liris 6 minute gemmulatis, prope basin leviter obliquum; apertura parva, oblique subtrigona; labrum tenue, postice sinuatum. *Long.* 6, *diam.* 1.5 mm.

Hab.—*New Caledonia.*

This species may be recognized by the dark-brown bands on each whorl; the gem-like nodules common to many species are arranged in two prominent rows, with a narrow intervening crenulated ridge; on the last whorl they are smaller and closer, forming six ridges.

Translation of the Latin text. Elongate sinistral shell with a sharp apex, dark-brown banded; 18 light convex whorls with two rows of gem-like rounded nodules (a narrow intervening ridge), impressed suture; last whorl short, with 6 small gemmulated lirae, slightly slanting near its basis; small aperture, obliquely subtrigonal; thin external lip with a posterior sinum. Length 6, diameter 1.5 mm.

Locality: New Caledonia.

Diagnosis. Syntype 5.3 mm high. Shell conical with flat whorls. Teleoconch of 12 whorls with three spiral cords with tubercles at the intersection with slightly prosocline axial ribs. The second cord starts in the lower part of the shell as a fine thread and never fully develops to the size of the others. Fine axial threads are visible in the interspaces. Peristome incomplete in the syntype, with faint additional spiral cords. Siphonal canal short. The base bears two additional smooth spiral cords. Protoconch incomplete, but clearly multispiral; the three visible whorls have numerous axial ribs and a single spiral keel. Teleoconch whorls dark brown apically and light brown to whitish abapically. Base very light brown to white, siphonal canal brown. Protoconch hyaline, but worn in the syntype.

***Triphora hungerfordi* G.B. Sowerby III, 1914**

Figure 95

Triphora hungerfordi G.B. Sowerby III 1914: 477–478, pl. 19, fig. 10.**Type locality.** Hong Kong.**Type material.** Syntypes: NHMUK 1919.12.31.17: 1 specimen, Hong Kong.

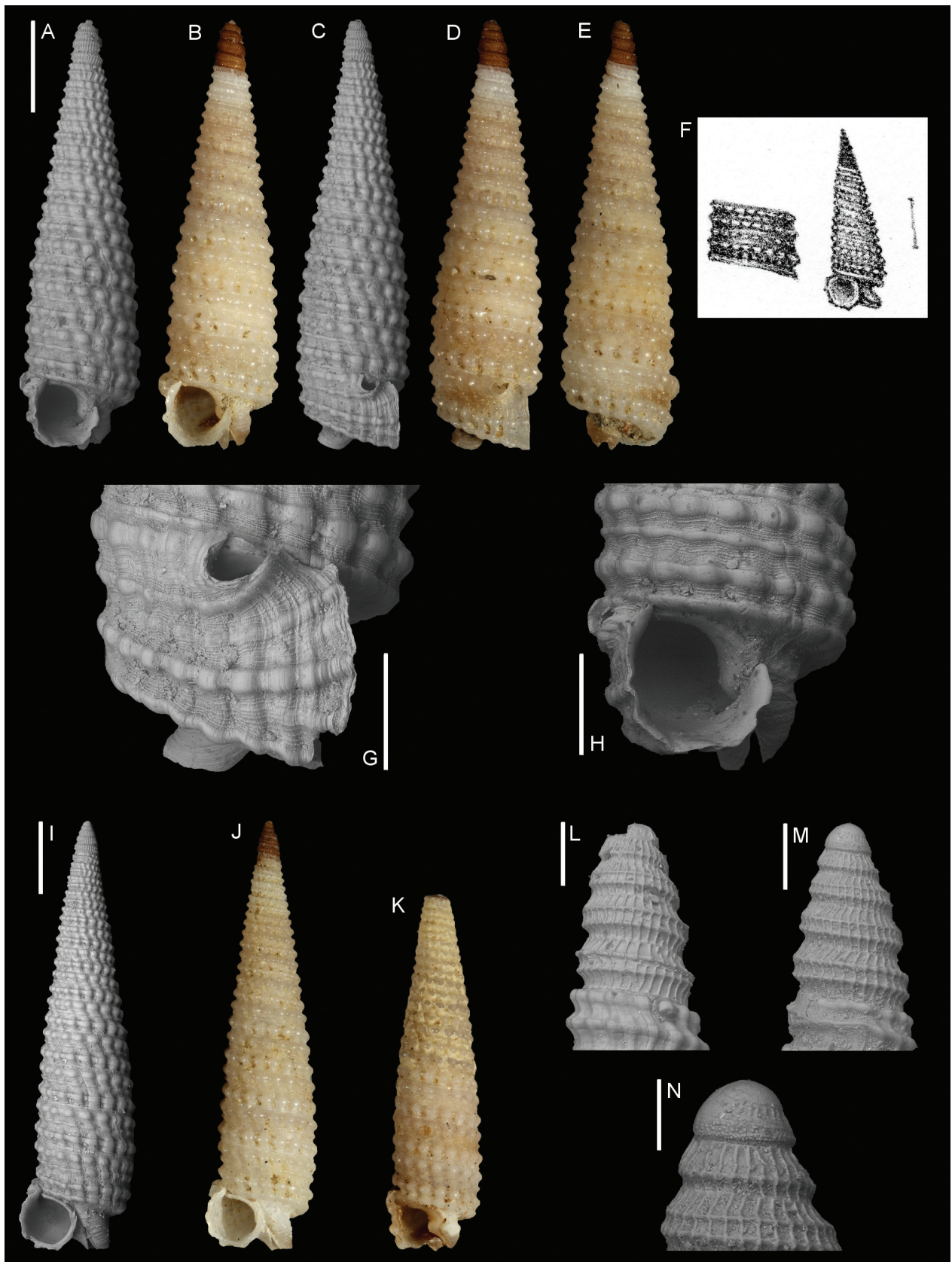


Figure 93. *Triphora fuscoapicata* G.B. Sowerby III, 1907. Cebu Island, Philippines. A–E, G, H, L Syntype NHMUK 1907.8.28.38: front (A, B), side (C, D), back (E), peristome (G), aperture (H), protoconch (L). I, J Syntype NHMUK 1907.8.28.39: front. K, M, N Syntype NHMUK 1907.8.28.40: front (K), protoconch (M, N). F Original figures. Scale bars: A–E, I–K: 1 mm; G, H: 0.5 mm; L, M: 0.2 mm; N: 0.1 mm.

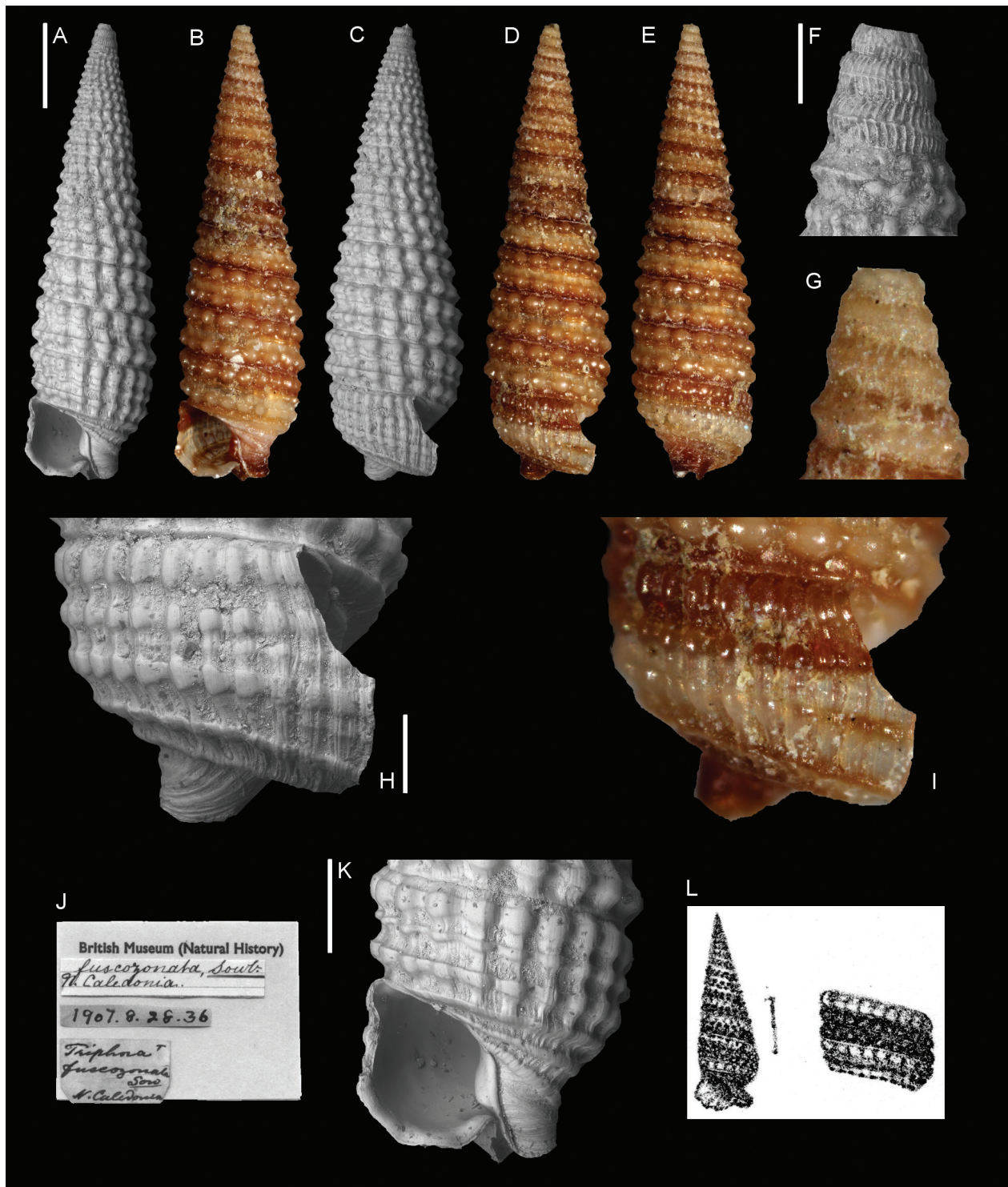


Figure 94. *Triphora fuscozonata* G.B. Sowerby III, 1907, New Caledonia. **A–K** Syntype NHMUK 1907.8.28.36: front (**A**, **B**), side (**C**, **D**), back (**E**), protoconch (**F**, **G**), peristome (**H**, **I**), original labels (**J**) aperture (**K**). **L** Original figures. Scale bars: **A–E**: 1 mm; **F**, **G**: 0.2 mm; **H**, **I**: 0.3 mm; **K**: 0.5 mm.

Original description. Testa sinistrorsa, elongato-acuminata, nigro-fusca; spira elata, leviter convexa; anfractus 12, bi-seriatim pustulati; pustulis rotundatis, glabris, inaequalibus; anfractus ultimus breviusculus, circiter sex-soriati pustulatus; rostrum valide reflexum. Apertura subquadrata; labrum tenue, minute crenulatum; columella obliqua.

Long. 12, *diam.* 2¼ mm.

Hab.—Hongkong.

In general form and appearance this shell differs but little from small dark-coloured specimens of the European T. perversa, but the nodulous spiral ridges are more unequal

and irregular, and not interrupted by longitudinal furrows. A few specimens of this species were brought from Hong-kong many years ago by the late Surgeon-Major R. Hungerford, but until now it has remained nameless.

Translation of the Latin text. Elongate slender dark-brown sinistral shell; high spire slightly convex; 12 whorls with two ridges of rounded smooth irregular pustules; rather short last whorl with about six series of pustules; anterior siphon very reflected. Subquadrate aperture; light external lip slightly crenulated; slanting columella.

Length 12, diameter 21/4 mm.

Locality: Hong Kong.

Diagnosis. Syntype 5.6 mm. Shell conical, with flat sides. Teleoconch of 11 whorls bearing two spiral cords with tubercles at the intersection with slightly prosocline axial ribs. Beginning on the seventh whorl, a fine spiral thread develops between the two major cords but fully develops only on the last whorl. A very fine smooth suprasutural cord is also visible as well as fine axial threads in the interspaces. Peristome with a shallow posterior sinus and additional spiral cords between the main ones. Siphonal canal short. Base with two smooth spiral cords. Protoconch missing. Teleoconch brown with lighter first whorls and tubercles.

Remarks. The original description refers to “a few specimens”, but only one was found in the NHMUK. The other specimens may have been sold and dispersed. *Trifora hungerfordi* closely resembles *Triforis fusca* Dunker, 1860 (Albano and Bakker 2016). However, caution is necessary in establishing these as synonyms because of the lack of the protoconch. In the Indo-Pacific, species with morphologically indistinguishable teleoconchs may have entirely different protoconch types (P.G. Albano and P.A.J. Bakker pers. obs.).

***Triforis picturatus* G.B. Sowerby III, 1901**

Figure 96

Triforis picturatus G.B. Sowerby III 1901: 210, pl. 22, fig. 11.

Type locality. Cebu, Philippines.

Type material. Syntypes: NHMUK 1901.10.3.89–90: 2 specimens, Cebu Island, Philippines.

Original description. *Testa sinistrorsa, elongata, gracilis, albida, nigro-fusco maculata, ad apicem fusca; anfr. 18, planati, vix concavi, liris tribus acutiusculis cincti, inferne angulati ad angulum pustulati, pustulis albidis fusco interpunctatis; anfractus ultimus breviculus, biangulatus, ad basim vix concavus, rostro fusco oblique dextrorsus reflexo instructus; apertura parva, subquadrata; labrum tenue, serratum. Long. 9, diam. 2.5 mm.*

A pretty species, neatly sculptured and nodule, streaked and spotted with blackish brown; with a brown tubular rostrum placed obliquely away from the aperture, on the right hand side of the shell.

Translation of the Latin text. Elongate sinistral slender shell, white with blackish-brown spots and dark apex; 18 flat, barely concave whorls with three sharp spiral lirae, angulated and pustulated anteriorly with alternating dark-brown and white pustules; last whorl short, biangulated, barely concave, dark siphonal canal placed obliquely right from aperture; small subquadrate aperture; light serrated external lip. Length 9, diameter 2.5 mm.

Diagnosis. Syntypes 7.6 and 9.4 mm high. Conical shell with flat whorls. Teleoconch of 12 whorls with three spiral narrow cords that bear oblong tubercles in the first whorls. Such tubercles soon become a continuous weakly undulated spiral cord. A fourth smooth cord is barely visible suprasuturally. Between the main cords, many fine spiral and axial threads are visible. Peristome rebuilt after breakage in one syntype and incomplete in the other but it apparently bears additional spiral cords and a shallow posterior sinus. Base with two additional undulate spiral cords and foliaceous axial riblets. Siphonal canal large and moderately long. Protoconch missing. Teleoconch brown with white blotches and tubercles. Base brown. Operculum horny, thin, ovate, paucispiral of about 2 whorls, nucleus a little eccentric, periphery thinner and only very little upturned.

Remarks. Syntype NHMUK 1901.10.3.89 was collected live and contains the dried animal inside. The operculum was extracted and photographed.

***Triphora princeps* G.B. Sowerby III, 1904**

Figure 97

Triphora princeps G.B. Sowerby III 1904: 174–175, figured.

Type locality. Not reported.

Type material. Holotype: NHMUK 1904.12.23.147, fixed by monotypy.

Original description. *Testa perelongata, sinistrorsa, straminea, postice fusco-tincta, lineis rufo-fuscis numerosis longitudinalibus parum obliquis picta; anfractus circa 40, planulati, sulcis longitudinalibus parum obliquis hic illic foveolatis insculpti, cingulis 4 interruptis pseudo-nodulosi, aliquanto irregularibus, inaequalibus, duo inferioribus majoribus, instructi; anfractus ultimus infra sub-acute angulatus, ad angulum bicarinatus, infra angulum subconcavo-constrictus, carinis 2 aliquanto robustis munitus; rostrum longiusculum, contort-reflexum; apertura subquadrata; labrum tenue. Long. 57, diam. maj. 7 mm.*

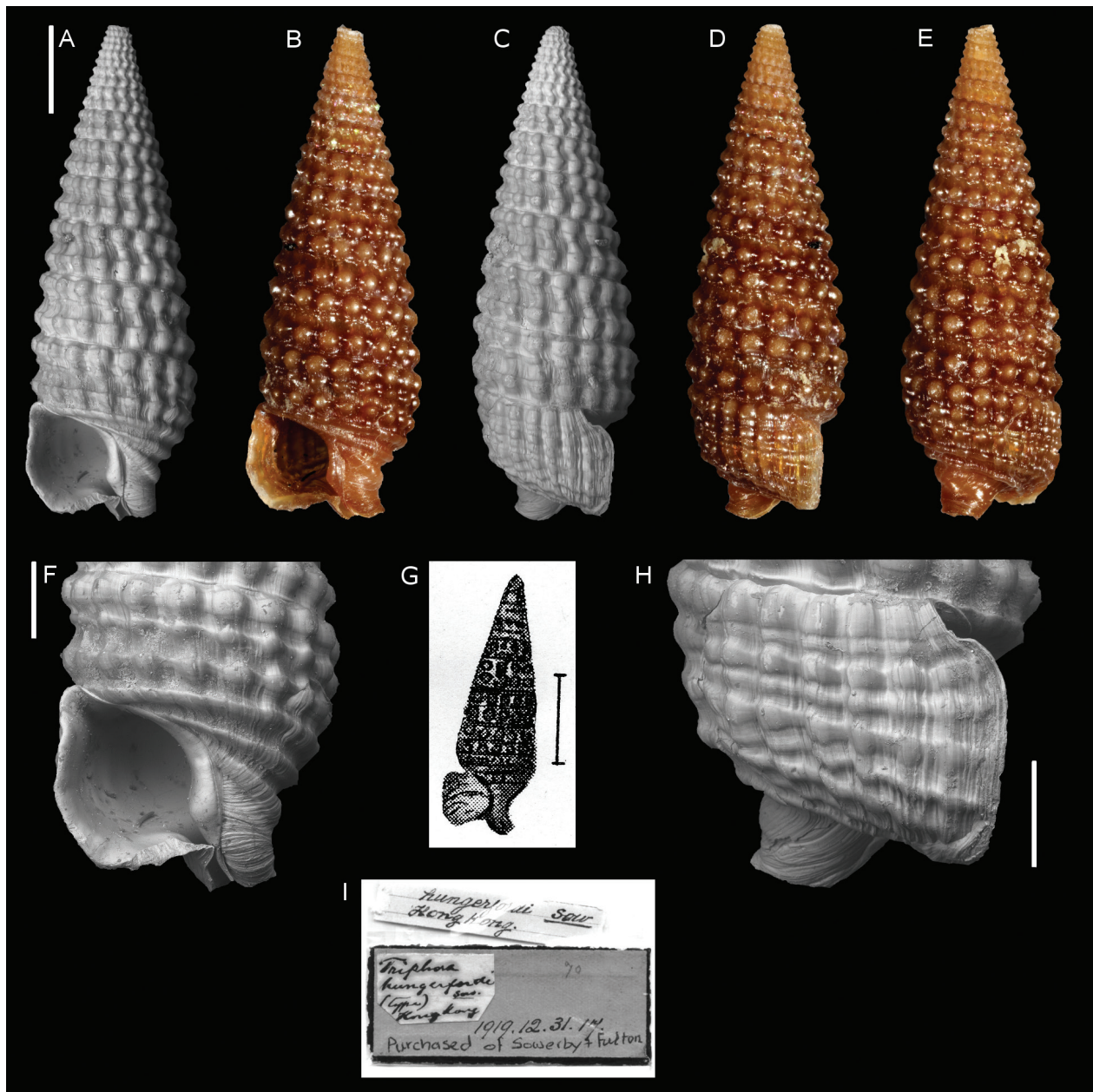


Figure 95. *Triphora hungerfordi* G.B. Sowerby III, 1914, Hong Kong. A–F, H, I Syntype NHMUK 1919.12.31.17: front (A, B), side (C, D), back (E), aperture (F), peristome (H), original labels (I). G Original figure. Scale bars: A–E: 1 mm; F, H: 0.5 mm.

Hab.—?

This is by far the largest known species of the genus. Unfortunately, with the unique specimen there is no indication of its habitat, but it is not improbable it may have been dredged off Ascension Island, as it was found in Admiral Keppel's cabinet in close proximity to shells so labelled. Besides its remarkable size, the shell is very distinct in character. The longitudinal brown pitted grooves intersect the spiral ridges, causing the most prominent ones to assume the form of transversely oblong nodules. There is a very small young shell of this species in the British Museum, from the Cuming Collection.

Translation of the Latin text. A straw-like very elongated sinistral shell posteriorly dark-brown with several a little obliquely longitudinal lines dark red in colour; about 40 flat whorls with longitudinal scars slightly slanting and pitted here and there, four pseudo-nodulose spiral cords somewhat irregular, unequal, being the two anterior more developed; last whorl rather sharply angulated at the base with a bicarinated edge, restricted and concave under the periphery, two rather strong carinae; bent long siphonal canal, subquadrate aperture; thin outer lip. Length 57, greater diameter 7 mm.

