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Integrative taxonomy of northeastern Atlantic top-shells of the genus *Jujubinus* Monterosato, 1884 (Gastropoda, Trochidae, Cantharidinae)

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Abstract. The northeastern Atlantic species of the gastropod genus *Jujubinus* Monterosato, 1884 (Trochidae, Cantharidinae) are reviewed based on an integrative taxonomic approach. Based on a comprehensive phylogenetic framework of cantharidine genera, it is suggested that the scope of the genus *Jujubinus* should be restricted to a radiation in the northeastern Atlantic and the Mediterranean, not including the tropical Indo-West Pacific species frequently ascribed to it. For *Trochus montagui* Wood,

1828, traditionally ascribed to *Jujubinus*, we did not find unequivocal evidence of it belonging in this clade, but rather we found some indication of a closer relationship with *Clelandella miliaris* (Brocchi, 1814) than with the *Jujubinus* clade. Thirteen morphospecies were checked against a DNA-barcoding dataset (*cox1*) and a molecular phylogenetic framework (*cox1*, *16S*, single genes and combined datasets, analysed by Bayesian inference and Maximum Likelihood analyses). Twenty-two secondary species hypotheses were eventually retained. For fifteen of them an available name has been found; seven are herein described as new.

Keywords. Mollusca, Vetigastropoda, species delimitation, *cox1*, Mediterranean, new species.

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Introduction

The trochid subfamily Cantharidinae Gray, 1857 is particularly diverse in the East Atlantic and Mediterranean with a long history and a series of radiation in different periods (Harzhauser 2021). In the Recent north-eastern Atlantic-Mediterranean fauna, at least 6 genera and some 75 extant species are currently recognised (MolluscaBase 2025a). This subfamily has been recently revised for the Mediterranean and North-East Atlantic region, for its systematics at the genus and subfamily level, and for the relationships of the north-eastern Atlantic lineages within the subfamily (Uribe *et al.* 2017). Among other results, the genus *Jujubinus* Monterosato, 1884 was suggested to be monophyletic, possibly endemic to the North-eastern Atlantic and Mediterranean, and sister to *Clelandella* Winckworth, 1932, and *Callumbonella* Thiele, 1924.

Like for other top-shells (e.g., *Gibbula* Risso, 1826, *Phorcus* Risso, 1826, *Steromphala* Gray, 1847 etc.), the genus *Jujubinus* is employed to accommodate a number of species living mostly from the lower intertidal zone down to about 80–100 m depth, and constantly associated with algae and/or marine angiosperms (Rueda *et al.* 2008; Mariottini *et al.* 2013 and references therein). Information on larval development of species of *Jujubinus* is scanty. Robert (1903) and Lebour (1937) reported, for two species of the North Atlantic, an intracapsular embryonic development with a short benthic larval phase, largely confirmed by the observation by Aricò *et al.* (1992) on Mediterranean specimens. A very limited dispersal capacity can be reasonably assumed for species of this group of trochoideans. Specialists of European marine gastropods have repeatedly attempted to assess the taxonomy of this group of top-shells on a morphological basis (e.g., Nordsieck 1973; Ghisotti & Melone 1975; Curini-Galletti & Palazzi 1980; Curini-Galletti 1982a; Gofas 1991; Cretella 1992, 1993; Rolán & Templado 2001; Bogi & Campani 2006; Rolán & Swinnen 2009; Ávila *et al.* 2011; Spanu 2011; Mariottini *et al.* 2013; Smriglio *et al.* 2014, 2015, 2016, 2017, 2019; Scuderi *et al.* 2019). The currently accepted taxa can be arranged into morphology-based species complexes (Curini-Galletti 1990) which often comprise both species with wide ranges (sometimes the entire Mediterranean and the NE Atlantic) and with very narrow ranges (sometimes endemic to small areas). For instance, *Jujubinus exasperatus* (Pennant, 1777) is considered ranging in the Eastern Atlantic, from the British islands to Morocco, and across the entire Mediterranean Sea: the morphology-based *Jujubinus exasperatus* complex includes also *Jujubinus unidentatus* (Philippi, 1844) endemic to Tunisia, *Jujubinus pseudogravinae* Nordsieck, 1973 limited to the Azores, *Jujubinus hernandezii* Rolán & Swinnen, 2009 endemic to the Canary Islands and *Jujubinus baudoni* (Monterosato, 1891) limited to a restricted area of the northern Central Mediterranean. However, the long list of putative synonyms of *Trochus exasperatus* Pennant, 1777 (at least 21 nominal taxa in WoRMS) is the result of a great deal of morphological variation, whose actual meaning has not yet been