Diagnosis. Holotype 58 mm, among the largest *Triphoridae*. Extremely elongated conical shell, with

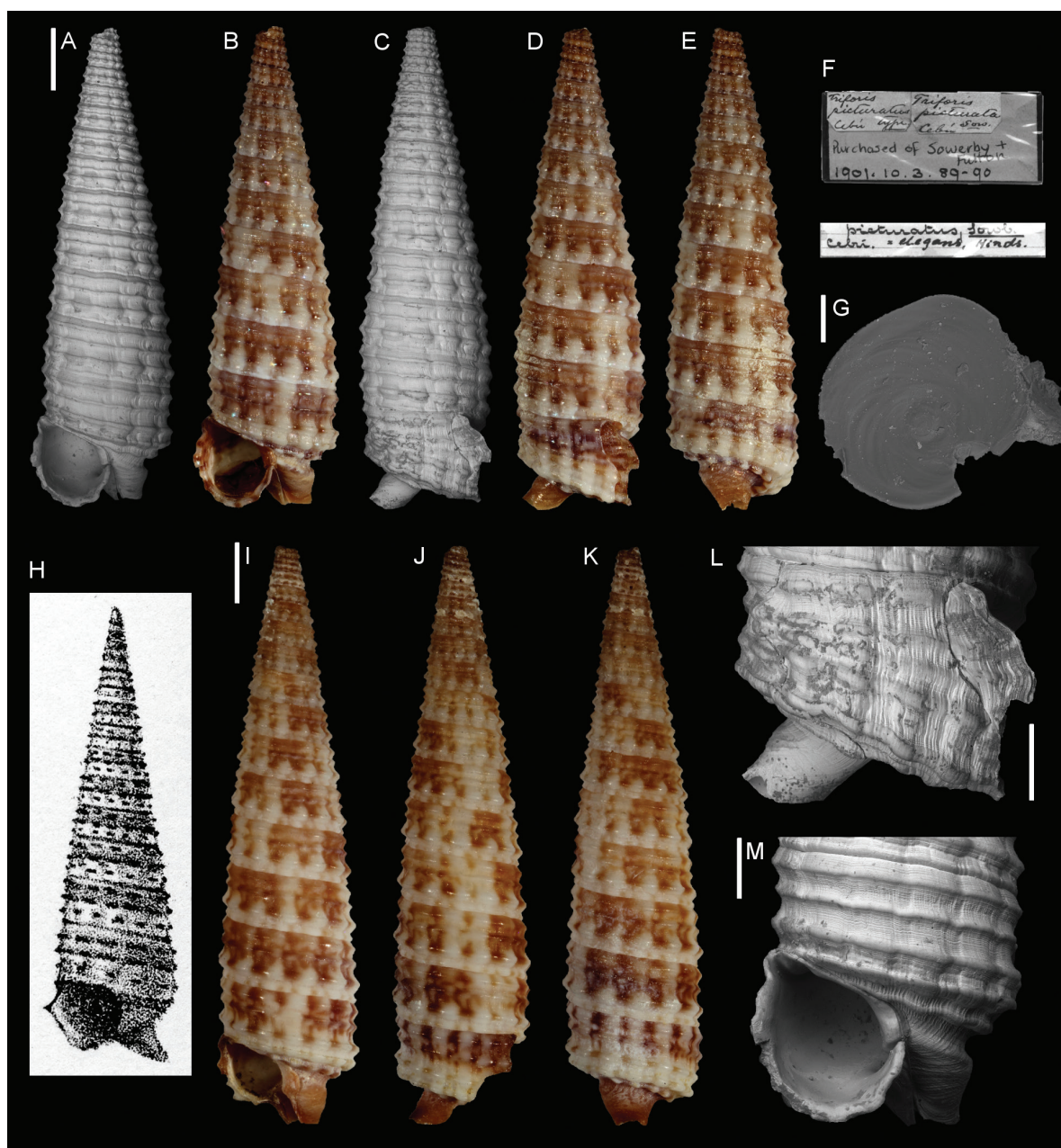


Figure 96. *Triforis picturatus* G.B. Sowerby III, 1901, Cebu Island, Philippines. A–E, G, L, M Syntype NHMUK 1901.10.3.89: front (A, B), side (C, D), back (E), operculum (G), peristome (L), aperture (M). F Original labels. H Original figure. I–K Syntype NHMUK 1901.10.3.90: front (I), side (J), back (K). Scale bars: A–E, I–K: 1 mm; G: 0.2 mm; L, M: 0.5 mm.

flat whorls. Teleoconch of ca 40 whorls, initially with three weakly nodulose spiral cords. In the lower part of the shell, a fourth cord between the second and third and a fifth suprasutural cord are visible, both weakly nodulose. The holotype is a subadult and, therefore, the peristome is not fully developed. Siphonal canal long with two smooth cords on it. Base with one prominent but weakly sculptured additional cord and two faint ones. Protoconch incomplete in the holotype, but may be paucispiral; the visible whorl has two strong smooth keels. Teleoconch elegantly coloured, with a

brown background and white flammules, dark brown interspaces.

Remarks. The NHMUK 196547 specimen (Fig. 97F) is most likely the “very small young shell of this species in the British Museum, from the Cuming collection” cited by Sowerby as also S.P. Dance observed in 1965 (note on labels accompanying the specimen). However, this specimen has a coarser sculpture and different colour pattern and we do not consider it conspecific.

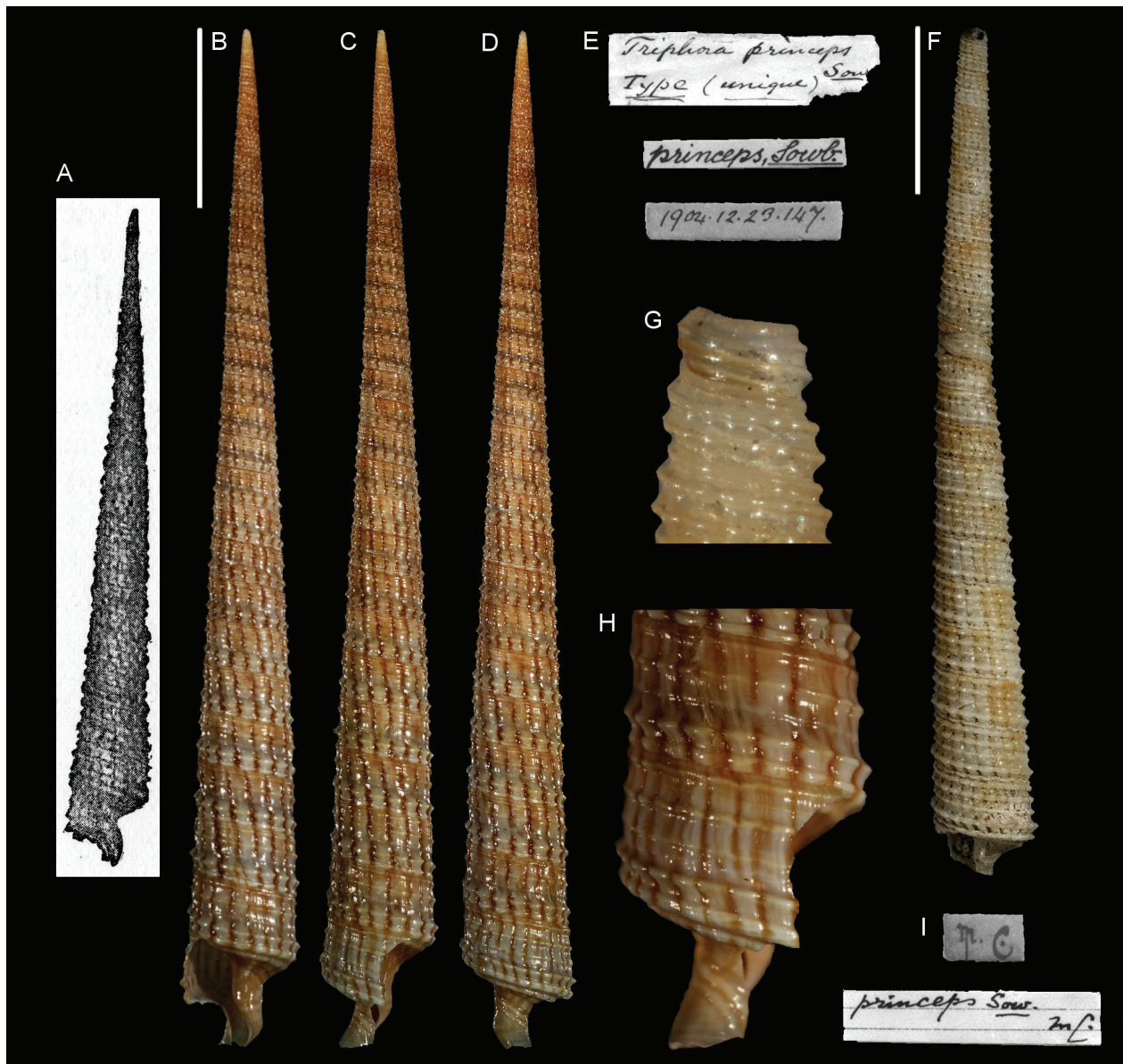


Figure 97. *Triphora princeps* G.B. Sowerby III, 1904, unknown locality. **A** Original figure. **B–E, G, H** Holotype, NHMUK 1904.12.23.147: front (**B**), side (**C**), back (**D**), original labels (**E**), protoconch (**G**), peristome (**H**). **F, I** Specimen NHMUK 196547 cited by Sowerby as “very small young shell” but belonging to a different species: front (**F**), original labels (**I**). Scale bars: **B–D**: 10 mm; **F**: 5 mm.

***Triphora smithi* G.B. Sowerby III, 1904**

Figure 98

Triphora smithi G.B. Sowerby III 1904: 175, figured.

Type locality. Not reported.

Type material. Holotype: NHMUK 1904.12.23.146, fixed by monotypy.

Original description. *Testa elongato-acuminata, pallide, straminea, anfractus circiter 35, planulati, cingulis spiralibus 2–4 acutiusculis laevibus instructi, aliter laeviusculi; anfractus ultimus obtuse angulatus, ad angulum*

bicarinatus, infra angulum leviter convexus, triliratus; rostrum breviusculum, leviter contortum; apertura subquadrata; labrum tenue. Long. 33, diam. maj. 5 mm.

Hab.—?

Although much smaller than *t. princeps*, this shell is larger than any other known species of the genus. It is broader in proportion to its length than *T. princeps*, and both the spiral ridges and the interstices between them are remarkably smooth, showing only irregular growth-lines. The specimen is at present unique.

Translation of the Latin text. A straw-like pale elongated sharp sinistral shell, about 35 plain whorls with 2–4 light and acute spiral cords differently slender; trilirate

last whorl obtusely angulated with a bicarinate angle and a light convexity under it; bend siphonal canal rather short; subquadrate aperture; thin outer lip. Length 33, larger diameter 5 mm.

Diagnosis. Holotype 32 mm, but lacks the apex. Elongated conical shell with flat whorls. Teleoconch of 21 whorls (but the original description states 35, suggesting that the apical part may have got broken after the description). Whorls with three smooth spiral cords, the first smaller, but present since the early teleoconch. A fourth smooth suprasutural cord is also visible. Peristome not fully developed in the holotype. Siphonal canal long. Base with one additional smooth spiral cord. Protoconch missing. Teleoconch whitish with greyish interspaces between cords.

Remarks. The general appearance and sculpture is very similar to *T. gracilior* E.A. Smith, 1903, although the latter has orange flecks not observable in *T. smithi*. E.A. Smith (1916) suggested that *T. smithi* is a synonym of *T. gracilior*.

Species described by J.R. le B. Tomlin

Four species of Triphoridae were described by John Read le Brockton Tomlin. The type material of three of these species was found in the NHMUK: *Viriola alboguttata* Tomlin, 1926, *Triphora alexandri* Tomlin, 1931, and *T. hemileuca* Tomlin, 1931. No type material was found of *Euthymia latisinuata* Tomlin, 1931. *Triphora barnardi* Tomlin, 1945 was introduced as a *nomen novum* for *T. capensis* Thiele, 1925, which is preoccupied by *Triphoris capensis* Bartsch, 1915. The Tomlin collection was deposited in NMW (Trew 1990); we refrain from making any lectotype designations here until we are able to see that material.

Viriola alboguttata Tomlin, 1926

Figure 99

Viriola alboguttata Tomlin 1926: 294, pl. 16, fig. 7.

Original localities. Scottburgh and Port Shepstone, Natal, South Africa.

Type material. Syntypes: NHMUK 1926.12.6.7, Scottburgh, Natal, South Africa, 1 specimen (glued on paper); NMW 1955.158.1124, 1 specimen (fide Trew 1990; not seen).

Original description. Shell sinistral, consisting of 13½ whorls, 4½ of which form the protoconch; the whorls of the protoconch have an extremely sharp, central, raised keel, from each side of which numerous short, raised, waved lines run to the sutures at right angles; the other nine whorls have a series of three outstanding spiral cords equally spaced; the two outer cords are of much

the same strength throughout, but the central one starts as quite a fine line and approximates gradually to the strength of the other two; the interstices between the cords are crossed at right angles by fine raised lines, which are more distant than those on the protoconch and not waved.

The colour of the protoconch is dark reddish, that of the rest of the shell light chocolate brown, the uppermost of the 3 spiral cords being spotted broadly with white at regular intervals—about 4 or 5 times on each whorl.

At the summit of the aperture there is a strong sinus, and the interior is marked with three pairs of brown lines running outwards to the edge of the peristome.

Length 5 mm., max. diam. 1.75 mm.

HAB.—Scottburgh (C.W. Alexander), apparently living; Port Shepstone (Burnup).

This distinct little species belongs, together with *ima* Bartsch and *fuscescens* Smith, to Jousseaume's genus *Viriola*, which is exactly analogous to *Seila* in having a spiral ribs plain, without tubercles.

Diagnosis. Syntype 4.4 mm high. Shell conical with flat sides. Teleoconch of eight whorls with three smooth spiral cords. The second cord develops initially as a fine thread and attains full size only on the last whorl. Among the spiral cords, orthocline obsolete axial ribs are visible. Peristome with additional spiral cords and a pronounced posterior sinus. Siphonal canal short. Base with four additional smooth spiral cords. Protoconch multispiral of five whorls; the first two with tiny granules, the last three with a strong spiral keel and axial riblets. Colour brown with white blotches more pronounced on the first spiral cord.

Remarks. *Viriola fallax* Kay, 1979 (p. 215) is a junior synonym.

Triphora alexandri Tomlin, 1931

Figure 100

Triphora alexandri Tomlin 1931: 425–426, pl. 33, fig. 3.

Type locality. Umhlali, Natal, South Africa.

Type material. Syntypes: NHMUK 1931.7.23.8: 1 specimen, South Africa.

Original description. Shell with 15½ whorls, whereof 1½ are protoconch—the extreme apex is missing and would probably add one more whorl to protoconch; what is left shows a sharp, central keel with rather distant axial lines. This sculpture gradually develops on the postnuclear whorls into two rows of very regular tubercles, the upper row pale brown and the lower white; the last seven whorls have three rows, of which the upper two are pale brown; the white row throughout is obviously the strongest. Sutures marked by a raised line; periphery with a tubercled keel; base pale brown, with 3 keels encircling the canal; canal reflexed.

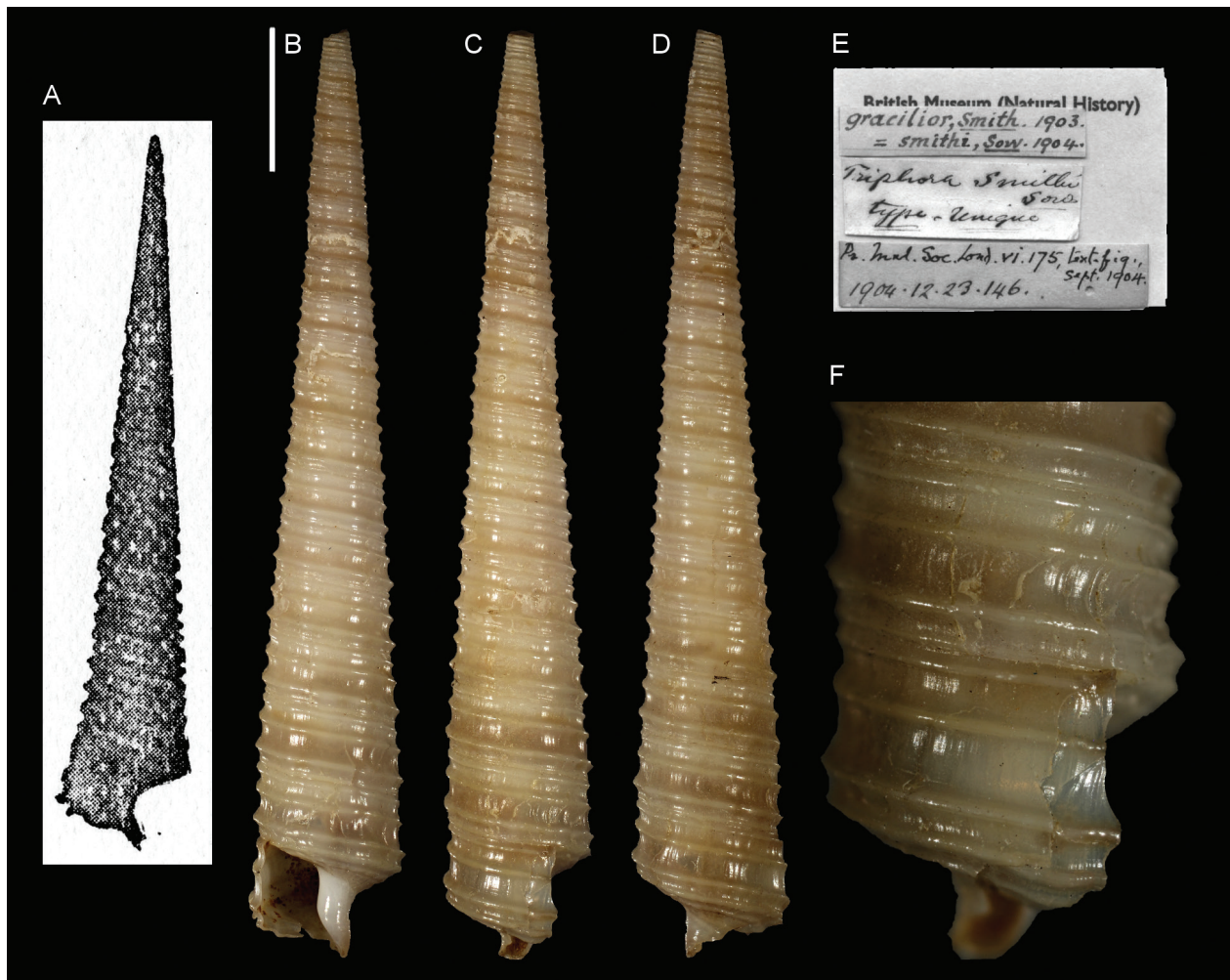


Figure 98. *Triphora smithi* G.B. Sowerby III, 1904, unknown locality. **A** Original figure. **B–F** Holotype, NHMUK 1904.12.23.1476: front (**B**), side (**C**), back (**D**), original labels (**E**), peristome (**F**). Scale bar: **B–D**: 5 mm.

Alt. 8.75 mm.; diam. max. vix 2 mm.

HAB.—Umhlali (Alexander).

Readily distinguished by its coloration.

Diagnosis. Available syntype 7.4 mm high. Shell cyrtococonoid. Teleoconch of 13 whorls with three spiral cords bearing tubercles at the intersection with prosocline axial ribs. Suture deep. Peristome incomplete without additional spiral cords. Posterior sinus not observable. Siphonal canal long. Base with three narrow, almost smooth spiral cords. Protoconch broken in the available syntype, but its last whorl is present and suggests a multispiral type with one spiral keel and axial riblets. Background teleoconch colour light brown, with lighter tubercles and white third spiral cord and first two teleoconch whorls. The remaining protoconch whorl light brown.

Remarks. The original figure closely matches with this specimen, including also in having the protoconch in-

complete. No other type specimens were reported in the NMW (Trew 1990).

Triphora hemileuca Tomlin, 1931

Figure 101

Triphora hemileuca Tomlin 1931: 426, pl. 33, fig. 4.

Type locality. Port Shepstone, Natal, South Africa.

Type material. Holotype: NHMUK 1931.7.23.6, fixed by monotypy.

Original description. Shell with a protoconch of 3 whorls, which are irregularly crossed by axial riblets; protoconch and next three whorls cream-white, last six whorls brown-black; there are twelve whorls in all, of which nos. 4 to 7 have a prominent central keel, cut into tubercles by numerous axial riblets, and fine spi-

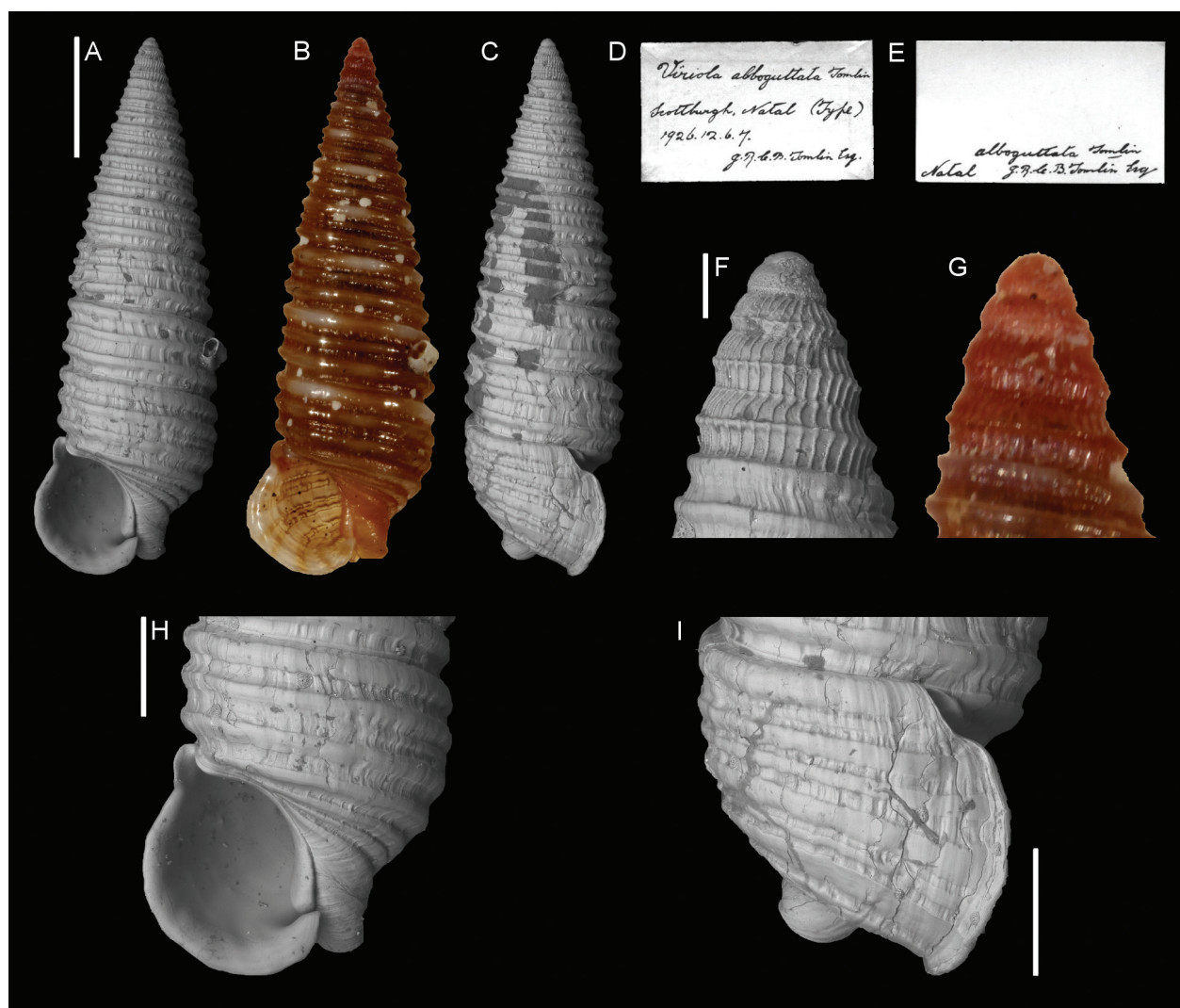


Figure 99. *Viriola alboguttata* Tomlin, 1926, Scottburgh, Natal, South Africa. **A–C, F–I** Syntype NHMUK 1926.12.6.7: front (**A, B**), side (**C**), protoconch (**F, G**), aperture (**H**), peristome (**I**). **D, E** Original labels. Scale bars: **A–C**: 1 mm; **F, G**: 0.1 mm; **H, I**: 0.5 mm.

ral lines above and below the keel. The last five whorls have three tuberculiferous keels, one immediately below the suture, and two on the lower half of the whorl very close together and only separated by a fine groove, the interspaces being filled with fine spirals as before. Periphery sharply keeled; base of shell and canal much lighter brown.

Alt. 6 mm.; diam. max. 1.5 mm.

HAB.—Port Shepstone (Burnup).

This specimen is unique, but is so extraordinarily perfect in every way that I do not hesitate to describe it. There is the usual raised line round the suture, and a considerable interval between the uppermost keel and the two lower ones on each whorl. The coloration will at once be recognizable.

Diagnosis. Holotype height 5.4 mm. Shell cyrtocoid, with eight weakly rounded teleoconch whorls with three spiral cords. The second develops on the fourth whorl.

Tubercles are present at the intersection with orthocline axial ribs. Two or three fine spiral threads are visible in the interspace between the main spiral cords. Peristome with a moderately deep posterior sinus and no additional spiral cords. Siphonal canal short. Base with two additional weakly tubercled spiral cords. Protoconch paucispiral with 2.5 whorls with wavy thick axial ribs and interspaces smaller than the ribs. Colour deep brown. The protoconch and the first two teleoconch whorls are pure white.

Remarks. No other type specimens were reported for the NMW (Trew 1990).

Species described by W.H. Turton

William H. Turton deposited large sets of his South African collections in the OUMNH in Oxford including "... the *Types* of the 625 new species and varieties, which I have named myself..." (Turton 1932: xiv). Turton depos-

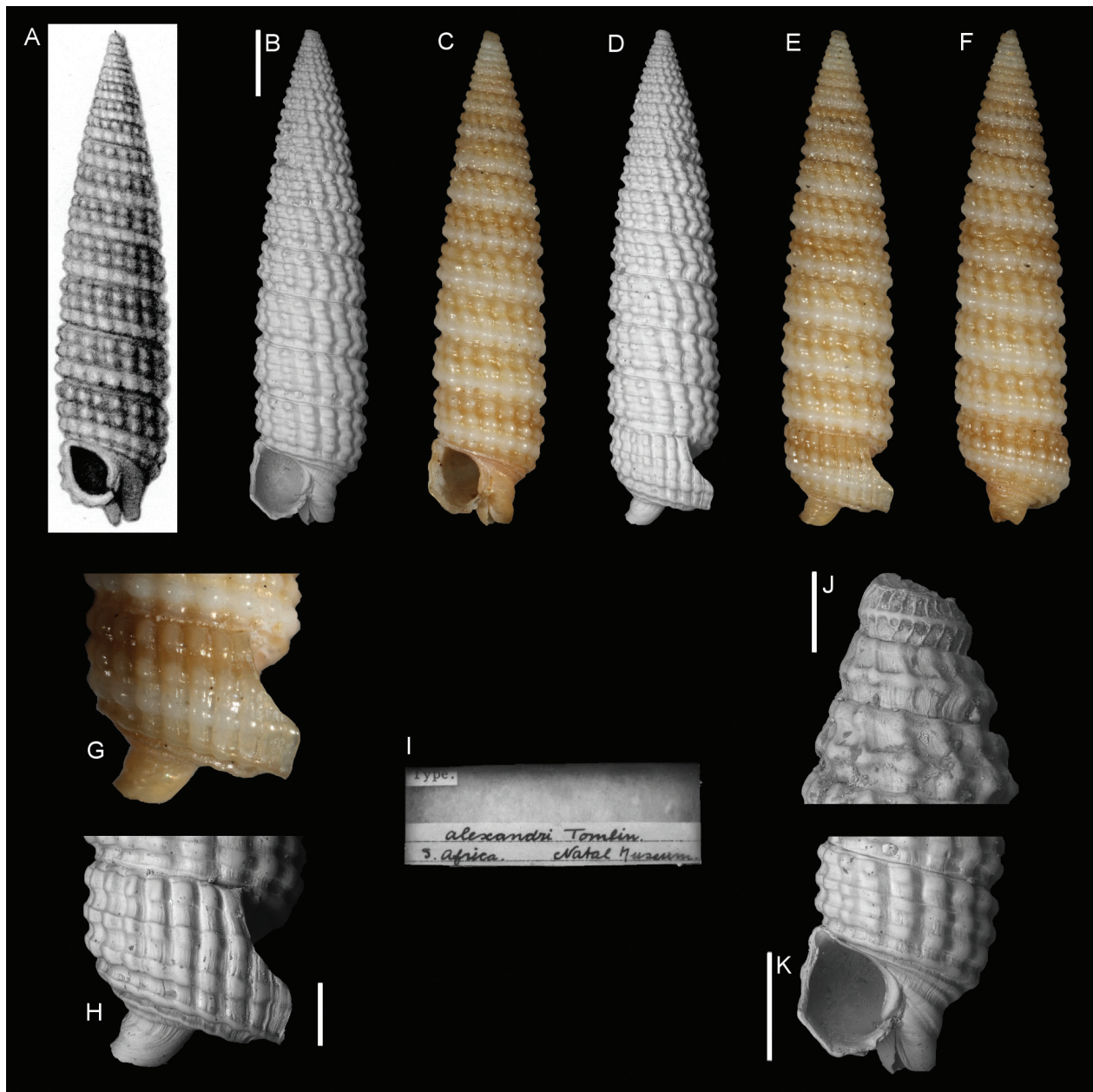


Figure 100. *Triphora alexandri* Tomlin, 1931, Umhlali, S. Africa. **A** Original figure. **B–H, J, K** Syntype NHMUK 1931.7.23.8: front (**B, C**), side (**D, E**), back (**F**), peristome (**G, H**), protoconch (**J**), aperture (**K**). **I** Original label. Scale bars: **B–F, K**: 1 mm; **G, H**: 0.5 mm; **J**: 0.2 mm.

ited material at the USNM and repeatedly tried to send shells to the NHMUK, but they were often refused with his great disappointment. Eventually, however, he managed to send material to the NHMUK (Turton 1932: x). Unfortunately, the type material of his South African triphorids was prepared for loan to the first author in 2014 but the package apparently never left the Museum and was not found any more. All types should be regarded as lost (S. De Grave pers. comm. October 2015). Therefore, we here illustrate and describe the lots of Turton's species present in the NHMUK; such shells, however, shall not be considered type specimens, because Turton clearly stated

that the the type material was sent to Oxford. We found specimens of three species: *T. apicibulbus* Turton, 1932, *T. retusa* Turton, 1932, and *T. rufanensis* Turton, 1932.

***Triphora apicibulbus* Turton, 1932**

Figure 102

Triphora apicibulbus Turton 1932: 118, pl. XXV, fig. 863.

Type locality. Port Alfred, South Africa.

Type material. OUMNH: lost.

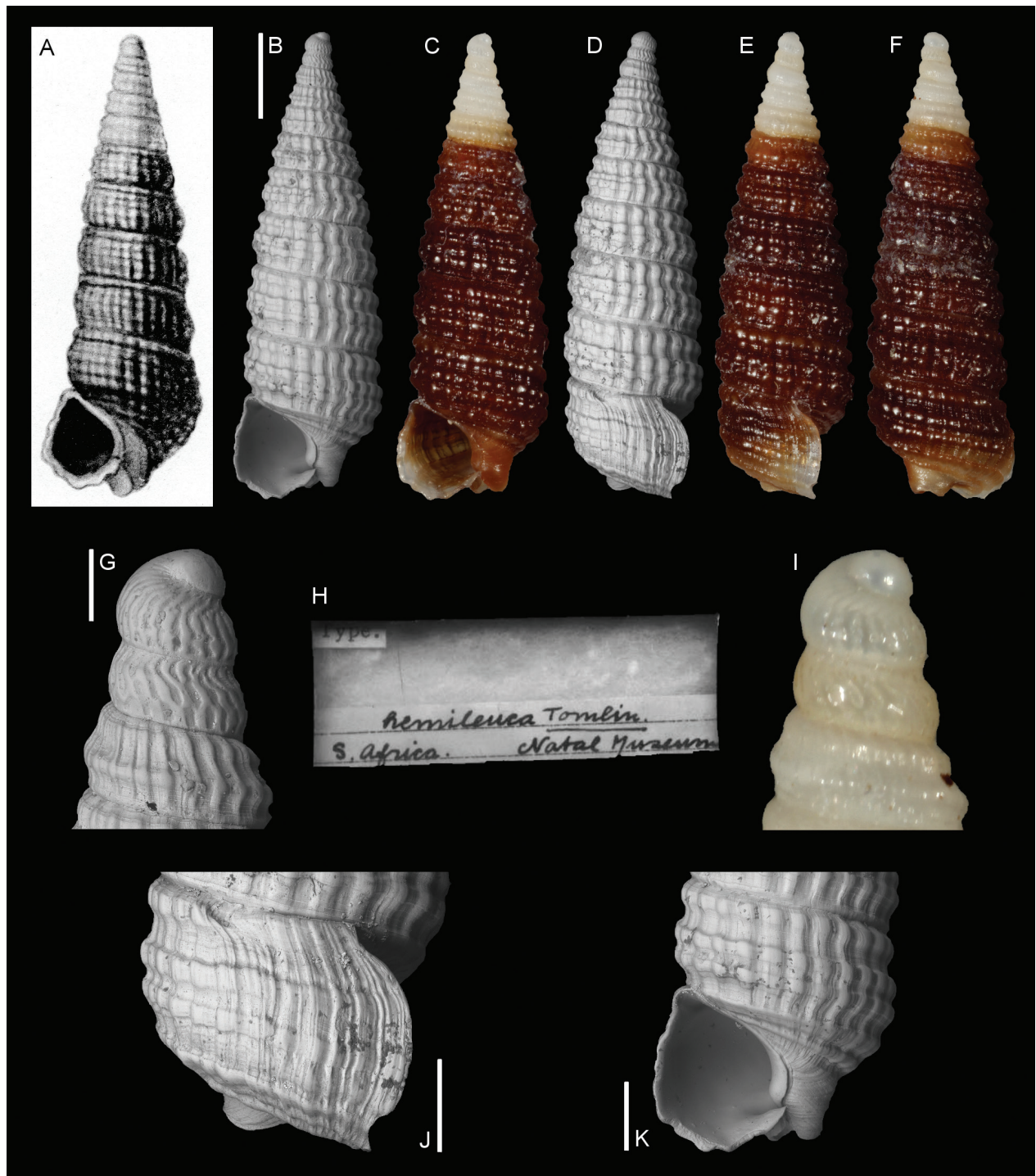


Figure 101. *Triphora hemileuca* Tomlin, 1931, South Africa. **A** Original figure. **B–G, I–K** Holotype, NHMUK 1931.7.23.6: front (**B, C**), side (**D, E**), back (**F**), protoconch (**G, I**), peristome (**J**), aperture (**K**). **H** Original label. Scale bars: **B–F**: 1 mm; **G, I**: 0.2 mm; **J, K**: 0.5 mm.

Additional material. NHMUK 1933.9.4.34–36: 3 specimens, Port Alfred, South Africa (coll. W.H. Turton).

Original description. *The shape of the shell is narrowly conic; 1 minute and 2 bulbous nuclear whorls, the remaining 8 very slightly globular. The surface is marked by 3 rows of tubercles on each whorl, and there are 2 basal cords. The colour is white, except the base, which is light*

brown. The size of the type is 6×1.5 mm. The shell grows up to 8 mm, but the larger ones do not show the sculpturing so plainly. Characteristics. Near 860, [Triphora] madria, though wider, with only 2 basal cords. It is wider than 858, [Triphora] innocens. But the brown colour at the base best distinguishes it; and also the very bulbous protoconch, the last nuclear whorl being larger than the succeeding one. This gives it a curious appearance, and

I think justifies the name. It is true that [T.] madria has something like it, as noticed by Bartsch, but not nearly so pronounced. I attach two photos, the smaller shell, 4 mm, showing this better than the other.

Diagnosis. Height range 5.5–6.1 mm. Shell slightly cyrtocoid, with flat sides. Teleoconch of ca 10 whorls with three strong spiral cords, all visible since the first whorl, with coalescent tubercles which on the last whorls look like continuous bands. Siphonal canal short. Base with two-three additional smooth spiral cords. Paucispiral protoconch of 1.5 whorls, apparently smooth but the specimens are worn. Shell white in colour.

Triphora retusa Turton, 1932

Figure 103

Triphora retusa Turton 1932: 117, pl. XXV, fig. 855.

Type locality. Port Alfred, South Africa.

Type material. OUMNH: lost.

Additional material. NHMUK 1933.9.4.37: 1 specimen, Port Alfred, South Africa (coll. W.H. Turton).

Original description. *The shape is broadly conic; 1 very small nuclear whorl, with 5 others nearly straight; aperture large, nearly circular, and rather projecting; apex very blunt. The surface is covered with 3 rows of tubercles on each whorl. The colour is yellowish brown; and the size 2 × 1 mm. Characteristics. A little shell near [Triphora] sabita but smaller, more broadly conic, with a much blunter apex, and more projecting aperture. Though so small it seems to be full-grown, as I found about a dozen specimens, the type being the largest.*

Diagnosis. Specimen 1.1 mm high, but it is clearly a juvenile with just three post-metamorphic whorls, which bear two spiral cords with granules at the intersection with faint orthocline axial ribs. Paucispiral protoconch of one whorl, apparently smooth, but very worn. Shell brown in colour.

Triphora rufanensis Turton, 1932

Figure 104

Triphora rufanensis Turton 1932: 118, pl. XXV, fig. 862.

Type locality. Port Alfred, South Africa.

Type material. OUMNH: lost.

Additional material. NHMUK 1933.9.4.22–23: 2 specimens, Port Alfred, South Africa (coll. W.H. Turton).

Original description. *The shape of the shell is narrowly conic; with rather a blunt apex; 1 nuclear whorl, broken,*

and 10 others which are straight. The surface is marked by 3 nodulous cords on each whorl, and there are 3 basal cords. The colour is white, and glistening; and the size 5 × 1.6 mm. Characteristics. It is near 869, whitechurchi, but more broadly conic, and much smaller.

Diagnosis. The available specimen is 4.7 mm high, but subadult. Conical shell with flat sides. Teleoconch of eight whorls with three spiral cords clearly visible since the first whorl and with nodules at the intersection with the slightly prosocline axial ribs. Peristome not preserved and the specimen is subadult, thus without base. Apex badly worn, but apparently paucispiral of 1.5 whorls which bears three smooth spiral cords on after the first half whorl. White shell with small brown marks.

Species described by J.C. Verco

Joseph C. Verco introduced 16 new triphorid names. In the NHMUK, we found specimens of eight species. Although Verco donated his collection to the South Australian Museum (Dance 1966; Cotton 1933), he sent some specimens to the NHMUK, as reported in the museum's register. This register contains entries of several families, suggesting that Verco sent several lots of many taxa to the NHMUK, as reported by E.A. Smith (1906) for some "Pleurotomidae" (Turridae s.l.). Verco often listed several specimens as part of the type series. Moreover, some labels and register entries report that the shells in the NHMUK are "co-types", which shall be considered syntypes according to Article 72.4.6 of the Code (ICZN 1999). In his work on South Australian Triphoridae, Marshall (1983) discussed most of Verco's names but probably was not aware of these syntypes. Most of Marshall's "holotype" records are actually lectotype designations according to Article 74.6 of the Code (ICZN 1999), and the syntypes are now paralectotypes according to Article 74.1.3. Marshall included accurate descriptions; therefore, we refrain here from adding additional diagnostic notes.

Triphora armillata Verco, 1909

Figure 105

Triphora armillata Verco 1909: 283–284, pl. XXII, fig. 5.

Type locality. Gulf St Vincent, South Australia.

Type material. Lectotype: SAM D.13448 (fide Marshall 1983; not seen, see Remarks). Paralectotypes: NHMUK 1910.3.29.40–42, 3 specimens, Gulf St Vincent, South Australia.

Original description. *Shell solid, elongate-conic. Protoconch of 4 whorls, convex, centrally carinate, the fourth with two approximate carinae; crowded fine axial bars, concave forward above the carinae, straight below. Spire-whorls twelve, sloping, the first four with two spiral rows*

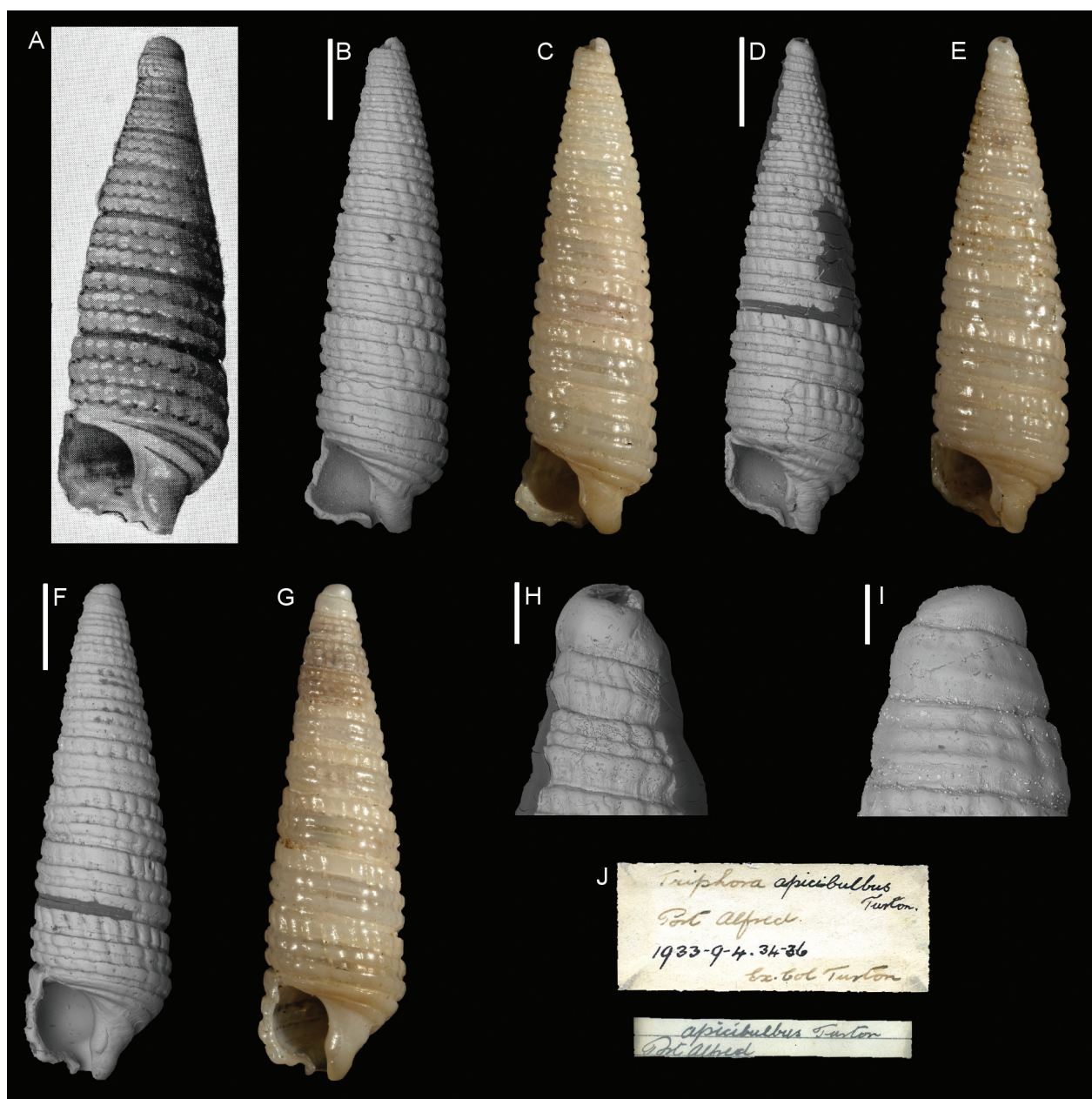


Figure 102. *Triphora apicibulbus* Turton, 1932, Port Alfred, South Africa, NHMUK 1933.9.4.34–36. **A** Original figure. **B**, **C** NHMUK 1933.9.4.34: front. **D**, **E**, **H** NHMUK 1933.9.4.35: front (**C**, **D**), protoconch (**H**). **F**, **G**, **I** NHMUK 1933.9.4.36: front (**F**, **G**), protoconch (**I**). **J** Original labels. Scale bars: **B**–**G**: 1 mm; **H**, **I**: 0.2 mm.



Figure 103. *Triphora retusa* Turton, 1932, Port Alfred, South Africa. **A**, **B** NHMUK 1933.9.4.37. **C** Original labels. **D** Original figure. Scale bar: **A**, **B**: 0.3 mm.