defined. *Jujubinus striatus* (Linnaeus, 1758) is also considered as a wide-ranging species, occurring in the Eastern Atlantic, from the Isle of Man to Senegal, including Canary Islands, Madeira, and Azores, and across the entire Mediterranean Sea: the morphology-based *Jujubinus striatus* complex includes also *Jujubinus mabelae* Rolán & Swinnen, 2009, *Jujubinus guanchus* Curini-Galletti, 1985, and *Jujubinus silbogomerus* Smriglio, Mariottini & Swinnen, 2019, all endemic to the Canary Islands. Also, in the case of *Trochus striatus* Linnaeus, 1758, the great morphological variation observed resulted in a long list of putative synonyms (over 30 nominal taxa in WoRMS).

A total of 32 species of *Jujubinus* are currently regarded as valid, plus two taxa of uncertain status, for the East Atlantic fauna (Table 1; MolluscaBase 2025b).

Additionally, the following nine species from the Indo-Pacific are currently included in the genus *Jujubinus*: *J. escondidus* Poppe, Tagaro & Dekker, 2006, *J. geographicus* Poppe, Tagaro & Dekker, 2006, *J. gilberti* (Montrouzier, 1878), *J. guphili* Poppe, Tagaro & Dekker, 2006, *J. hubrechtii* Poppe, Tagaro & Dekker, 2006, *J. interruptus* (Wood, 1828), *J. maldivensis* (E.A. Smith, 1903), *J. polychroma* (A. Adams, 1853), and *J. suarezensis* (P. Fischer, 1878).

The applicability of an integrative taxonomical approach to members of Cantharidinae has been positively tested on the top-shells of the genus *Gibbula* s. lat. (Barco *et al.* 2013; Affenzeller *et al.* 2017). Results showed that the genus *Gibbula* as previously conceived is polyphyletic and some of the commonest nominal species of the Mediterranean Sea actually comprise cryptic lineages of species level. We have, therefore, attempted here to revise the actual diversity of the genus *Jujubinus* by an integrative taxonomy approach, combining morphology-based hypotheses, species hypotheses based on the barcode fragment of the *cox1* gene, and a phylogenetic approach based on two mitochondrial gene fragments (*cox1* and *16S*).

Material and methods

Samples and morphological observations

Sample localities and data on the species investigated are provided in Supp. file 1. Specimens were collected by hand while diving (snorkelling or by SCUBA), or by sorting samples from massive collection means (air-lift, rock-brushing, algae washing, dredging). Species identification was initially made by each collector, but all specimens were then cross-checked by the specialist authors (Paolo Mariottini, Carlo Smriglio, Simone Pezzotti, Marco Oliverio). Shells of the specimens sequenced in the present work are stored as vouchers (Supp. file 1) under an MNHN (Muséum national d'Histoire naturelle) or a BAU (Dept of Biology and Biotechnologies "Charles Darwin", Sapienza University of Rome) catalogue number. When possible, live collected specimens were observed and photographed upon collection in small aquaria, to take notes of the chromatic patterns of the soft parts. The soft parts have also been observed on specimens stored in alcohol, although part of the colouration may rapidly fade out in alcohol: in these cases, we aimed at checking at least the presence/absence of a darker strip on the snout, which proved a diagnostic character in several instances. Soft parts were as far as possible microwave-extracted from the specimens upon collection (Galindo *et al.* 2014), and fixed in 100% ethanol. When the entire specimen had to be directly dropped in alcohol, the soft parts were subsequently removed in the lab, sometimes after drilling the shell to ease removal. A piece of tissue was dissected from the foot for DNA extraction, and the remaining tissues were stored, preserved in 100% EtOH with the relevant voucher shell. For the characters employed in shell descriptions we have followed the recent literature on the groups (e.g., Curini-Galletti & Palazzi 1980; Curini-Galletti 1982a; Gofas 1991; Cretella 1992, 1993; Scuderi *et al.* 2019) and adopted the standard used in our recent works (Mariottini *et al.* 2013; Smriglio *et al.* 2014, 2015, 2016, 2017, 2019). SEM observations were done with a Philips XL30 and a FE-SEM ZEISS Sigma Gemini 300 at the interdepartmental laboratory of

Table 1. The East Atlantic species (in alphabetic order by specific epithet) of the genus *Jujubinus*, as recognised before this revision, with their distribution (in bold nominal taxa for which samples have been genetically assayed in this work). + Presence in: Az = Azores; Ca = Canary Islands; CV = Cape Verde Islands; EM = East Mediterranean; Ma = Madeira; NEA = northern East Atlantic; WA = West Africa; WM = West Mediterranean; # = restricted range within this area.

species	Distribution							
	EM	WM	WA	CV	Ca	Ma	Az	NEA
<i>Jujubinus alboranensis</i> Smriglio, Mariottini & Oliverio, 2015		#						
<i>Jujubinus augustoi</i> Rolán & Gori, 2009			#					
<i>Jujubinus baudoni</i> (Monterosato, 1891)		#						
<i>Jujubinus browningleeae</i> Smriglio, Mariottini & Swinnen, 2018								#
<i>Jujubinus catenatus</i> Ardovini, 2006		#						
<i>Jujubinus curinii</i> Bogi & Campani, 2006		#						
<i>Jujubinus dispar</i> Curini-Galletti, 1982		#						
<i>Jujubinus eleonora</i> Smriglio, Di Giulio & Mariottini, 2014		#						
<i>Jujubinus errinae</i> Smriglio, Mariottini & Giacobbe, 2016		#						
<i>Jujubinus exasperatus</i> (Pennant, 1777)	+	+	+		+			+
<i>Jujubinus fraterculus</i> (Monterosato, 1880)	#							
<i>Jujubinus fulgor</i> Gofas, 1991								#
<i>Jujubinus gravinae</i> (Dautzenberg, 1881)	+	+						
<i>Jujubinus guanchus</i> Curini-Galletti, 1985					#			
<i>Jujubinus hernandezii</i> Rolán & Swinnen, 2009					#			
<i>Jujubinus karpathoensis</i> F. Nordsieck, 1973	#							
<i>Jujubinus mabelae</i> Rolán & Swinnen, 2009					#			
<i>Jujubinus montagui</i> (Wood, 1828)	+	+						+
<i>Jujubinus poppei</i> Curini-Galletti, 1985					#			
<i>Jujubinus pseudogravinae</i> Nordsieck, 1973							#	
<i>Jujubinus rafaelmesai</i> Rolán & Swinnen, 2013					#			
<i>Jujubinus roseus</i> Smriglio Mariottini & Oliverio, 2026		#						
<i>Jujubinus rubioi</i> Rolán & Templado, 2001				#				
<i>Jujubinus ruscurianus</i> (Weinkauff, 1868),	+							
<i>Jujubinus seguenzae</i> Ghisotti & Melone, 1975	#							
<i>Jujubinus silbogomerus</i> Smriglio, Mariottini & Swinnen, 2019					#			
<i>Jujubinus striatus</i> (Linnaeus, 1758)	+	+	+	+	+	+	+	+
<i>Jujubinus tingitanus</i> (Pallary, 1902)		#						
<i>Jujubinus trilloi</i> Smriglio, Di Giulio & Mariottini, 2014		#						
<i>Jujubinus tumidulus</i> (Aradas, 1846)		+						
<i>Jujubinus unidentatus</i> (Philippi, 1844)	+							
<i>Jujubinus vexationis</i> Curini-Galletti, 1990							#	