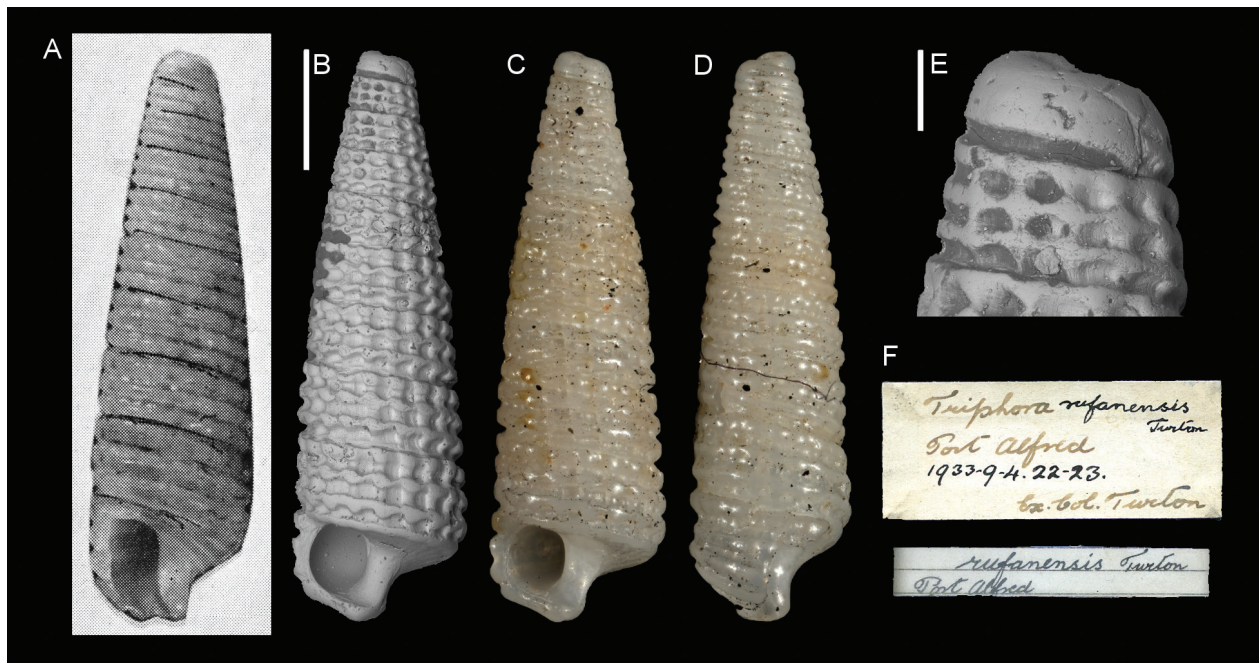


Figure 104. *Triphora rufanensis* Turton, 1932, Port Alfred, South Africa. **A** Original figure. **B–F** NHMUK 1933.9.4.22: front (**B**, **C**), side (**D**), protoconch (**E**), original labels (**F**). Scale bars: **B–D**: 1 mm; **E**: 0.2 mm.

of pearls; in the fifth a lira appears between them, and becomes gradually as large as the others; the tubercles are large, about twenty in a row in the penultimate, joined by short bars transversely, and by narrower axial bars directed obliquely forwards towards the lower suture. Sutural spaces distinct, as wide as a pearl row; in the eighth a supra-sutural thread arises, which grows distinct and slightly tuberculate. Base flatly convex, with the sutural lira, and two basal lirae; the first with valid transversely oval tubercles, joined by very broad axial bands to much lower tubercles in the second, and by vanishing bands to the nearly smooth third lira. Aperture round, pinched at the suture into a sinus, and with a short well recurved canal in front; outer lip thin, simple, slightly reflected at its margin, retrocurrent at the suture, crossing the columella in front and flattened out over the base of the canal, so as to close it here. The outer lip has eight nodulous spirals on its outer surface, viz., three as on the spire, the peripheral and one basal, and three others intercalated on the bodywhorl. Colour, protoconch light-brown, shell white, but for the fifth and sixth whorls which are dark-brown, so as to form a sort of bracelet, whence the name.

Dim.—Length, 7,9 mm.; breadth, 2,2 mm.

Locality.—Type, Gulf St. Vincent, dredged in 20 fathoms, with many other good ones; also in 6 and in 15 to 20 fathoms off St. Francis Island, 9 good in each; in 22 fathoms, Investigator Strait, 2 good and 4 poor; in 22 fathoms, outside Backstairs Passage, 3 poor; in 40 fathoms off Beachport, 2 moderate, 3 poor; in 55 fathoms off Cape Borda, 4 poor. Also taken on the beach in Gulf St. Vincent, Venus and Scales Bay, West Coast, and many and

good on St. Francis Island. It is a shallow-water species, ranging up to about 40 fathoms.

Remarks. Verco referred to a type series consisting of multiple specimens in the original description of *T. armillata*. Marshall (1983) reported the “holotype” in SAM, but this should be considered a lectotype designation according to Article 74.6 of the Code (ICZN 1999). The NHMUK collection register reports the type locality and the wording “Co-types”, which suggests that the accompanying specimens are part of the type series. Because of Marshall’s lectotype designation, these and all other syntypes are now paralectotypes.

Triphora tasmanica var. *lilacina* var. *aureovincta* Verco, 1910

Figure 106

Triphora tasmanica var. *lilacina* var. *aureovincta* Verco 1910: 126, not illustrated.

Type locality. “off Cape Borda” (Kangaroo Island, South Australia).

Type material. Holotype: SAM D.13444, fixed by monotypy (not seen, fide Marshall 1983).

Additional material. NHMUK 1911.8.12.3–4: 2 specimens (glued on cardboard), Rottneest Is. Western Australia.

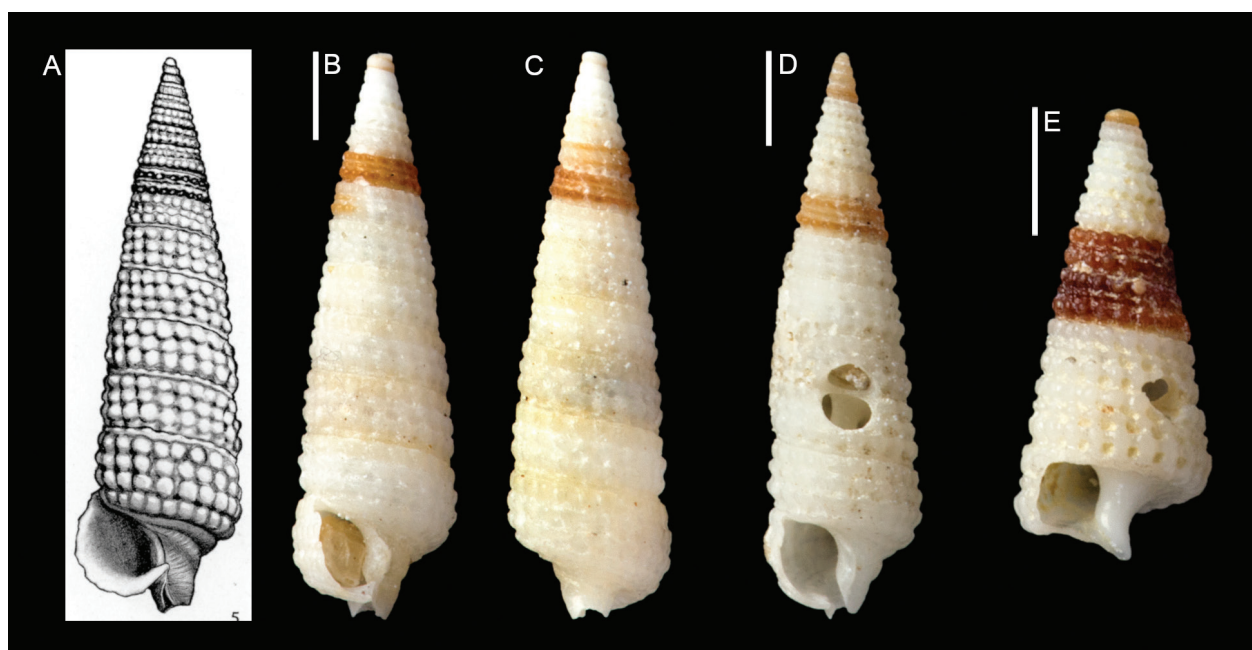


Figure 105. *Triphora armillata* Verco, 1909, Gulf St. Vincent, South Australia. **A** Original figure. **B, C** NHMUK 1910.3.29.40: front (**B**), back (**C**); **D** NHMUK 1910.3.29.41: front; **E** NHMUK 1910.3.29.42 front. Scale bar: 1 mm (photo courtesy: Kevin Webb, NHMUK Photographic Unit).

Original description. *This exquisitely pretty little shell was taken in perfect condition in 55 fathoms off Cape Borda.*

It has a golden band like T. regina, Hedley, but instead of colouring the most anterior spiral of pearls, it ornaments the smooth spiral plait in front of this, and so is found in the suture and on the base of the body-whorl. Its protoconch is that of T. tasmanica, and has not the spicular form of T. regina. It is very deeply-coloured purple, like the var. lilacina, Verco. One example, perfect, of eight whorls, was taken.

Type in my collection.

Remarks. Marshall (1983) considered this variety a valid taxon: *Isotriphora aureovincta*. Because the original description clearly refers to a single specimen examined at the time of description, Marshall's record of the holotype is correct and the material in the NHMUK does not belong to the type series.

Triphora cana Verco, 1909

Figure 107

Triphora cana Verco 1909: 289, pl. XXIII, figs 2–4.

Type locality. “Gulf St. Vincent” (South Australia).

Type material. Lectotype: SAM D. 13439 (fide Marshall 1983; not seen, see Remarks). Paralectotypes: NHMUK 1910.3.29.43–44: 2 specimens, Gulf St. Vincent, South Australia.

Original description. *Shell sinistral, solid, of 12 whorls, elongate-conical. Protoconch slightly mamillate, of two whorls; the second the larger, convex, with sigmoid axial bars, 16 in a whorl. Spirewhorls, the first with one nodulous carina, the second with two, the third with three, the last arising between the other two. Whorls sloping, the last three subconvex. Sutural space distinct, with a supra-sutural thread in the last six spaces, remaining nearly smooth. Tubercles close, about 18 in the penultimate, joined transversely and axially (obliquely forwards) by stout bars which lattice the surface. Aperture roundly rhomboidal, scarcely pinched behind. Outer lip slightly retrocurrent towards the suture; basal lip in contact with the erect, solid inner lip, and crossing the columella, where it closes in the short recurved notched, otherwise open canal. Base flatly convex, bounded by the nearly smooth peripheral lira, with a second smooth basal lira and a third encircling the base of the canal. The protoconch and first four spire-whorls are white, the rest light-brown.*

Dim.—Length, 71 mm.; breadth, 2.1 mm.

Locality. —Type, Gulf St. Vincent, depth unrecorded, with 15 good and 34 moderate examples; 35 fathoms, St. Francis Island, 1 good; 40 fathoms off Beachport, 1 good and 1 poor; 55 fathoms off Cape Borda, 3 good and 5 poor; 62 fathoms off Cape Borda, 1 moderate and 3 poor; 110 fathoms off Beachport, 2 moderate; St. Francis Island beach, 5 good, 1 poor.

The species varies a great deal—

1. In colour. The first six whorls may be white, and all the rest a blackish-brown. The first three whorls (in-

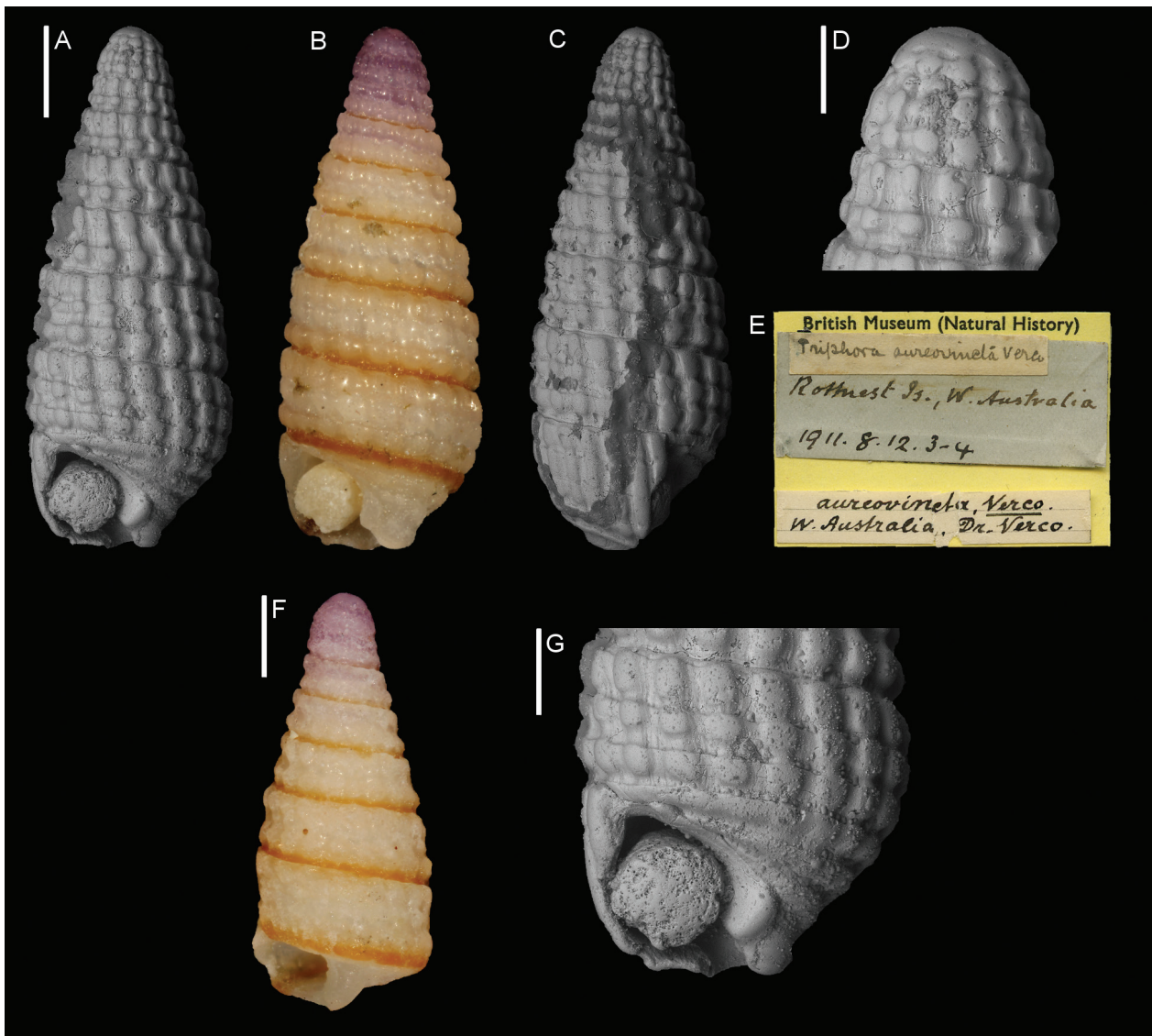


Figure 106. *Triphora tasmanica* var. *lilacina* var. *aureovincta* Verco, 1910, Rottneest Is., Western Australia. A–D, G NHMUK 1911.8.12.3: front (A, B), side (C), protoconch (D), aperture (G). E Original labels. F NHMUK 1911.8.12.4: front (F). Scale bars: A–C, F: 0.5 mm; D: 0.2 mm; G: 0.3 mm.

cluding the protoconch) may be dark-brown, and all the rest light-brown, with no white whorls. The three apical whorls may be brown, the next three white, and the rest brown, so connecting the previous shell with the type. The three apical whorls may be brown, and the seven remaining whorls quite white. The infra-sutural pearl row in the coloured portion may be dark-purple or barely tinted, the others brown, or the highest and lowest row may be purple and the central brown.

2. In shape. In most examples, though not in the type, the posterior pearl row becomes larger than the others, the pearls being greater, and consequently closer, and are somewhat axially elongate. When this is marked the whorl may be wider below the suture than above it, so as to give a more or less gradate appearance to the whorls.

Remarks. Verco referred to a type series consisting of multiple specimens in the original description. Marshall

(1983) reported of the “holotype” in SAM but this specimen should be considered a lectotype according to Article 74.6 of the Code (ICZN 1999). The label accompanying this lot reports the type locality and the wording “Co-types”, which suggests that the accompanying specimens indeed belong to the type series. Because of Marshall’s lectotype designation, these and all other syntypes are now paralectotypes.

Triphora latilirata Verco, 1909

Figure 108

Triphora latilirata Verco 1909: 283, pl. XXVI, fig. 1.

Type locality. “Gulf St. Vincent” (South Australia).

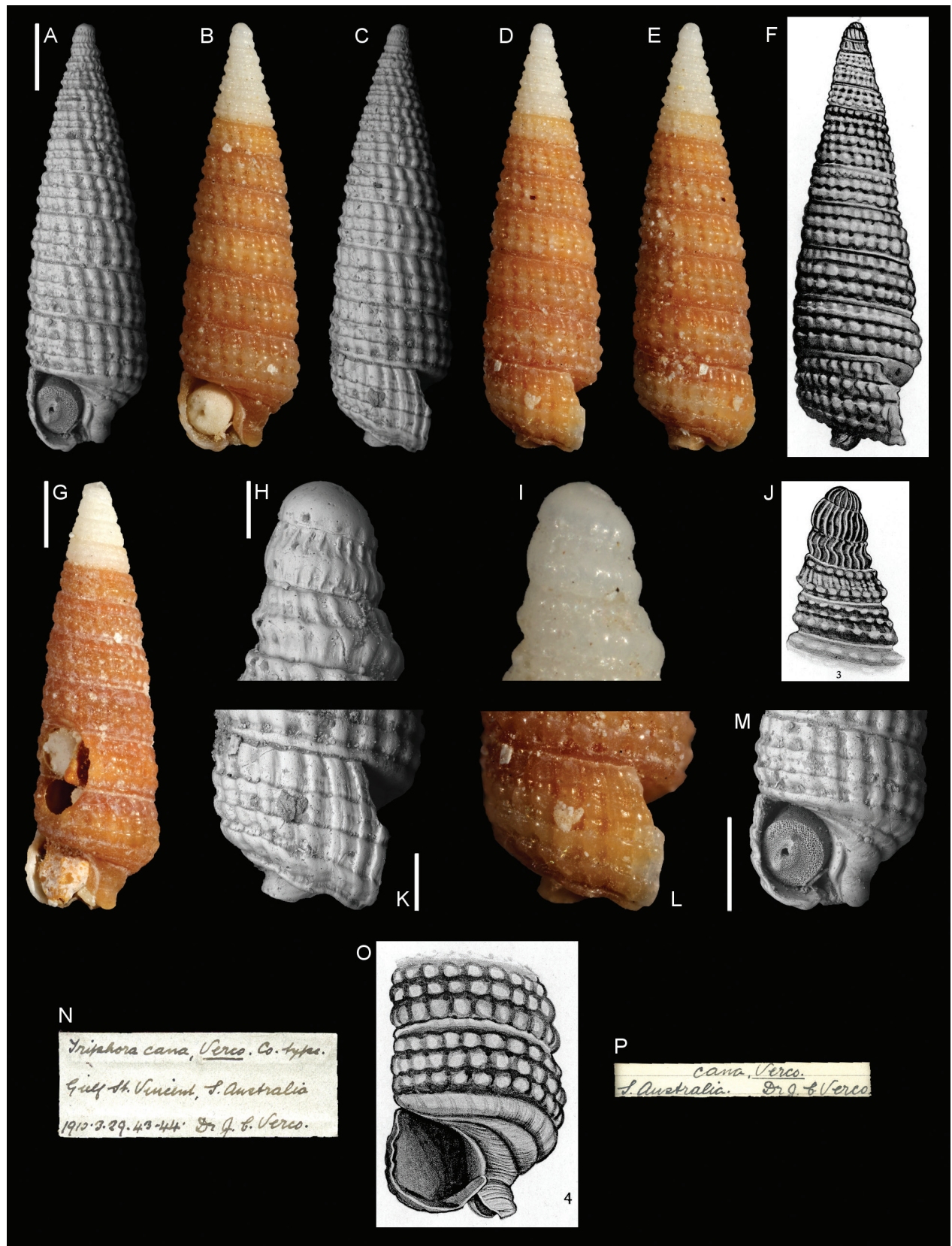


Figure 107. *Triphora cana* Verco, 1909, Gulf St. Vincent, South Australia. A–E, H, I, K–M Paralectotype, NHMUK 1910.3.29.43: front (A, B), side (C, D), back (E), protoconch (H, I), peristome (K, L), aperture (M). G Paralectotype, NHMUK 1910.3.29.44: front. F, J, O Original figures. N, P Original labels. Scale bars: A–E, G, M: 1 mm; H, I: 0.2 mm; K, L: 0.5 mm.

Type material. Lectotype: SAM D. 13447 (fide Marshall 1983; not seen, see Remarks). Paralectotype: NHMUK 1910.3.29.45: 1 specimen, Gulf St Vincent, South Australia.

Original description. *Shell sinistral, solid, elongate-conic. Protoconch of 5 whorls, smooth and round. Spire-whorls 13, flat, sloping; suture rather wider than the spaces between the spiral ribs. Spirals 3, flat, wide, nearly smooth on the surface; interstices narrow, pinctated by close-set axial incisions, which also cut the sides of the lirae. Body-whorl rhomboidal, with three spiral ribs, towards the aperture the interspaces are occupied each by a short, rapidly-widening spiral; the axial incisions are more distinct towards the aperture. Base convex with a peripheral spiral, rounded, smooth keel, and a second more anterior, punctated between. Aperture roundly quadrate: outer lip sloping, straight, ascending at the suture and pinched into a tiny sinus, anteriorly circular and effuse; in profile straight, minutely retrocurrent at the suture, obliquely very slightly antecurrent anteriorly. Canal well marked, nearly closed, especially at the junction with the aperture, markedly recurved. Inner lip distinct, slightly erect. Colour, white.*

Dim.—Length, 10.5 mm; breadth, 2.5 mm.

Locality. —Type, Gulf St. Vincent, (?) depth, with 23 others moderate: in 15 to 20 fathoms off St. Francis Island, 1 moderate; in 24 fathoms off Newland Head, 1 moderate; in 55 fathoms off Cape Borda, 1 good.

Variations.—In the shell from 55 fathoms, in the antepenultimate whorl an interstitial thread arises between the middle and anterior spirals, and becomes a definite though small lira. In some large shells a thin sutural lamina is seen between the later whorls. A large broken specimen would measure 15 mm if complete. In one individual the posterior spiral lira throughout the shell is tinged brown.

Remarks. Verco referred to a type series consisting of multiple specimens in his original description. Marshall (1983) reported the “holotype” in SAM but this should be considered a lectotype designation according to Article 74.6 of the Code (ICZN 1999). The label accompanying this lot reports the type locality and the wording “Co-types”, which suggests that the specimens indeed belong to the type series. Because of Marshall’s lectotype designation, these and all other syntypes are now paralectotypes.

Triphora albobittata var. *mamillata* Verco, 1909

Figure 109

Triphora albobittata var. *mamillata* Verco 1909: 285–286, not illustrated.

Type locality. Gulf St Vincent, South Australia (fide Marshall 1983, by lectotype designation).

Type material. Lectotype: SAM D.13446 (fide Marshall 1983; not seen, see Remarks).

Additional material. NHMUK 1910.3.29.49–51: 3 specimens, Gulf St Vincent, South Australia.

Original description. *Instead of having the elongate four-whorled protoconch of the type, it has a mamillate two-whorled apex. The first whorl is round and smooth, the second has a central carina and subdistant axial bars. Generally the second is swollen and lies somewhat out of the axis of the shell, causing the mamillate form. Rarely the first whorl may be as large as the second. This protoconch seems complete, and not the base of a spiculate protoconch, whose terminal whorls have fallen. The shell varies in shape, being short, broad, and pupaeform, or long, narrow, and elongate-pyramidal.*

Dredged in Gulf St. Vincent, 7 perfect and 7 poor; in 90 fathoms off Cape Jaffa, 2 good; in 150 fathoms off Beachport, 2 poor. Taken on the beach MacDonnell Bay, 1; Gulf St. Vincent, 23, in varying condition; Venus Bay, 2, good.

The very different protoconch makes me diffident about calling this a variety, inasmuch as the characters of the protoconch are generally regarded as very certain specific diagnostics; but the shells are otherwise indistinguishable.

Remarks. Marshall (1983) considered this variety a valid taxon: *Obesula mamillata*, distinguished by *O. albobittata* by its paucispiral protoconch. Verco referred to a type series of multiple specimens in his original description. Marshall’s (1983) report of the “holotype” in the SAM should be considered a lectotype designation according to Article 74.6 of the Code (ICZN 1999).

The specimens in NHMUK represent two strikingly different colour forms: a white form (Fig. 109A, B) and a form with light brownish shell, white first spiral cord and brown base (Fig. 109C, D). Marshall (1983) reported that also *O. albobittata* occurs in two colour forms, similar to the ones illustrated here for *O. mamillata* and suggested that the only differentiating character between the two species is the protoconch type.

The NHMUK collection register does not indicate that these are “Co-types”, although the specimens were part of Verco’s collection and come from the type locality. Until additional evidence is available, we do not consider these specimens as belonging to the original type series.

Triphora novapostrema Verco, 1910

Figure 110

Triphora novapostrema Verco 1910: 126–127, pl. XXX, figs 1, 2.

Type locality. “off Cape Borda” (Kangaroo Island, South Australia) (fide Marshall 1983).

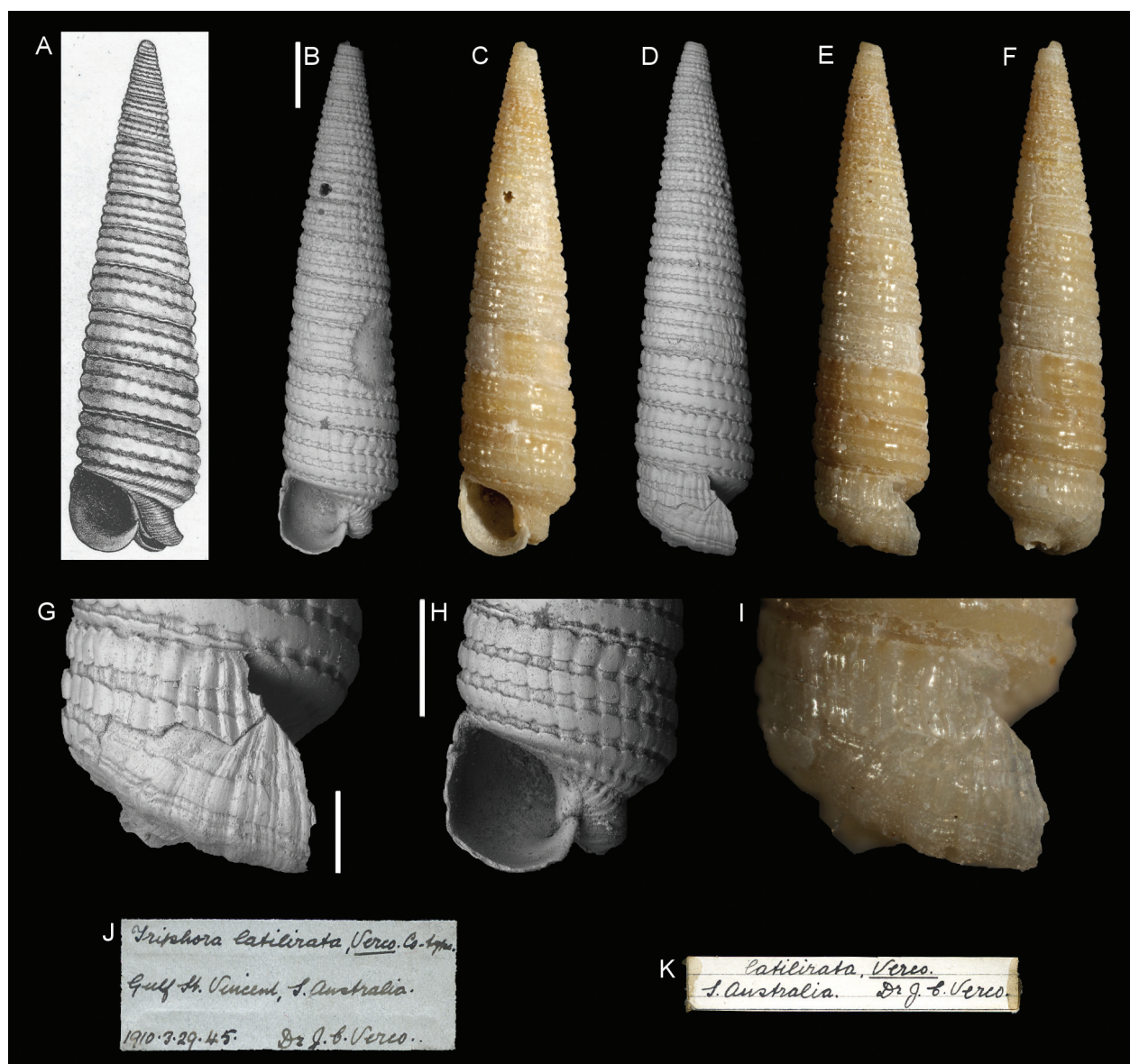


Figure 108. *Triphora latilirata* Verco, 1909, Gulf St. Vincent, South Australia. **A** Original figure. **B–K** Paralectotype, NHMUK 1910.3.29.45: front (**B**, **C**), side (**D**, **E**), back (**F**), peristome (**G**, **I**), aperture (**H**), original labels (**J**, **K**). Scale bars: **B–F**, **H**: 1 mm; **G**, **I**: 0.5 mm.

Type material. Lectotype: SAM D. 13450 (fide Marshall 1983; not seen, see Remarks).

Additional material. NHMUK 1911.8.12.1–2: 2 specimens (glued on cardboard), off Cape Borda, Kangaroo Island, South Australia.

Original description. *Shell immature, of eight whorls, including the protoconch of two whorls, the first nearly smooth with a round projecting apex, the second with two stout prominent keels, gradually becoming nodular. In the first spire-whorl arises a faint third spiral, posterior to the others (whence the specific name), which continuously enlarges till it nearly equals them in size. They are crossed by axial liras, about fourteen in the last whorl, both axials and spirals being well marked, the latter the stouter; and being tuberculate at their intersection. The*

peripheral spiral is prominent and subtuberculate, it is visible in the earlier sutures, but not in the later; two flat obsolete plaits curve round the base. Colour white.

Dim.—Length, 3.1 mm; breadth, 1.2 mm. The largest example, immature, is 5.2 mm.

Locality.—Dredged in 55 fathoms off Cape Borda, type with 7 others, some quite fresh, all immature; in Gulf St. Vincent, 1.

*Diagnosis.—Its special characters are its blunt protoconch with two carinae, and the third spiral arising behind the others; in most Triphora it arises between them as in *T. angasi*, *tasmanica*, *cana*, etc.*

Type in my collection.

Remarks. In the original description, Verco referred to multiple specimens in the type series. Marshall's (1983) re-

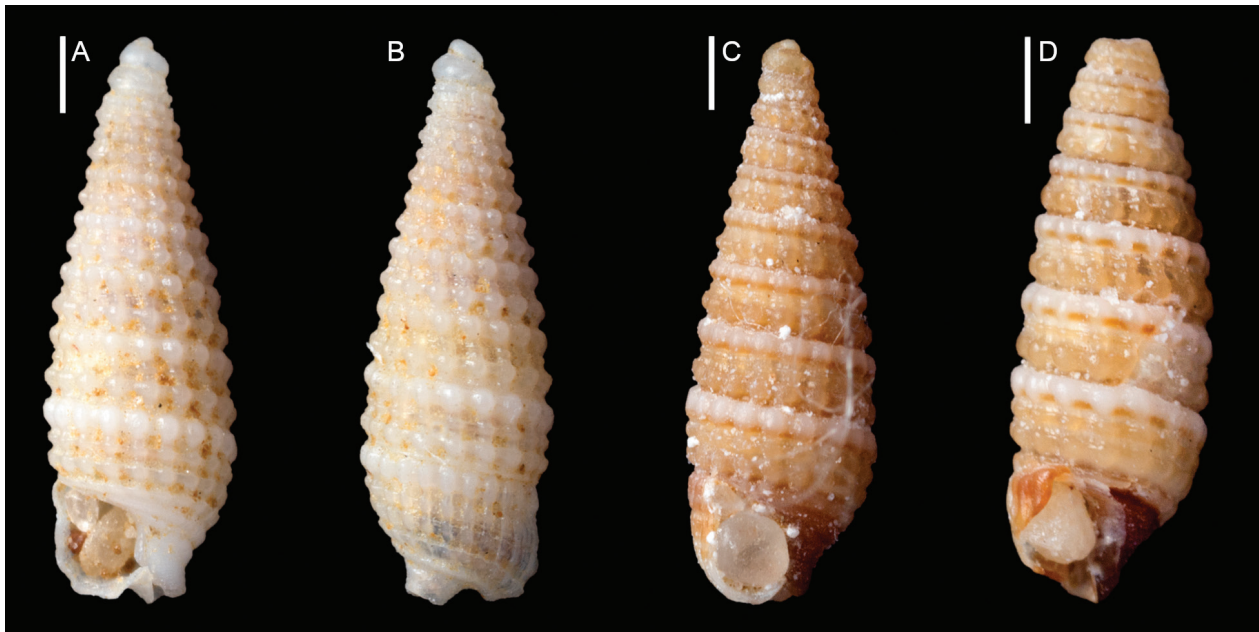


Figure 109. *Triphora albovittata* var. *mamillata* Verco, 1909, Gulf St. Vincent, South Australia. **A, B** NHMUK 1910.3.29.49: front (**A**), back (**B**). **C, D** NHMUK 1910.3.29.50–51: front views. Scale bar: 0.5 mm (photo courtesy: Kevin Webb, NHMUK Photographic Unit).

port of the “holotype” in the SAM should be considered a lectotype designation according to Article 74.6 of the Code (ICZN 1999). The two NHMUK shells come from the type locality. However, neither the label nor the register entry states that they are co-types. Their type status is uncertain.

Triphora spica Verco, 1909

Figure 111

Triphora spica Verco 1909: 281, pl. XXIII, fig. 1.

Type locality. “off Beachport” (South Australia).

Type material. Lectotype: SAM D. 13453 (fide Marshall 1983; not seen, see Remarks). Paralectotypes: NHMUK 1910.3.29.54–55: 2 specimens, Cape Borda, Kangaroo Island, South Australia.

Original description. *Shell solid, long, narrow, upper third elongate-conical, the rest nearly cylindrical. Protoconch of 5 whorls, convex, with two central closely approximate spiral threads and numerous axial bars. Spire-whorls 17, the first three with two nodulate spiral ribs, and an infra-sutural small, smooth cord. In the fourth whorl this becomes nodulate; and getting thicker equals the other spirals in the sixth whorl. Between the twelfth and thirteenth whorls a supra-sutural thin threadlet appears and gradually enlarges and grows subnodular. The nodules in a spiral row on the penultimate are 17, transversely elliptical, and are joined spirally by a bar about one-third of their width, and vertically by obsolete bars nearly their own width. The body-whorl has three spiral ribs, a subnodulated peripheral riblet, a distinct smooth,*

stout, basal spiral, and an obsolete one at the base of the canal. The lip is broken. Colour, lightbrown, with axial streaks of darker-brown from suture to suture; sometimes these happen to be continuous over two or more whorls, sometimes not; the protoconch is of darker brown.

Dim.—Length, 97 mm; breadth, 1.55 mm; length of protoconch, 0.55 mm.

Locality.—Type, 40 fathoms off Beachport, with 4 others; 55 fathoms off Cape Borda, 10 good, many poor; 62 fathoms off Cape Borda, 1 poor; Gulf St. Vincent, under 25 fathoms, 7 poor. The habitat would appear to be in 40 to 50 fathoms.

Diagnosis.—From *T. kesteveni*, Hedley, it differs in its nodulated spirals and in its colour.

Remarks. In the original description, Verco referred to multiple specimens in the type series. Marshall’s (1983) report of the “holotype” in the SAM should be considered a lectotype designation according to Article 74.6 of the Code (ICZN 1999). The label accompanying this lot reports Cape Borda as the locality, as listed in the original description, and the wording “Co-types”, which suggests that these specimens indeed belong to the type series. Because of Marshall’s lectotype designation, these and all other syntypes are now paralectotypes.

Triphora spina Verco, 1909

Figure 112

Triphora spina Verco 1909: 280–281, pl. XXII, figs 2–4.

Type locality. “off Beachport” (South Australia).

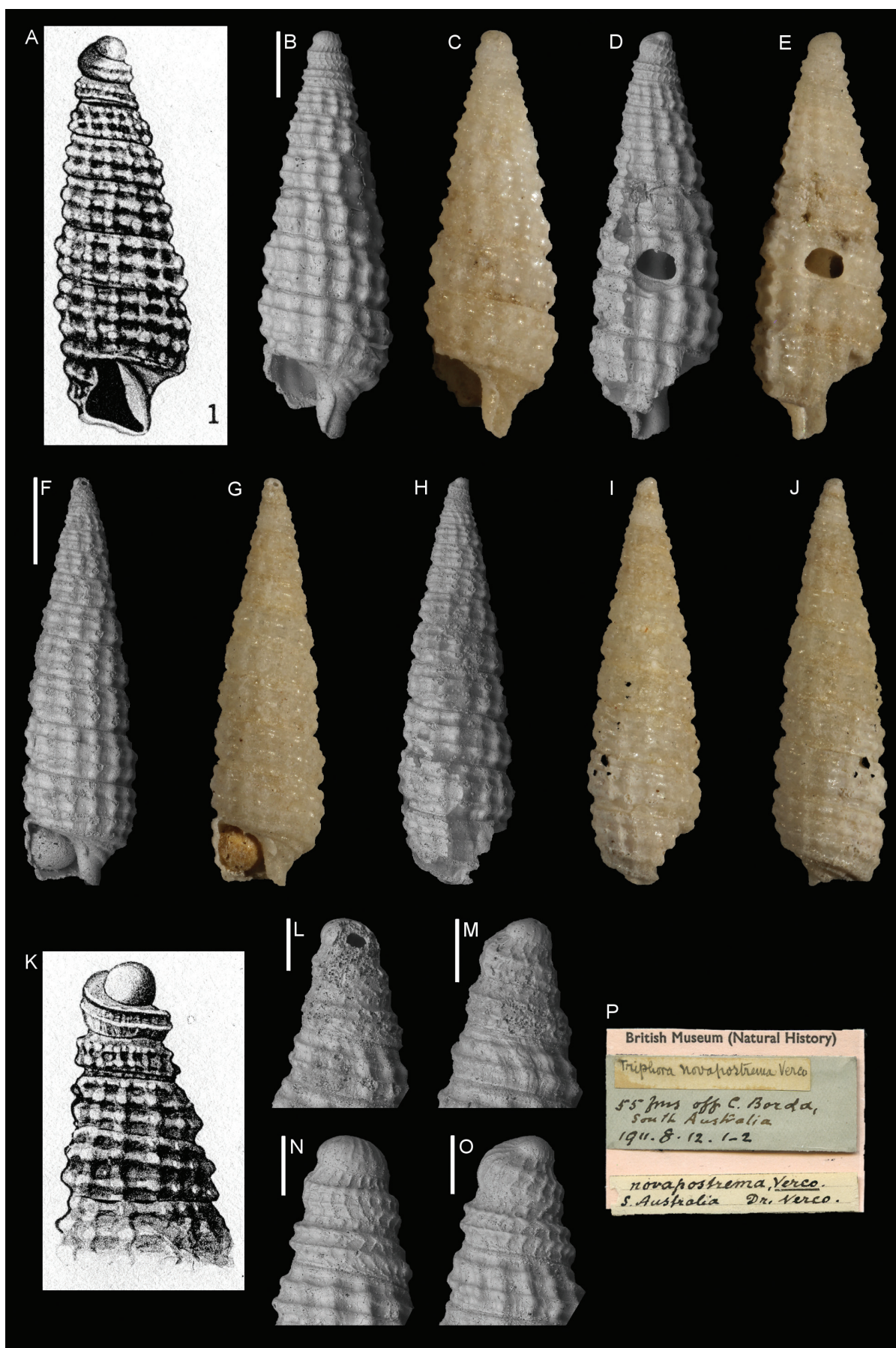


Figure 110. *Triphora novapostrema* Verco, 1910, off Cape Borda, South Australia. A, K Original figures. B–E, N, O NHMUK 1911.8.12.1: front (B, C), side (D, E), protoconch (N, O). F–J, L, M NHMUK 1911.8.12.2: front (F, G), side (H, I), back (J), protoconch (L, M). P. Original labels. Scale bars: B–E: 0.5 mm; F–J: 1 mm; L–O: 0.2 mm.



Figure 111. *Triphora spica* Verco, 1909, Cape Borda, South Australia. **A** Original figure. **B–H** Paralectotype, NHMUK 1910.3.29.54: front (**B**, **C**), side (**D**, **E**), back (**F**), aperture (**G**), peristome (**H**). **I–K**: Paralectotype, NHMUK 1910.3.29.55: front (**I**), side (**J**), back (**K**). **L** Original labels. Scale bars: **B–F**, **I–K**: 1 mm; **G**, **H**: 0.5 mm.

Type material. Lectotype: SAM D. 13449 (fide Marshall 1983; not seen, see Remarks). Paralectotype: NHMUK 1910.3.29.39: 1 specimen, off Beachport, South Australia.

Original description. Shell sinistral, elongate-subulate-pyramidal. Protoconch of 4 turns, apex prominent and tongue-like, whorls smooth, centrally boldly angled, concave between the median angulations. Suture linear. Spire-whorls 17, with four ribs; the largest is the continuation of the nuclear angulation; above this is a much smaller infra-sutural rib, below it the shell wall seems thinner and less opaque; then comes a bold rib, and close below it a supra-sutural rib. They are slightly tuberculate with low transverse nodules, united by low broad oblique axial

costae, most marked between the upper two ribs, but connecting the upper three; the supra-marginal rib is smooth, and wedged in between the two adjacent ribs. Aperture roundly rhomboidal; outer lip crenulated by the spirals, antecurrent into a spur towards the front canal nearly closed at this point, curved to the left, and reflected; back of the aperture pinched at the suture, but no sutural notch. Base smooth, with one spiral. Colour, light-amber tint.

Dim.—Length, 12.4 mm; width, 1.9 mm.

Locality.—Type, 110 fathoms off Beachport, with 2 others perfect and 11 broken, in 150 fathoms 6 moderate, and in 200 fathoms 3 poor; in 90 fathoms off Cape Jaffa, 7 perfect and 14 broken, and in 130 fathoms 3 broken.

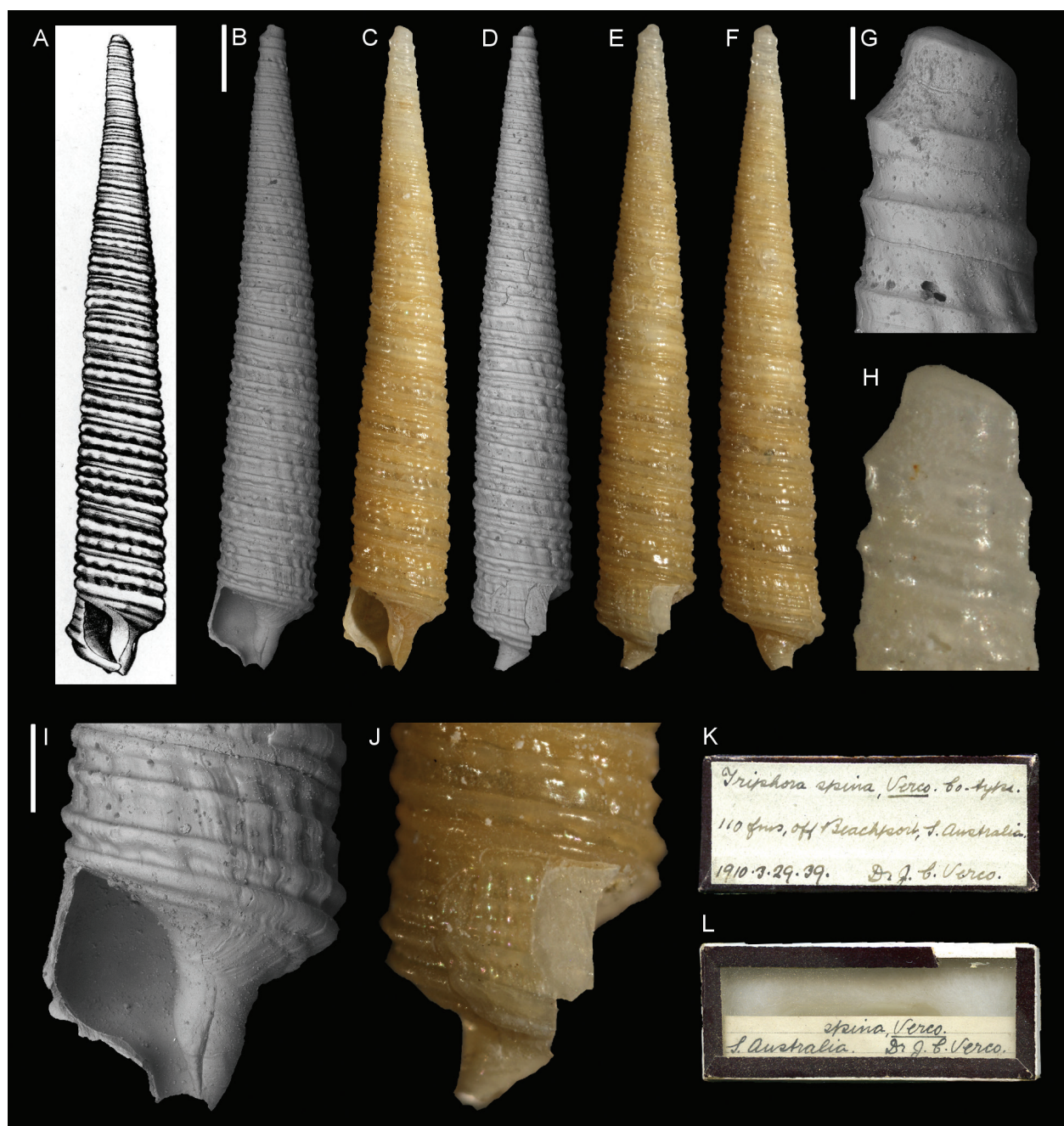


Figure 112. *Triphora spina* Verco, 1909, off Beachport, South Australia. **A** Original figure. **B–L** Paralectotype, NHMUK 1910.3.29.39: front (**B**, **C**), side (**D**, **E**), back (**F**), protoconch (**G**, **H**), aperture (**I**), peristome (**J**), original labels (**K**, **L**). Scale bars: **B–F**: 1 mm; **G**, **H**: 0.2 mm; **I**, **J**: 0.5 mm.