electron Microscopy (LIME: “Roma Tre” University, Rome). Protoconch whorls were counted according to the widest adopted standard (e.g., Bouchet & Kantor 2003: fig. 1b; see Fig. 5D). Measurements on protoconchs and teleoconchs have been taken both at SEM and under a stereo microscope, and thus, we provide them (including protoconch width) in mm to convey the appropriate approximation. We have classified the species into three size classes based on the maximum height normally reached by adults (i.e., excluding clearly gerontic and exceptional specimens): large = height ≥ 9 mm; medium = height < 9 mm; small = height ≤ 5 mm). A microsculpture on the teleoconch, if present, was detectable in reasonably fresh specimens. Conversely, protoconchs may be abraded also in relatively fresh shells; the presence of spiral threads on the protoconch was thus not always observable and we cannot exclude that what we defined as ‘seemingly smooth’ protoconchs were in fact devoid of threads by corrosion.

Molecular analyses

Total genomic DNA was extracted using a standard proteinase K phenol-chloroform method with ethanol precipitation, as reported in Oliverio & Mariottini (2001), or with the DNeasy 96 Tissue kit (Qiagen). PCR amplifications were performed in 25 μ l containing 2.5 μ l of BIOLINE 10 \times buffer, 0.5 μ l of 10 mM dNTPs mix, 0.4 μ l of each primer (10 mM), 2.5–3 μ l of 50 mM MgCl₂, 1 U of BIOLINE TaqPolymerase and 0.5–1 μ l of genomic DNA.

Fragments of two mitochondrial genes were amplified and sequenced: the 3' fragment of the 16S rRNA with primers 16SA+ (Palumbi *et al.* 1991) and CGLeuUURR– (Hayashi 2005) and the DNA barcode fragment of cytochrome c oxidase I (*cox1*) with primers LCO1490+ and HCO2198– (Folmer *et al.* 1994). When amplification of the standard *cox1* fragment failed, possibly due to DNA degradation, a minibarcode region of ~ 350 bp was amplified replacing the forward primer with the more internal primer mlCOintF (Leray *et al.* 2013).

PCR reactions included 30 amplification cycles [30 s at 94°C, 40 s at 48°C, 1 min at 72°C]. PCR products were purified with the ExoSAP protocol. A mix of 2 μ l containing 20 U/ μ l Exonuclease I (New England Biolabs, Ipswich, MA, USA) and 1 U/ μ l Shrimp Alkaline Phosphatase (Roche, Basel, Switzerland) was used to purify 5 μ l of PCR product. Amplicons were purified using ethanol precipitation and sequenced by Macrogen Inc. (Seoul, South Korea) or by the Eurofins sequencing facility, using the same PCR primers. Forward and reverse sequences were assembled, edited and aligned using Geneious 11 (Kearse *et al.* 2012) or the online version of MAFFT 7 (Kuraku *et al.* 2013; Katoh *et al.* 2019) with the Q-INS-I algorithm. Ambiguous regions in the 16S alignments were discarded using Gblocks ver. 0.91b (Castresana 2000) with 76% of the original positions being retained; we used default options. Base composition of nucleotide sequences was analysed with MEGA (ver. 5.0; Tamura *et al.* 2011).

Phylogenetics of Cantharidinae

An exhaustive definition of the taxonomic scope and the phylogenetic relationships of the genus *Jujubinus* was beyond the aims of the present study. However, we checked the monophyly of *Jujubinus* using the large cantharidine dataset from Uribe *et al.* (2017). Representatives of several genera of Cantharidinae were included in the alignments to check if any unexpected, odd results might bias our subsequent species delimitation analyses.