It differs from T. subula in its unicarinate protoconch, and in having the 4 ribs throughout.

Remarks. In his original description, Verco referred to multiple specimens in the type series. Marshall's (1983) report of the "holotype" in the SAM should be considered a lectotype designation according to Article 74.6 of the Code (ICZN 1999). The label accompanying this lot reports the type locality and the wording "Co-types", which suggests that the specimens indeed belong to the type series. Because of Marshall's lectotype designation, these and all other syntypes are now paralectotypes.

Species described by R.B. Watson

Robert B. Watson described seven species of Triphoridae. All the types are in the NHMUK. We follow Low and Evenhuis (2013) in dating Watson (1886).

Cerithium (Bittium) abruptum Watson, 1880

Figure 113

Cerithium (Bittium) abruptum Watson 1880: 119–120, not illustrated. Illustration available in Watson (1886): 551, pl. XLI, fig. 4.

Type locality. Lat. 38°38'N, long. 28°28'30"W, Fayal, Azores.

Type material. Syntypes: NHMUK 1887.2.9.1709–11: 3 specimens, type locality.

Original description. St. 75. July 2, 1873. Lat. 38°38'N., long. 28°28'30"W. Fayal, Azores. 450–500 fms. Sand.

Shell.—Small, narrow, conical, blunt, in general form very like a decollated *Cerithiopsis metaxa*, solid, translucent, white. Sculpture. Longitudinals—there are on the last whorl about thirteen, on the earlier, fewer longitudinal ribs, which are low and narrow, and are parted by flat and broader furrows. They come down the spire, from whorl to whorl, with a strong sinistral twist. The embryonic whorls have ten or twelve small ribs. Spirals—except on the first two whorls there are on each whorl four narrow, rounded, prominent spiral threads, which rise, as they cross the longitudinals, into pointed high tubercles. The furrows which part them (except that between the third and the fourth) are narrower than the spirals. The highest of these spirals is the weakest and least prominent, being pinched in by the superior contraction of the whorl into the suture. Close above this highest spiral runs the suture. The base of each whorl is roundly but rather abruptly contracted, so that the sutural furrow has its upperside abruptly, its underside gradually, declining. The base, which is oblique, concave, and contracted, has a strong plain spiral thread round its edge, and a very minute thread encircling the base of the pillar, the scar of the siphonal cut. Besides the larger systems of sculpture, there are some faint and irregular traces of microscopic rounded longitudinals and sharper spirals. Colour translucent white. Spire high, narrow, with very straight outlines, and scarcely contracted. Apex excessively blunt and abrupt, the extreme point being rounded and barely rising into view; it is quite smooth and polished. The second whorl is longitudinally ribbed and polished; on the third the ordinary sculpture begins. Whorls 11, convex, constricted suddenly below and gradually above. Suture excessively minute and faint in itself, but its place strongly marked by the constriction of the whorls above and below. Mouth very small, oval, perpendicular, pointed above, and with a large open rounded slit in front, whose edge is hardly reverted. Outer lip thin, advancing on the base much beyond the point of the pillar. Inner lip a thin glaze, with microscopic corrugations on the pillar. Pillar very short, with a broad base spreading out to meet the outer lip, straight, with a broad but sharp point. H. 0.23. B. 0.05. Penultimate whorl, height 0.03. Mouth, length 0.028, breadth 0.02.

This species in general aspect is very like *Cerithiopsis metaxa*, della Chiaje, but differs in not having the sharp sculptured apex; the whorls, in consequence of the sutural contraction, are more rounded; the longitudinals are swellings of the whole shell, not, as in that other, mere projecting tubercles; the spirals are more definitely continuous; the longitudinal rows of tubercles run less definitely from whorl to whorl, and have a strong sinistral

twist as they proceed down the spire, while in *C. metaxa* their continuous lines are very straight.

Remarks. Bouchet (1985) accurately described the species and, therefore, we refrain from adding additional diagnostic notes.

Cerithium (Triforis) bigemma Watson, 1880

Cerithium (Triforis) bigemma Watson 1880: 101–102, not illustrated. Illustration available in Watson (1886): 562–563, pl. XLIII, fig. 6.

Type locality. “Lat. 18°38'30"N, long. 65°5'30"W, St. Thomas, North of Culebra Island, Danish West Indies” (Puerto Rico).

Type material. Lectotype: NHMUK 1887.2.9.1762, designated by Rolán and Fernández-Garcés (2008) (not seen).

Original description. St. 24. Mar. 25, 1873. Lat. 18°38'30"N., long. 65°5'30"W. St. Thomas, N. of Culebra Island, Danish West Indies. 390 fms. Coral-mud.

Shell.—Sharply conical, high and narrow, solid, opaque, brilliant, yellowish white. Sculpture. Longitudinals—the whorls are crossed by rows of tubercles with broad and rounded hollows between; of these longitudinal rows there are 17 to 18 on the last, and about 14 on a great many of the preceding whorls; besides these the surface is sharply, distinctly, and pretty closely scored by minute lines of growth. Spirals—a prominent spiral band encircles the whorls formed by two rows of rounded tubercles, which in each row are connected by a spiral thread; of these threads the lower is rather the larger, sharper, and more prominent. The distance between these threads is very nearly the same as that between the longitudinal rows, so that each group of four adjoining tubercles forms nearly a rhomb. Round the upper part of each whorl is an impressed flat surface, in which, very near the suture, lies another smaller spiral, which becomes minutely tubercled where it crosses the longitudinal rows. At the bottom of each whorl is a very minute spiral thread, which forms a pouting edge to the suture. Besides these the surface is faintly reticulated by microscopic spirals crossing the longitudinal lines of growth. This reticulation is best seen on the flat and glossy base, which is unbroken except by a small sharp spiral, about 0.012 in. within the edge. Colour yellowish white, pure white on the upper part of the spire; round the base of each whorl is a suffused pale tint of brown, which is more or less the colour of the base of the shell; the point of the pillar is white. Spire high, narrow, and conical, slightly slewed to the left; so that while the left slope is straight, almost concave, the right slope is just perceptibly convex. Whorls probably 22, but of these the 3 or 4 apical ones are broken off; they are of very slow increase, flat, constricted on their upper part, flatly prominent in the middle, and contracted at the lower part; the base of the shell is flatly conical. Suture strongly defined by the de-

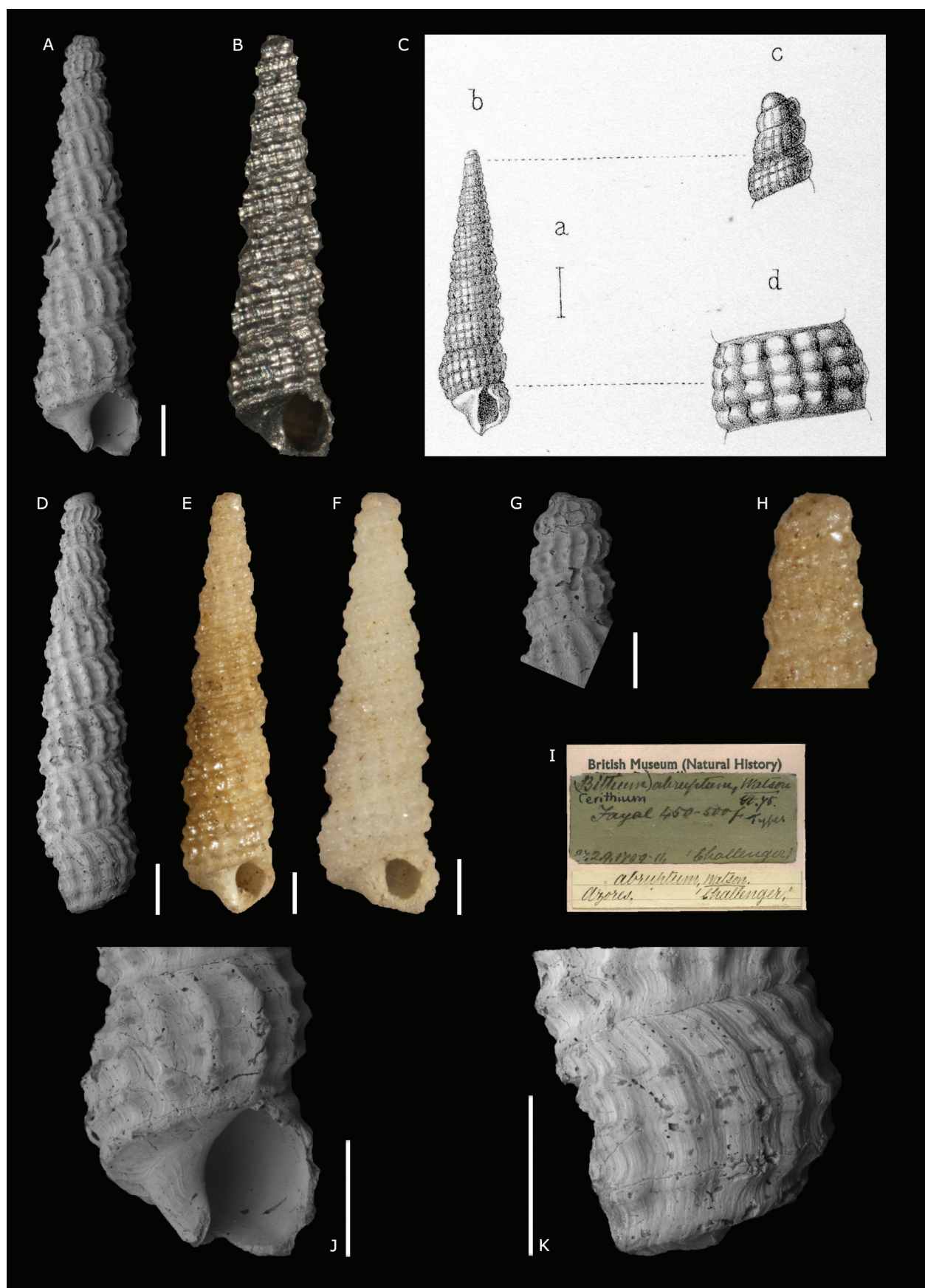


Figure 113. *Cerithium (Bittium) abruptum* Watson, 1880, Fayal, Azores. **A, B, D, G, J, K** Syntype NHMUK 1887.2.9.1709: front (**A, B**), side (**D**), protoconch (**G**), aperture (**J**), peristome (**K**). **C** Original figure. **E, H** Syntype NHMUK 1887.2.9.1710: front (**E**), protoconch (**H**). **F** Syntype NHMUK 1887.2.9.1711: front. **I** Original labels. Scale bars: **A, B, D–F, J, K**: 0.5 mm; **G, H**: 0.1 mm.

pression in which it lies, but itself linear and projecting, being minutely margined both above and below. Mouth squarely oval, pointed above and at the front of the pillar by the canal, which is small. Outer lip broken. Pillar short, small, straight, scarcely excavated or twisted, at the point sharp and slightly advancing outwards. Inner lip. A very thin layer of glaze is carried across the body, and turns round the pillar in a few microscopic lines, by which alone it can be traced. H. 0.6. B. 0.12. Penultimate whorl 0.072. Mouth, length 0.08, breadth 0.06.

This has a good deal the proportions of *C. metula*, Lov., with a narrower base. It slightly resembles the *Triforis Pfeifferi*, Crosse, and (apparently, for the *B. M. tablet* has more than one species on it) the *T. scitula*, A. Ad., both from S. Australia; but these have only one series of gemmules, the upper row being very much smaller, and in both the whole shell is very much smaller and slenderer. *T. gigas*, Hinds, is a much thinner and less strongly tubercled and sutured shell. *T. angustissima*, Desh. (Moll. de Bourbon), is larger, broader in proportion, has the lower (in his description “supérieure”, as he reverses the shell) row of tubercles larger, and lacks the infrasutural flat constriction with its small and finely tubercled spiral.

Remarks. Rolán and Fernández-Garcés (2008) recently treated this species and illustrated the lectotype.

Triforis dolicha Watson, 1886

Figure 114

Triforis dolicha Watson (1886): 565–566, pl. XLII, fig. 1.

Type locality. “Lat. 9°59'S, long. 139°42'E West of Cape York, North-east Australia”

Type material. Syntypes: NHMUK 1887.2.9.1767: 1 specimen, type locality.

Original description. Station 188. September 10, 1874. Lat. 9°59'S., long. 139°42'E. West of Cape York, North-east Australia. 28 fathoms. Green mud.

Shell.—Long and narrow, conical, pale, spotted with brown, with three rows of fine tubercles on the later whorls and two on the earlier, a furrowed suture, a small regularly tapering apex, and a square barely produced base. Sculpture: Longitudinals—there are on each whorl about 16 riblets, which originate at the upper row of tubercles, and swell down to the lower; they are parted from each other by little shallow pits, and they but feebly and doubtfully run down the spire, being not quite coincident in the adjoining whorls, and being parted by the sutural furrow; near the outer lip the riblets subside into continuous bars, which are prolonged to the base. Spirals—on the last four whorls there are three, on the earlier two, rows of tubercles set upon the longitudinals, and slightly connected in each row by a fine thread; round the angle of the base runs a sharp rounded thread; at the top

of the pillar is another finer; on the pillar itself there are two folds. Colour pale brownish, with darker stains. Spire high and narrow, conical. Apex conical, consisting of five rather sharply angulated and carinated whorls, which are ornamented by minute not quite regular longitudinal bars; the extreme tip is small, rounded, quite smooth, polished, and not very prominent, but rather spread out than immersed. Whorls: there are 11½ regular whorls, which are short and of very gradual increase; the edge of the base is bevelled off, but the base itself is flat, with a slight hollowing in the middle. Suture furrowed, but in itself invisible, rather oblique. Mouth somewhat squarely rounded, small, bluntly pointed above. Outer lip is very thin and sharp; has at its insertion a small deep rounded sinus, below which it advances very much into a scoop-like form on the base, and is on the right sharply bent in upon the pillar, the forward edge of which it inwraps. Pillar very short indeed; its point is twisted, and very sharply bent to the right, infolding the generic canal. Inner lip concave, very short, with a thickened edge; there is a minute nick at its junction, with the outer lip on the pillar. H. 0.184 in. B. 0.048. Mouth, height 0.027, breadth 0.022. Apex, height 0.018, breadth 0.013.

This species is not at all unlike the smaller forms of *Triforis perversa* (Linne), of Europe; but, besides very many minute points of distinction, the base is squarer, with two not three threads, the labral sinus is much deeper, the mouth is rounder, the basal lip more produced, and the pillar tip more bent and elongated; the sutural furrow, too, is deeper, wider, and less oblique, and while the apex is slightly broader, the extreme tip is a very little smaller.

Diagnosis. Syntype 4.3 mm high. Shell slightly cyrtconoid with flat whorls. Teleoconch of 11 whorls with three spiral cords, the second as a narrow thread until the last whorl, with tubercles at the intersection with the prosocline axial ribs. A fourth smooth suprasutural cord is visible in the second half of the shell. Numerous prosocline growth lines are visible in the interspaces between the cords. Peristome with a shallow posterior sinus and additional spiral cords. Siphonal canal long. Base rather flat and concave with two additional smooth spiral cords. Protoconch incomplete in the syntype, but clearly multispiral with at least four whorls. The last three bear a single strong spiral keel and axial riblets. Teleoconch apparently whitish, but the syntype is worn; the “darker stains” described by Watson may be again due to taphonomic damage. Protoconch light brown.

Cerithium (Triforis) hebes Watson, 1880

Figure 115

Cerithium (Triforis) hebes Watson 1880: 103, not illustrated. Illustration available in Watson (1886): 551, pl. XLIII, fig. 7.

Type locality. “Nightingale Island, Tristao da Cunha Islands, S. Atlantic”

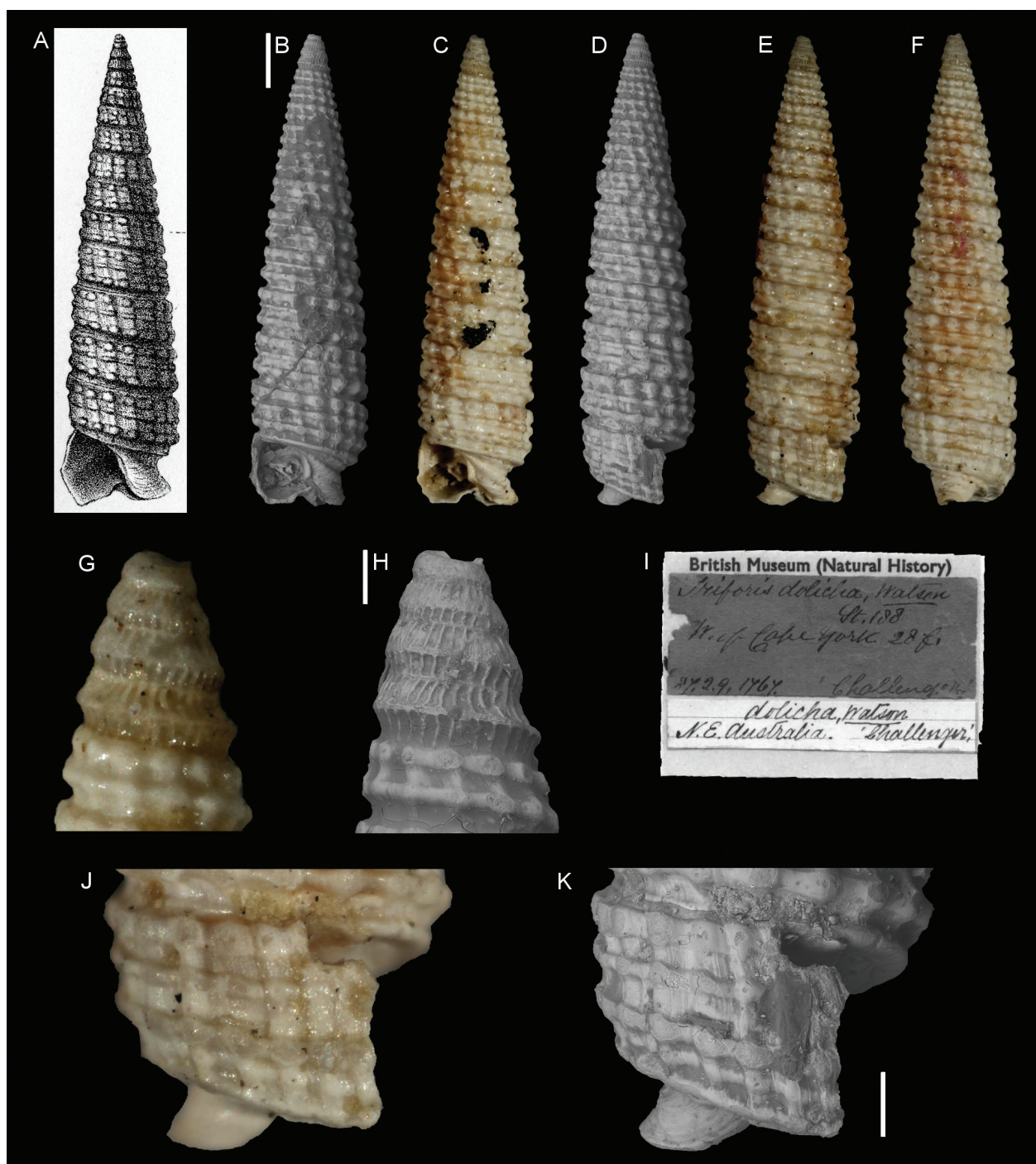


Figure 114. *Triphoris dolicha* Watson, 1886, West of Cape York, North-East Australia. **A** Original figure. **B–H, J, K** Syntype NHMUK 1887.2.9.1767: front (**B, C**), side (**D, E**), back (**F**), protoconch (**G, H**), peristome (**J, K**). **I** Original labels. Scale bars: **B–F**: 0.5 mm; **G, H**: 0.1 mm; **J, K**: 0.2 mm.

Type material. Syntypes: NHMUK 1887.2.9.1763–5: 3 specimens, type locality.

Original description. *St. 135. Oct. 18, 1873. Nightingale Island, Tristao da Cunha Islands, S. Atlantic. 100–150 fms. Rock; shells.*

Shell.—Cylindrically conical, blunt, uncontracted towards the base, strong, translucent, hardly glossy. Sculpture. Longitudinals—on the last whorl there are about 20

longitudinal rows of rounded tubercles, parted by depressions of much the same breadth and form as themselves; they run more or less continuously and straight up the spire from whorl to whorl. There are indistinct lines of growth. Spirals—on each whorl the tubercles are arranged in three spiral rows, parted by rather deep but narrow squarish furrows. The highest row is rather smaller and less prominent than the others. The base of each whorl is sharply but not deeply constricted; the edge of this constriction appears on

the margin of the base as a rounded thread, defined by a slight furrow, which, with the exception of microscopic radiating lines of growth, is the only ornament of the flat and very slightly conical base. Colour pure somewhat translucent white. Spire high and conical, but contracting very little, and hence more cylindrical than usual. Apex very blunt, but almost mucronated; this arises from the three embryonic whorls, which are smooth, being formed of two tumid threads, of which the lower is the larger, but the upper is at first the more prominent, and at its origin stands up minute, round, and prominent, like a small eccentric blunt spike, reminding one of the mucronated mamillary plug of some of the *Caecums*. It is not a plug, however, but the true embryonic form. This embryonic shell is smooth and glossy, but has some faint trace of spiral sculpture. Whorls 12, of very gradual increase, flat on the sides, constricted below, flat and hardly conical on the base. Suture well defined by the contraction of the whorl above it, and by a minute thread on which it projects. Mouth angulately oval, with a small straight canal in front. Outer lip broken. Pillar perpendicular, straight, short, narrow, pointed. Inner lip a thickish porcellanous glaze. *H.* 0.24. *B.* 0.06. Penultimate whorl 0.03. Mouth, length 0.032, breadth 0.02.

This species has some resemblance to *T. suturalis*, *Ad. & Rve.*, but is easily distinguished from that by its blunt apex and the less sunken suture.

Diagnosis. Syntypes ranging in height between 3.7 and 5.3 mm; none looks fully mature. Shell conical with slightly curved sides. The largest specimen has ca 9 whorls bearing three strong spiral cords from the beginning of the teleoconch; tubercles are present at the intersection with the orthocline axial ribs. A fourth smooth narrow cord is visible suprasuturally. Growth lines are visible between the cords. Due to the subadult stage, the peristome and the base are not fully developed. Siphonal canal short. The large protoconch is certainly paucispiral, with two whorls: the first bears a strong spiral keel and possibly some thick axial ribs, but all syntypes have very worn apices. Teleoconch and protoconch white.

Cerithium (Triforis) inflata Watson, 1880

Cerithium (Triforis) inflata Watson 1880: 103–104, not illustrated. Illustration available in Watson (1886): 564–565, pl. XL, fig. 1.

Type locality. “Lat. 18°38'30"N, long. 65°5'30"W, St. Thomas, North of Culebra Island, Danish West Indies” (Puerto Rico).

Type material. Lectotype: NHMUK 1887.2.9.1766, designated by Rolán and Fernández-Garcés (2008) (not seen).

Original description. *St.* 24. *Mar.* 25, 1873. *Lat.* 18°38'30"N, *long.* 65°5'30"W. *St. Thomas, N. of Culebra Island, Danish West Indies.* 390 fms. *Mud.*

Shell.—Small, narrow, conical, with a blunt inflated apex, solid, opaque, glossy. Sculpture. Longitudinals—

there are on the last whorl 16 rows of small rounded but not blunt tubercles, which more or less continuously run obliquely down the spire in lines from right to left; the hollows which part them are in form much like themselves; there are also faint microscopic scratches on the lines of growth. Spirals—on each whorl the tubercles are arranged in two spiral rows, in which the tubercles have their sharp tips tilted up the spire, and they are parted by a triangular shaped furrow, narrower than the spirals of tubercles. Below the under row of tubercles is a broader furrow, in the bottom of which runs the suture on the spireward face of a fine rounded thread occupying the extreme upper edge of the subjacent whorl. This thread is undulated rather than tubercled where it crosses the longitudinal rows; on the spireward side this thread is defined by a minute deep square-bottomed trench, while on the basal side it lies close in to the foot of the upper spiral row of tubercles. Round the edge of the base is a slight sharp narrow keel, which the succeeding whorl as it grows buries in the spiral thread mentioned above. At 0.004 from the edge, and there forming a ledge, the whole centre of the base is slightly projected: with this exception, the flat and scarcely conical base has no ornamentation beyond the radiating lines of growth and the microscopic spirals, which, though visible on the rest of the shell, are, as usual, more distinct on the base. Colour dull translucent white. Spire high, narrow, and conical. Apex blunt and inflated. The two embryonic whorls are larger, but otherwise very much like those of *C. metula*, *Lov.*, being turban-shaped and projecting beyond the succeeding whorls; they are glossy and quite smooth but for some very faint microscopic longitudinal and spiral lines. Whorls 13, of very gradual increase, flat on the sides; the base, too, is flat, and very little conical. Suture linear, almost hidden by the overlap of the subjacent whorl. Mouth very small and square, with a minute, round, very short canal in front, whose edges are reverted all round. Outer lip broken. Pillar very small, extremely short, straight, but reverted at the point. Inner lip not fully formed. *H.* 0.2. *B.* 0.06. Penultimate whorl 0.02. Mouth, length 0.028, breadth 0.025.

This species, which in shape resembles *T. suturalis*, *Ad. & Rve.*, may be easily distinguished from that species by the absence of the deep suture and by the inflated apex. From *C. (T.) hebes*, *W.*, its sculpture and its apex distinguish it at once.

Remarks. Rolán and Fernández-Garcés (2008) recently treated this species and illustrated the lectotype.

Cerithium (Triforis) levukense Watson, 1880

Figure 116

Cerithium (Triforis) levukense Watson 1880: 100, not illustrated. Illustration available in Watson (1886): 551, pl. XXIX, fig. 4.

Type locality. “Levuka, Fiji”.

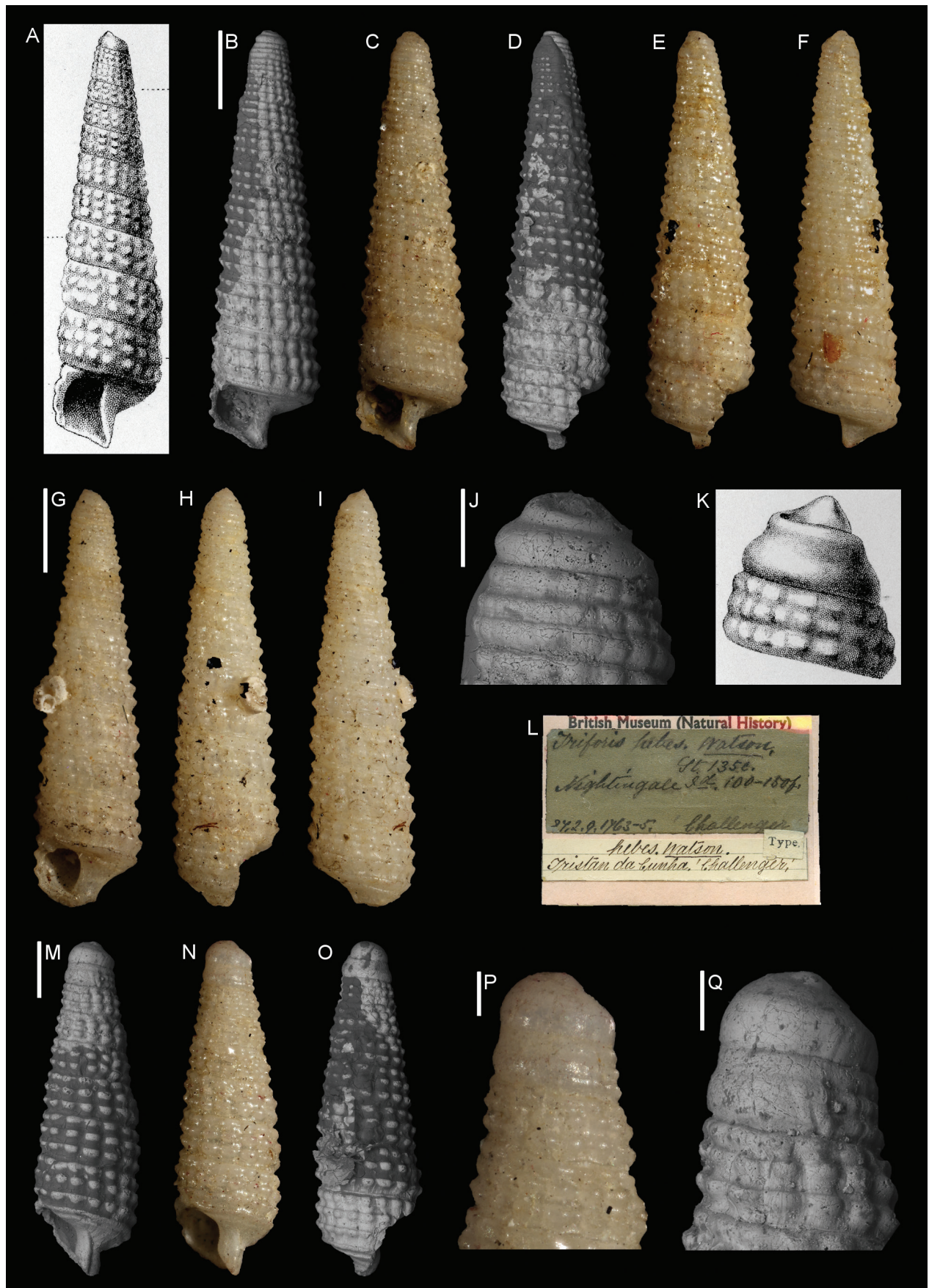


Figure 115. *Cerithium (Triforis) hebes* Watson, 1880, Nightingale Island, Tristan da Cunha, South Atlantic. **A, K** Original figures. **B–F, J** Syntype NHMUK 1887.2.9.1763: front (**B, C**), side (**D, E**), back (**F**), protoconch (**J**). **G–I** Syntype NHMUK 1887.2.9.1764: front (**G**), side (**H**), back (**I**). **M–Q** Syntype NHMUK 1887.2.9.1765: front (**M, N**), side (**O**), protoconch (**P, Q**). **L** Original labels. Scale bars: **B–I**: 1 mm; **H, P, Q**: 0.2 mm; **M–O**: 0.5 mm.

Type material. Syntypes: NHMUK 1887.2.9.1760–1: 2 specimens, type locality.

Original description. July 29, 1874. Levuka, Fiji. 12 fms.

Shell.—Sinistral, sharply conical, with a narrow and produced base, solid, yellowish white, glossy. Sculpture. Longitudinals.—there are (on the last whorl) about twenty longitudinal rows of round tubercles, which rows form a small rib across the whorl, and are more or less continuous up the spire; these continue on the base as strongly as on the upper part of the whorls. These rows are parted by shallow rounded depressions. Spirals—the longitudinal rows are cut by narrow little rounded grooves, whose intersection with them forms the tubercles. On the upper whorls there is only one such spiral groove, so that there are only two tubercled spirals, but the groove gradually widens, and there appears in the bottom of it a minute additional spiral, which finally becomes as large as the other two; on the base are 3 equally divided tubercled spiral threads, of which the inmost is the smallest, and it ceases at the siphonal tube. The apex consists of 6 small rather elongated narrow whorls, of which the first $1\frac{1}{2}$ have about ten rows of minute tubercles faintly connected by spirals; the next $4\frac{1}{2}$ whorls are crossed by about 24 longitudinal sharp little ribs, rising into points at the carina, which is a continuous spiral thread. This carina on the first of these whorls is near the base, but later it rises so as to encircle the upper part of the whorl. The minute spiral rows of tubercles, which alone appear on the first whorl and half, cover the whole surface (both ribs and interstices) on the later apical whorls. The regular sculpture does not begin abruptly and at once, but a tongue of this new sculpture breaks across the top of the whorl, while the lower part retains the earlier ornamentation. Colour. The apical whorls are amber, the rest of the shell yellowish white, with a narrow amber-coloured thread within the contraction of the base of each whorl; this spiral thread is not continuous, being interrupted by each of the longitudinal rows of tubercles. Spire high, sharply conical, with a very slight convexity in its lines of profile, which are not perfectly alike. Apex a narrow and perfect cone, ending in a small rounded point. Whorls 17, of very regular increase, flat on the side; the whole last whorl is contracted and a little elongated; the base is narrow and flat. Suture sharply impressed, and broader than the spiral grooves, being marginated on its upperside by a minute flat surface, which runs round the base of the superior whorl. Mouth almost more than perpendicular; square, with a largish auricle at its upper corner, and a small and very transverse rift at the pillar. Outer lip sharp, thin, straight, perpendicular, angulated at the basal corner, flat across the base, turned in towards the mouth and pinched in at the pillar; where it joins the pillar-lip, closing in the side of the small siphonal canal, whose edge is sharp and straight, or a very little contracted all round. Pillar straight in front, then very much bent back, so that its posterior line almost stands on the edge of the base. Pillar-lip expanded but abruptly defined on the base, blunt but projecting on the pillar, where it is covered by and

cemented to the outer lip. H. 0.22. B. 0.075 least 0.06. Penultimate whorl 0.032. Mouth, length 0.037, breadth 0.035. This beautiful little species is very like in general aspect to *C. perversum*, L.; but, apart from other obvious differences, the sculpture of the apex is quite distinct. In that species the extreme apex has about seven spiral scatches, parted by roughened threads, and the following whorls are beset with much closer-set and more numerous riblets, and they have two close-set spirals at the carina. The whole of this sculptured apex (in *C. perversum*) is stumpier, and the whorls are not so angulated, and the extreme point is blunter. *T. Hindsii*, Desh. (*Bourbon Moll.* p. 99), is very near, but is less contracted in front towards the base, has not there near the mouth four rows of pearls, has the pearls white on a brown ground, has not the single amber thread, and is a little narrower in proportion.

Diagnosis. The adult syntype is 4.4 mm high. Shell cyrtconoid with flat whorls. Teleoconch with at least 11 whorls, but the apical part is missing. Three spiral cords are present with the second developing initially as a narrow thread and attaining full size only on the last whorl. A fourth smooth suprasutural cord is visible. Peristome incomplete in the adult syntype. Siphonal canal short. Base flat, with two weakly sculptured spiral cords. Protoconch present only in the juvenile syntype and likely multispiral as illustrated by Watson. Teleoconch light yellowish with a narrow orange-brown line on the lower part of the third spiral cord.

Triforis rufula Watson, 1886

Figure 117

Triforis rufula Watson (1886): 566–567, pl. XLII, fig. 2.

Type locality. “Lat. $10^{\circ}30'S$, long. $142^{\circ}18'E$. Off Wednesday Island, Cape York, North-east Australia”.

Type material. Lectotype: NHMUK 1887.2.9.1768, here designated. Paralectotypes: NHMUK 1887.2.9.1769–71: 3 specimens (at least one certainly not belonging to this species, see remarks).

Original description. Station 186. September 8, 1874. Lat. $10^{\circ}30'S$, long. $142^{\circ}18'E$. Off Wednesday Island, Cape York, North-east Australia. 8 fathoms. Coral mud.

Shell.—High, ruddyish, with convexly conical outlines, a slightly convex base, three rows of tubercles on each whorl, a small furrowed suture, and a conical and high apex. Sculpture: Longitudinals—there are on the last whorl about 18 (on the earlier whorls fewer) direct riblets, which run down the spire pretty continuously, and cross the base; the parting furrows are wide open and rounded. Spirals—on each whorl there are three very slightly raised square threads, which swell into strongish tubercles as they cross the riblets; they are parted by squarish somewhat narrower furrows; at the angle of the base, barely within its contraction, is a slightly weaker subtubercled thread; another, weaker and undulated rath-

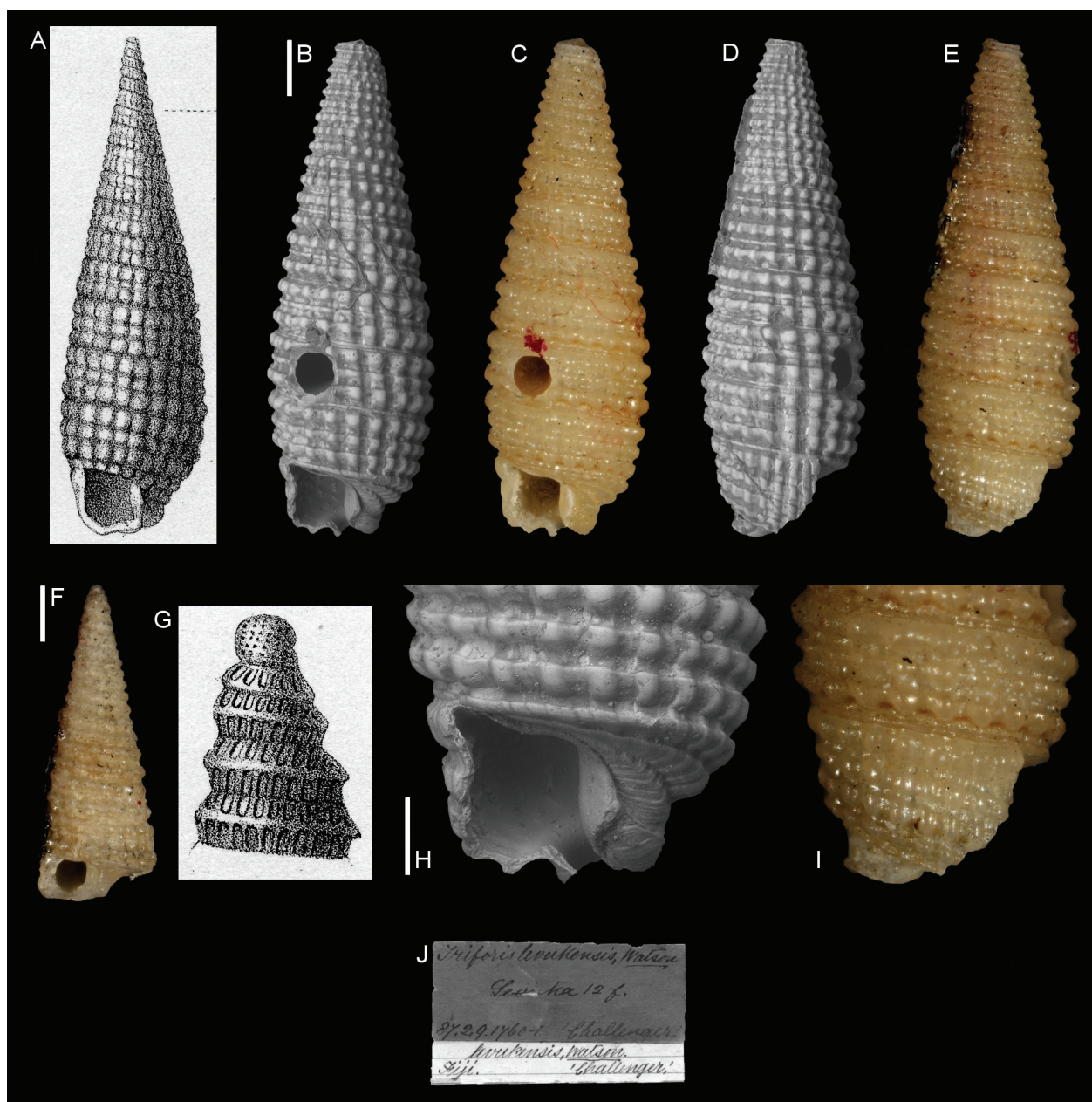


Figure 116. *Cerithium (Triforis) levukense* Watson, 1880, Levuka, Fiji. **A, G** Original figure. **B–E, H, I** Syntype NHMUK 1887.2.9.1760: front (**B, C**), side (**D, E**), aperture (**H**), peristome (**I**). **F** Syntype NHMUK 1887.2.9.1761: front. **J** Original labels. Scale bars: **B–F**: 0.5 mm; **H**: 0.3 mm.

er than tubercled, occupies the middle of the base; round the top of the pillar is another weaker still. Colour yellow, more or less ruddy. Spire high, very slightly tumid, the lateral outlines being convex. Apex has a small blunt rounded tip, is translucent white and conical, and consists of five short convex whorls, on each of which, above the middle, are two fine flat slightly raised threads; their surface is also scored longitudinally with fine regular bard. Whorls 8, besides those of the apex; they are flat on the sides, of slow and regular increase, and are parted by a strong sutural furrow; the last whorl is little larger than the penultimate, and has a short rounded base. Suture oblique, strongly defined by its furrow, but in itself invis-

ble. Mouth oblique, irregularly four-sided, very acute-angled above at the sinus, and below at the canal. Outer lip thin and sharp, angulated but not sinuated at its insertion; from this point its edge advances all the way to the base of the shell, at the corner of which it turns in a distinct angle, and across which it is prominent; the lip of the canal does not touch the pillar point, so that the round canal is not closed. Pillar short, twisted but very shortly reverted at the point. Inner lip well defined, with a slightly thickened edge, concave. *H.* 0.192 in. *B.* 0.057. Mouth, height 0.037, breadth 0.027. Apex, height 0.02, breadth 0.014.

This species is in a vague way very like a great many others of the genus, but is distinct from any known to me.

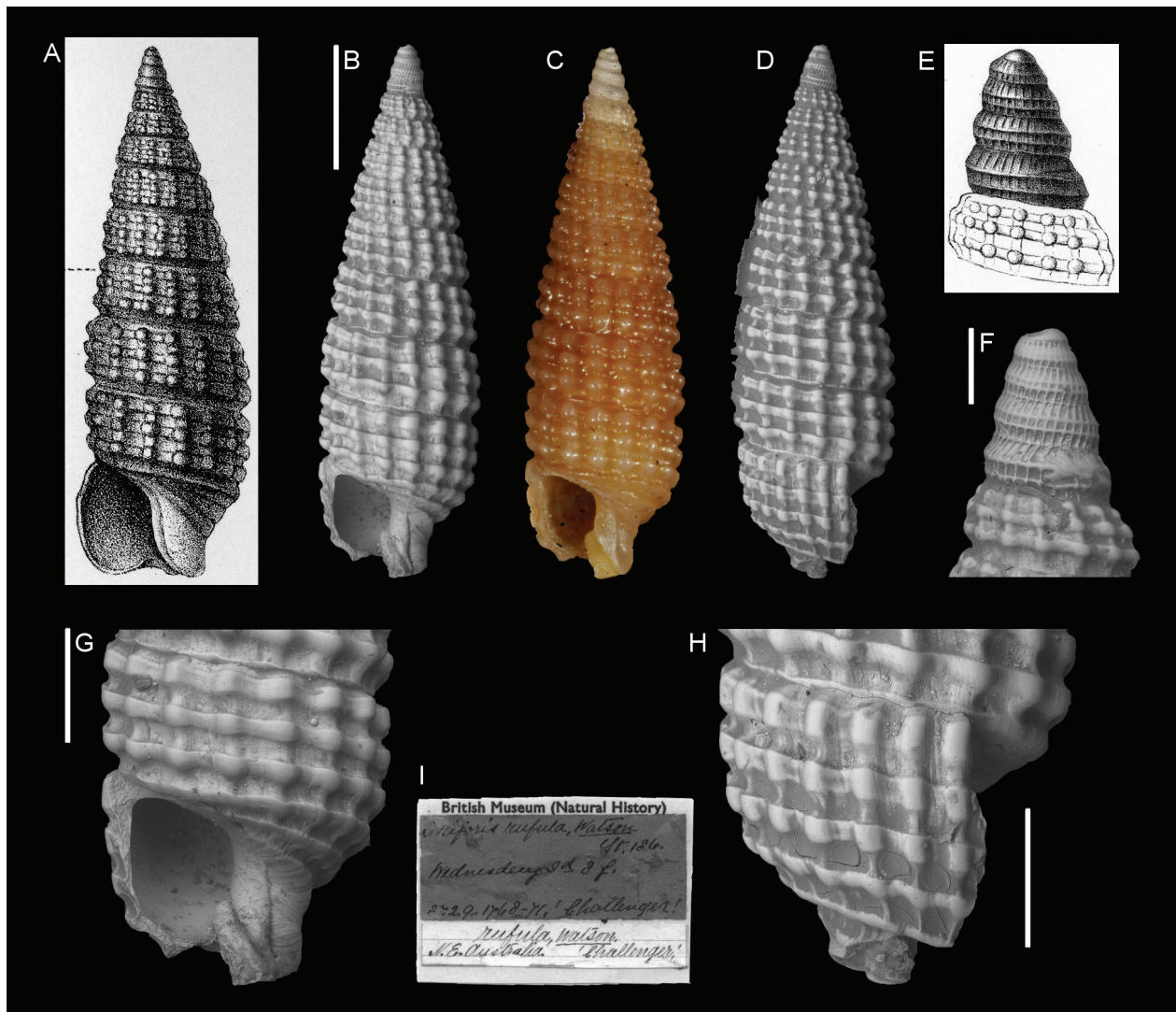


Figure 117. *Triforis rufula* Watson, 1886, off Wednesday Is., Cape York, north-east Australia. **A, E** Original figures **B–D, F–H** Lectotype NHMUK 1887.2.9.1768: front (**B, C**), side (**D**), protoconch (**F**), aperture (**G**), peristome (**H**). **I**. Original labels. Scale bars: **B–D**: 1 mm; **F**: 0.2 mm; **G, H**: 0.5 mm.