The best fitting substitution models and parameters for each partition, corresponding to each codon position, were chosen with ModelFinder using the Bayesian Information Criterion (BIC) for model selection. Maximum Likelihood (ML) analyses were done using IQ-TREE ver. 2.2.0 (Nguyen *et al.* 2014; Trifinopoulos *et al.* 2016), with 10 000 ultrafast bootstrap (UFBoot) replicates for node support (Hoang *et al.* 2018). Bayesian inference (BI) analyses were performed using MrBayes ver. 3.2.3 (Ronquist *et al.* 2012) with four-chain Markov chain Monte Carlo (MCMC), run twice in parallel for 3×10^7 generations. Convergences of the chains were evaluated by plotting the values of standard deviation of average split

frequencies and using the Potential Scale of Reduction Factor (PRSF: Gelman & Rubin 1992). A single topology was sampled every 1000 generations obtaining a final sample of 30 000 trees; 25% of the trees were removed as burnin before reconstructing the consensus tree. All analyses were run on the Sapienza supercomputing cluster Terastat2 (Bompiani *et al.* 2020).

Since single-gene trees did not show any supported conflicts (see below), sequences from both genes were combined into a single dataset and analyses were rerun accordingly. Sequences of Stomatellinae J.E. Gray, 1840, were used as outgroups, having been shown to be the sister to the cantharidines by Williams *et al.* (2010).

Species delimitation

We have used an integrative taxonomy approach to species delimitation. In this framework species are considered hypotheses to be subsequently evaluated by independent approaches (Puillandre *et al.* 2009, 2012, 2014).

First, every assayed specimen was preliminary identified at the species level by using characters of the teleoconch based on traditional taxonomy of the group (Nordsieck 1973; Ghisotti & Melone 1975; Curini-Galletti & Palazzi 1980; Curini-Galletti 1982a, 1982b; Gofas 1991; Cretella 1992, 1993; Rolán & Templado 2001; Bogi & Campani 2006; Rolán & Swinnen 2009; Ávila *et al.* 2011; Spanu 2011; Mariottini *et al.* 2013; Smriglio *et al.* 2014, 2015, 2016, 2017, 2019), to define morphology-based Species Hypotheses (morpho-SHs).

Second, we have used the Assemble Species by Automatic Partitioning method (ASAP; Puillandre *et al.* 2021), a method designed to automatically propose species partitions, and return an asap-score for each partition. We used the web-based version of ASAP (available at SpartExplorer: <https://spartexplorer.mnhn.fr/>) with the K2P model on a fasta file with the aligned *cox1* sequences; sequences with >100 missing nucleotides were excluded to avoid bias on distance computation, as already shown by Chiappa *et al.* (2024). The groups defined by the ASAP best-scored partition(s) represented our DNA-based Primary Species Hypotheses (PSHs), to be contrasted to the morpho-SHs.

Then, the monophyly of the PSHs was tested performing a phylogenetic analysis by Maximum Likelihood (ML) and Bayesian inference (BI), following the same pipeline used for the phylogeny of the Cantharidinae (see above). We have run analyses on single gene alignments (*16S* or *cox1*), and on a combined dataset excluding specimens missing the *cox1*.

Finally, the morphological and ASAP approaches, together with the phylogenetic results and additional data (especially on sympatric vs allopatric occurrence of genetically diverging lineages), were integrated to turn the PSHs into Secondary Species Hypotheses (SSHs). When the retained SSHs were not congruent with the morpho-SHs, shell characters were checked again to identify new diagnostic characters. A subset of morphological characters was mapped onto a phylogenetic tree of the species along with the chorotype of each assayed species.

In the Systematics section, we first revise all the species are defined by the SSHs; when there was no available species name, the SSHs are herein described as new species; eventually, we add taxonomic summaries for all remaining currently accepted species. In this section, we have used a standardised format for the citation of specimen data in the “Type material” and the “Other material examined” sections, as described by Chester *et al.* (2019), with the following data-fields: COUNTRY • number of specimens (lv and/or dd); locality data (from largest to smallest); geographic coordinates; depth; date (format “16 Jan. 1998”); other collecting data (e.g., habitat); collection repository and catalogue code.