Diagnosis. Lectotype 4.2 mm high. Shell cyrtococonoid with flat whorls. Teleoconch of eight whorls with three spiral cords well developed from the first whorl onward and bearing tubercles at the intersection with orthocline axial ribs. A fourth smooth suprasutural cord is visible in the lower half of the shell. Growth lines are visible between the cords. Peristome incomplete in the lectotype. Siphonal canal short. On the base, the fourth cord becomes strong and slightly tubercled and two more smooth cords are visible. Protoconch multispiral of at least four whorls, but the first whorls are missing. These whorls bear two spiral keels and axial riblets. Teleoconch brown, protoconch white.

Remarks. Lot NHMUK 1887.2.9.1768–71 contains four specimens, with one specimen clearly matching the original drawing. Another specimen is obviously not conspecific because it has the second spiral cord developing later

along the spire in contrast to *T. rufula* in which the three spiral cords are evident throughout the teleoconch. The other two specimens are juveniles and difficult to associate to this taxon due to their state of preservation. A lectotype is designated to stabilise the nomenclature.

Acknowledgements

The Synthesys (GB-TAF-4910) and Bioresource projects funded PGA's and BS's visit to the NHMUK, respectively. We thank Andreia Salvador, curator of marine Mollusca (NHMUK), for her help during PGA's visit and for the continuous support during the preparation of the manuscript. Vladimir Blagoderov and Rebecca Summerfield (Sackler Biodiversity Imaging Laboratory) helped PGA with digital photography, and Tomasz Goral and Alex Ball (Imaging

and Analysis Centre) assisted with SEM. Harry Taylor and Kevin Webb (NHMUK Photographic Unit) photographed the specimens that we did not see ourselves. Kathie Way (also NMHUK) helped locating type material. Wolfgang Brunnbauer (Zoological Library of the Natural History Museum, Vienna) helped obtaining important literature. Mathew Lowe and Richard Preece (Museum of Zoology of the University of Cambridge) provided the images of type specimens of *Triphoris macandraeae* and kindly allowed their publication. Emilio Rolán shared data useful to understand the status of *Triphoris grayii*. Paul Callomon, Marien Faber, Riccardo Giannuzzi-Savelli, Kazunori Hasegawa, David Herbert, Harry G. Lee and Chris Vos helped by offering information and literature. Beata Dunne revised the English. Marco Oliverio gave suggestions on a previous version of the manuscript. The open access publication of this paper was supported by the University of Vienna.

References

- Adams A (1854) Descriptions of new species of *Eulima*, *Triphoris*, etc., from the Collection of Hugh Cuming, Esa. Proceedings of the Zoological Society of London 19: 276–279. <https://doi.org/10.1111/j.1096-3642.1851.tb01178.x>
- Adams A (1861) On some new species of *Eulima*, *Leiostraca* and *Cerithiopsis* from Japan. Annals and Magazine of Natural History (Series 3) 7: 125–131
- Adams A, Reeve L (1848–1850) Mollusca. In: Adams A (Ed.) The zoology of the voyage of H.M.S. Samarang; under the command of Captain Sir Edward Belcher, C.B., F.R.A.S., F.G.S., during the years 1843–1846. Reeve and Benham, London, 87 pp.
- Albano PG, Bakker PAJ (2016) Annotated catalogue of the types of Triphoridae (Mollusca, Gastropoda) in the Museum für Naturkunde, Berlin, with lectotype designations. Zoosystematics and Evolution 92(1): 33–78. <https://doi.org/10.3897/zse.92.5936>
- Albano PG, Sabelli B, Bouchet P (2011) The challenge of small and rare species in marine biodiversity surveys: microgastropod diversity in a complex tropical coastal environment. Biodiversity and Conservation 20(13): 3223–3237. <https://doi.org/10.1007/s10531-011-0117-x>
- Albano PG, Bakker PAJ, Janssen R, Eschner A (2017) An illustrated catalogue of Rudolf Sturany's type specimens in the Naturhistorisches Museum Wien, Austria (NHMW): Red Sea gastropods. Zoosystematics and Evolution 93(1): 45–94. <https://doi.org/10.3897/zse.93.10039>
- Barnard KH (1963) Contributions to the knowledge of South African marine Mollusca. Part III. Gastropoda: Prosobranchiata: Taenioglossa. Annals of the South African Museum 47(1): 1–199.
- Biggs HEJ (1973) The marine Mollusca of the Trucial coast, Persian Gulf. Bulletin of the British Museum Natural History (Zoology) 24(8): 343–421.
- Bouchet P (1985) Les Triphoridae de Méditerranée et du proche Atlantique (Mollusca, Gastropoda). Lavori della Società Italiana di Malacologia 21: 5–58.
- Bouchet P, Guillemot H (1978) The *Triphora perversa*-complex in Western Europe. Journal of Molluscan Studies 44: 344–356.
- Bouchet P, Strong EE (2010) Historical name-bearing types in marine molluscs. An impediment to biodiversity studies? In: Polaszek A (Ed.) Systema Naturae 250. CRC Press, London, 63–74. <https://doi.org/10.1201/EBK1420095012-c6>
- Bouchet P, Lozouet P, Maestrati P, Héros V (2002) Assessing the magnitude of species richness in tropical marine environments: exceptionally high numbers of molluscs at a New Caledonia site. Biological Journal of the Linnean Society 75: 421–436. <https://doi.org/10.1046/j.1095-8312.2002.00052.x>
- Carpenter PP (1857) Report on the present state of our knowledge with regard to the Mollusca of the west coast of North America. Report of the British Association for the Advancement of Science 26 [for 1856]: 159–368. <https://doi.org/10.5962/bhl.title.60613>
- Cotton BC (1933) Obituary and bibliography of conchological works of Sir Joseph Cooke Verco. The South Australian Naturalist 14(4): 121–124.
- Crosse H, Fischer P (1865) Description d'espèces nouvelles de l'Australie méridionale. Journal de Conchyliologie 13: 38–55.
- Dance SP (1966) Shell Collecting. An Illustrated History. University of California Press, London, 344 pp.
- De Folin L (1867) Espèces nouvelles. Les Meleagrinicoles, Havre, 74 pp.
- Dickinson EC (2005) The Proceedings of the Zoological Society of London, 1859–1900: an exploration of breaks between calendar years of publication. Journal of Zoology 266: 427–430. <https://doi.org/10.1017/S0952836905007077>
- Duncan FM (1937) On the dates of publication of the Society's 'Proceedings', 1859–1926. With an appendix containing the dates of publication of 'Proceedings' 1830–1858, compiled by the late F.H. Waterhouse, and of the 'Transactions' 1833–1869, by the late Henry Peavot, originally published in the P.Z.S. 1893, 1913. Proceedings of the Zoological Society of London 107: 71–84.
- Fernandes F, Rolán E (1988) A família Triphoridae (Mollusca: Gastropoda) no Arquipélago de Cabo Verde. Publicações ocasionais da Sociedade Portuguesa de Malacologia 11: 17–32.
- Fernandes F, Rolán E (1993) Nuevas aportaciones a la familia Triphoridae (Mollusca, Gastropoda) para el Archipiélago de Cabo Verde. Iberus 10(1): 143–148.
- Herbert DG (2013) *Turritella declivis* Adams & Reeve, in Reeve, 1849 (Mollusca: Gastropoda) – a South African not an Australian species, and a characteristic component of the Agulhas Bank benthos. African Zoology 48(2): 412–417. <https://doi.org/10.1080/15627020.2013.11407611>
- Hertlein LG, Strong AM (1947) Eastern Pacific expedition of the New York Zoological Society. XXXVI. Mollusks from the west coast of Mexico and Central America. Part V. New York Zoological Society, Zoologica 31(4): 129–150.
- Hertlein LG, Strong AM (1950) Eastern Pacific expedition of the New York Zoological Society. XLII. Mollusks from the west coast of Mexico and Central America. Part IX. New York Zoological Society, Zoologica 35(4): 217–252.
- Higo S, Callomon P, Goto Y (2001) Catalogue and bibliography of the marine shell-bearing Mollusca of Japan. Gastropoda. Bivalvia. Polyplacophora. Scaphopoda. Type figures. Elle Scientific Publications, Osaka, 196 pp.
- Hinds RB (1843a) Descriptions of two new species of shells from the collection of Hugh Cuming. Proceedings of the Zoological Society of London 11: 22–23.
- Hinds RB (1843b) Descriptions of new shells from the collection of Captain Belcher, R.N., C.B.. Annals and Magazine of Natural History 11: 16–21. <https://doi.org/10.1080/03745484309445254>
- Hinds RB (1844) The Zoology of the Voyage of H.M.S. Sulphur, Under the Command of Captain Sir Edward Belcher, R.N., C.B., F.R.G.S., etc. during the years 1836–42. Smith, Elder and Co., London, 72 + iv pp.

- ICZN (1999) International Code of Zoological Nomenclature, 4th edition. The International Trust for Zoological Nomenclature, London, 306 pp.
- Jeffreys JG (1885) On the Mollusca procured during the ‘Lightning’ and ‘Porcupine’ expeditions, 1868–1870. Part IX. Proceedings of the Zoological Society of London 1885: 27–63.
- Johnson RI (1994) Types of shelled Indo-Pacific mollusks described by W.H. Pease. Bulletin of the Museum of Comparative Zoology 154(1): 1–61. [https://doi.org/10.3099/0027-4100\(2003\)158\[1:MTABOW\]2.0.CO;2](https://doi.org/10.3099/0027-4100(2003)158[1:MTABOW]2.0.CO;2)
- Jousseaume F (1884) Monographie des Triforidae. Bulletins de la Société Malacologique de France 1: 217–270.
- Kay EA (1965) Marine molluscs in the Cuming collection, British Museum (Natural History) described by William Harper Pease. Bulletin of the British Museum Natural History (Zoology) Supplement 1: 1–96.
- Kay EA (1965) Hawaiian marine shells. Reef and Shore Fauna of Hawaii. Section 4: Mollusca. Bishop Museum Press, Honolulu, XVII–653 pp.
- Keen AM (1966) West American mollusk types in the British Museum (Natural History). II. Species described by R.B. Hinds. The Veliger 8(4): 265–275.
- Kisch BS (1960) Les mollusques décrites par de Folin – a part les Caecidae et Chemnitzidae – avec catalogue. Journal de Conchyliologie 100(4): 137–162.
- Kosuge S (1962a) Descriptions of 10 new species and 1 new subspecies of the family Triphoridae (Mollusca) from Shiono-misaki, Kii Peninsula, Central Japan with a list of hitherto known species. Bulletin of the National Science Museum 6(2): 78–89.
- Kosuge S (1962b) On the family Triphoridae (Gastropoda) from Amami Islands (3). Venus 22(2): 119–129.
- Kosuge S (1963a) On the family Triphoridae (Gastropoda) from Amami Islands (4). Venus 22(3): 240–257.
- Kosuge S (1963b) On the family Triphoridae (Gastropoda) from Amami Islands (5). Venus 22(3): 257–263.
- Le Renard J (1995) Révision des mollusques paléogènes du bassin de Paris. III – Chronologie des créatures de références primaires. Cossmanniana 3(4): 133–150.
- Le Renard J, Pacaud J-M (1995) Révision des mollusques paléogènes du bassin de Paris. II – Liste des références primaires des espèces. Cossmanniana 3(3): 65–132.
- Low MEY, Evenhuis NL (2013) Dates of publication of the Zoology parts of the Report of the Scientific Results of the Voyage of H.M.S. Challenger During the Years 1873–76. Zootaxa 3701 (4): 401–420. <https://doi.org/10.11646/zootaxa.3701.4.1>
- Marshall BA (1977) The dextral triforid genus *Metaxia* (Mollusca: Gastropoda) in the south-west Pacific. New Zealand Journal of Zoology 4: 111–117. <https://doi.org/10.1080/03014223.1977.9517944>
- Marshall BA (1983) A revision of the recent Triphoridae of Southern Australia. Records of the Australian Museum Supplement 2: 1–119. <https://doi.org/10.3853/j.0812-7387.2.1983.102>
- Marshall BA (1994) Results of the Rumphius Biohistorical Expedition to Ambon (1990). Part 2. An unusual triphorid (Mollusca: Gastropoda) from the Moluccas, Indonesia. Zoologische Mededelingen 68: 39–43.
- Melville JC (1904) Descriptions of twenty-eight species of Gastropoda from the Persian Gulf, Gulf of Oman, and Arabian Sea, dredged by Mr. F.W. Townsend, of the Indo-European Telegraph Service, 1900–1904. Proceedings of the Malacological Society of London 6: 158–169. <https://doi.org/10.1093/oxfordjournals.mollus.a066056>
- Melville JC (1909) Report on the marine Mollusca obtained by Mr. J. Stanley Gardiner F.R.S., among the Islands of the Indian Ocean in 1905. Transactions of the Linnean Society of London, series 2, 13: 65–138. <https://doi.org/10.1111/j.1096-3642.1909.tb00411.x>
- Melville JC (1918) Descriptions of thirty-four species of marine Mollusca from the Persian Gulf, Gulf of Oman and Arabian Sea. Annals and Magazine of Natural History (Series 9) 1: 137–158. <https://doi.org/10.1080/00222931808562296>
- Melville JC, Standen R (1899) Report on the marine Mollusca obtained during the first expedition of Prof. A.C. Haddon to the Torres Straits, in 1888–89. Journal of the Linnean Society 27: 150–206.
- Melville JC, Standen R (1901) The Mollusca of the Persian Gulf, Gulf of Oman and Arabian Seas as evidenced mainly through the collections of Mr. F.W. Townsend, 1893–1900, with descriptions of new species. Part 1. Cephalopoda, Gastropoda and Scaphopoda. Proceedings of the Zoological Society of London 11: 327–460. <https://doi.org/10.1111/j.1469-7998.1901.tb08181.x>
- Pease WH (1861) Descriptions of forty-seven new species of shells from the Sandwich Islands, in the collection of Hugh Cuming. Proceedings of the Zoological Society of London 28: 431–438.
- Pease WH (1868). Synonymy of marine gastropodae inhabiting Polynesia. American Journal of Conchology 4(3): 103–132.
- Petit RE (2007) Lovell Augustus Reeve (1814–1865): malacological author and publisher. Zootaxa 1648: 1–120. <https://doi.org/10.11646/zootaxa.1648.1.1>
- Rolán E (2005) Malacological fauna from the Cape Verde Archipelago. Part 1. Polyplacophora and Gastropoda. ConchBooks, Hackenheim, 455 pp.
- Rolán E, Cruz-Abrego FM (1995) A new triphorid species (Gastropoda, Triphoridae) from Nichupté lagoon, Yucatán peninsula, Mexico. Iberus 13(2): 87–92.
- Rolán E, Espinosa J (1994) The family Triphoridae (Mollusca, Gastropoda, Prosobranchia) in Cuba. 3. The genus *Isotriphora*, with description of a new species. Basteria 58: 63–68.
- Rolán E, Fernández-Garcés R (1992) Familia Triphoridae (Mollusca: Gastropoda) en la isla de Cuba. 1. El genero *Metaxia* Monterosato, 1884. Bollettino Malacologico 28(5–12): 169–176.
- Rolán E, Fernández-Garcés R (1993) The family Triphoridae (Mollusca, Gastropoda, Prosobranchia) in Cuba. 2. The genus *Iniforis* Jousseaume. Apex 8(3): 95–106.
- Rolán E, Fernández-Garcés R (1994) The Family Triphoridae (Mollusca, Gastropoda) in Cuba. 4. The genera *Monophorus*, *Nototriphora*, *Cosmotriphora* and *Cheirodonta*, with the description of three new species. Apex 9(1): 17–27.
- Rolán E, Fernández-Garcés R (1995) The family Triphoridae (Mollusca, Gastropoda) in Cuba. 5. The genera *Marshallora*, *Mesophora*, *Similiphora*, *Eutriphora*, *Latitriphora*, *Aclophora* and other species without generic affiliation. Apex 10(1): 9–24.
- Rolán E, Fernández-Garcés R (2008) New data on the Caribbean Triphoridae (Caenogastropoda, Triphoroidea) with the description of 26 new species. Iberus 26(1): 81–170.
- Rolán E, Fernández-Garcés R (2009) Two new species of *Iniforis* (Gastropoda: Triphoridae) from the Caribbean. Novapex 10(3): 103–108.
- Rolán E, Peñas A (2001) Two new species of the genus *Monophorus* (Gastropoda, Triphoridae) in the east Atlantic and Mediterranean Sea. Iberus 19(2): 31–40.
- Sc Slater PL (1893) List of the date of delivery of the sheets of the ‘Proceedings’ of the Zoological Society of London, from the commencement in 1830 to 1859 inclusive. Proceedings of the Zoological Society of London 1893: 435–440.

- Sherborn CD (1922) Index Animalium 1801–1850. Volume A and B. Bibliography. Cambridge University Press, London, xv–cxxxii pp.
- Smith EA (1875) A list of the Gastropoda collected in Japanese Seas by Commander H.C. St. John, R.N. *Annals and Magazine of Natural History*, Series 4, 16: 103–115. <https://doi.org/10.1080/00222937508681135>
- Smith EA (1890) Report on the marine molluscan fauna of the Island of St. Helena. *Proceedings of the Zoological Society of London* 1890: 247–317.
- Smith EA (1903) Marine Mollusca. In: Gardiner JS (Ed.) *The fauna and geography of the Maldive and Laccadive Archipelagoes*, being an account of the work carried on and of the collections made by an expedition during the years 1899 and 1900. Cambridge University Press, Cambridge, 2(2): 589–630.
- Smith EA (1904) On a collection of marine shells from Port Alfred, Cape Colony. *Journal of Malacology* 11: 21–44.
- Smith EA (1906) The history of the collections contained in the natural history departments of the British Museum. Vol. II. Separate historical accounts of the several collections included in the Department of Zoology. British Museum, Clowes and Sons, London, 782 pp.
- Smith EA (1906) On South African marine mollusca, with descriptions of new species. *Annals of the Natal Government Museum* 1: 19–71.
- Smith EA (1910) On South African marine Mollusca, with descriptions of new species. *Annals of the Natal Museum* 2: 175–219.
- Smith EA (1916) Note on *Triphora smithi*, Sowerby, and *T. gracilior*, Smith. *Proceedings of the Malacological Society of London* 12(2–3): 60. <https://doi.org/10.1093/oxfordjournals.mollus.a063615>
- Sowerby GB III (1901) Descriptions of new species of marine Mollusca collected by the late Otto Koch at the Island of Cebú, Philippines. (Second paper). *Proceedings of the Malacological Society of London* 4(5): 208–211. <https://doi.org/10.1093/oxfordjournals.mollus.a065816>
- Sowerby GB III (1903) Descriptions of fourteen new species of marine Mollusca from Japan. *Annals and Magazine of Natural History*, series 7, 12: 496–501. <https://doi.org/10.1080/00222930308678886>
- Sowerby GB III (1904) Descriptions of six new species of marine Mollusca from the collection of the late admiral Keppel. *Proceedings of the Malacological Society of London* 6(3): 174–177. <https://doi.org/10.1093/oxfordjournals.mollus.a066058>
- Sowerby GB III (1907) Descriptions of new marine Mollusca from New Caledonia, etc. *Proceedings of the Malacological Society of London* 7(5): 299–303.
- Sowerby GB III (1914) Descriptions of new Mollusca from New Caledonia, Japan, Philippines, China, and West Africa. *Annals and Magazine of Natural History*, series 8, 14: 475–480. <https://doi.org/10.1080/00222931408693604>
- Sowerby GB III (1921) New shells from Port Alfred, collected by Lieut.-Colonel W. H. Turton. *Proceedings of the Malacological Society of London* 14(4): 125–127.
- Steger J, Stockinger M, Ivkić A, Galil BS, Albano PG (2018) New records of non-indigenous molluscs from the Eastern Mediterranean Sea. *Bioinvasions Records* 7(3): 245–257. <https://doi.org/10.3391/bir.2018.7.3.05>
- Tomlin JR le B (1926) On South African marine Mollusca, with descriptions of new species. *Annals of the Natal Museum* 5(3): 283–301.
- Tomlin JR le B (1931) On South African marine Mollusca, with descriptions of new genera and species. *Annals of the Natal Museum* 6(3): 415–450.
- Tomlin JR le B (1941) Shell sales. *Proceedings of the Malacological Society of London* 24(4): 157–160. <https://doi.org/10.1093/oxfordjournals.mollus.a064409>
- Trew A (1987) James Cosmo Melvill's New Molluscan Names. *Amgueddfa Genedlaethol Cymru*, National Museum of Wales, Cardiff, 84 pp.
- Trew A (1990) John R. le B. Tomlin's New Molluscan Names. *Amgueddfa Genedlaethol Cymru*, National Museum of Wales, Cardiff, 101 pp.
- Trew A (1992) Henry and Arthur Adams New Molluscan Names. *National Museum of Wales*, Cardiff, 63 pp.
- Trew A (1993) Edgar Albert Smith's New Molluscan Names. *National Museum of Wales*, Cardiff, 86 pp.
- Turton WH (1932) *The Marine Shells of Port Alfred, S. Africa*. Oxford University Press, London, 331 pp.
- Verco JC (1909) Notes on South Australian marine Mollusca, with description of new species. Part XI. *Transactions of the Royal Society of South Australia* 33: 277–292.
- Verco JC (1910) Notes on South Australian marine Mollusca, with description of new species. Part XIII. *Transactions of the Royal Society of South Australia* 34: 115–131.
- Warén A (1980) Marine Mollusca described by John Gwyn Jeffreys, with the location of the type material. *Conchological Society of Great Britain and Ireland, Special Publication* 1: 1–60.
- Watson RB (1880) Mollusca of H.M.S. 'Challenger' Expedition. Part V. *Journal of the Linnean Society* 15: 87–126. <https://doi.org/10.1111/j.1096-3642.1880.tb00346.x>
- Watson RB (1886) Report on the Scaphopoda and Gasteropoda collected by H.M.S. Challenger during the years 1873–76. *Reports of the scientific results of the voyage of H.M.S. "Challenger"*, *Zoology* 15(42): 1–756.