Abbreviations

The material used for this study is deposited in the following institutional and private collections.

Institutions

BAU	=	Department of Biology and Biotechnologies “Charles Darwin”, Sapienza University of Rome, Rome, Italy
BIOMLG	=	Department of Biological, Geological and Environmental Sciences, University of Catania, Belpasso, Catania, Italy
BMNH	=	Natural History Museum, London, United Kingdom
CMSN	=	Civico Museo di Storia Naturale, Milano, Italy
DSAT	=	Dipartimento di Scienze e del Territorio, Pisa, Italy
LSL	=	The Linnean Society of London, London, United Kingdom
MCZR	=	Museo Civico di Zoologia (Malacology section), Rome, Italy
MNCN	=	Museo Nacional de Ciencias Naturales, Madrid, Spain
MNdHN	=	Museo Nacional de Historia Natural, Santiago de Chile, Chile
MNHN	=	Muséum national d’Histoire naturelle, Paris, France
MP	=	Mauro Pizzini collection, Museum of Zoology of Rome, Italy
MZB	=	Museum of Zoology Bologna (collection of the Laboratory of Malacology, University of Bologna, Italy)
NMW	=	National Museum of Wales, Cardiff, United Kingdom
RBINS	=	Institut royal des Sciences naturelles de Belgique, Brussels, Belgium
RM3	=	Museum of Zoology of the University of “Roma Tre”, Rome, Italy
RUC	=	Collections of the Regia Università di Catania, University of Catania, Catania, Italy
SMF	=	Senckenberg Forschungsinstitut und Naturmuseum (Sektionsleiter Malakologie), Frankfurt, Germany

Private collections

AF	=	Angelo Fiorita collection, Porto Cesareo, Italy
BA	=	Bruno Amati collection, Rome, Italy
CS-PM	=	Carlo Smriglio-Paolo Mariottini collection, Rome, Italy
FS	=	Frank Swinnen, Lommel, Belgium
JMP	=	José Manuel Martín Pérez collection, Málaga, Spain
LT	=	Lionello Tringali collection, Rome, Italy
MCG	=	Marco Curini Galletti collection, Sassari, Italy
MO	=	Marco Oliverio collection, Rome, Italy

Other abbreviations

dd	=	empty shell(s)
H	=	height
ICZN	=	International Commission on Zoological Nomenclature
lv	=	live specimen(s)
MED	=	Mediterranean Sea
PSH	=	Preliminary Species Hypotheses
SSH	=	Secondary Species Hypotheses
W	=	width

Results

A total of 638 partial *cox1* and *16S* new sequences were obtained from 440 specimens (411 for the *cox1* and 227 for the *16S*). The sequences have been deposited in GenBank (Supp. file 1). Sequences

of 48 additional specimens, representing at least 32 cantharidine species retrieved from GenBank were added to the dataset: they included, among others, 9 individuals of three species ascribed to *Jujubinus* from the Indo-West Pacific, 8 individuals of as many species of *Cantharidus*, to test the monophyly of the NE Atlantic *Jujubinus*; and 10 individuals of 9 species of Stomatellinae to be used as outgroup.

Phylogenetics of Catharidinae

The North-East Atlantic and Mediterranean specimens ascribed to the genus *Jujubinus* formed (with a single exception) a clade (UFBoot = 88%; Posterior Probability PP = 0.99) in the phylogenetic analyses of the combined *16S+cox1* dataset (Fig. 1). None of the NE-Atlantic/Mediterranean samples showed any relationships with the Indo-Pacific species sometimes ascribed to the genus *Jujubinus* (*J. suarezensis*, *J. gilberti*, *J. geographicus* and the various *Cantharidus* spp.). The single exception to the strict monophyly of the NE Atlantic *Jujubinus* in our material was represented by the specimens ascribed to

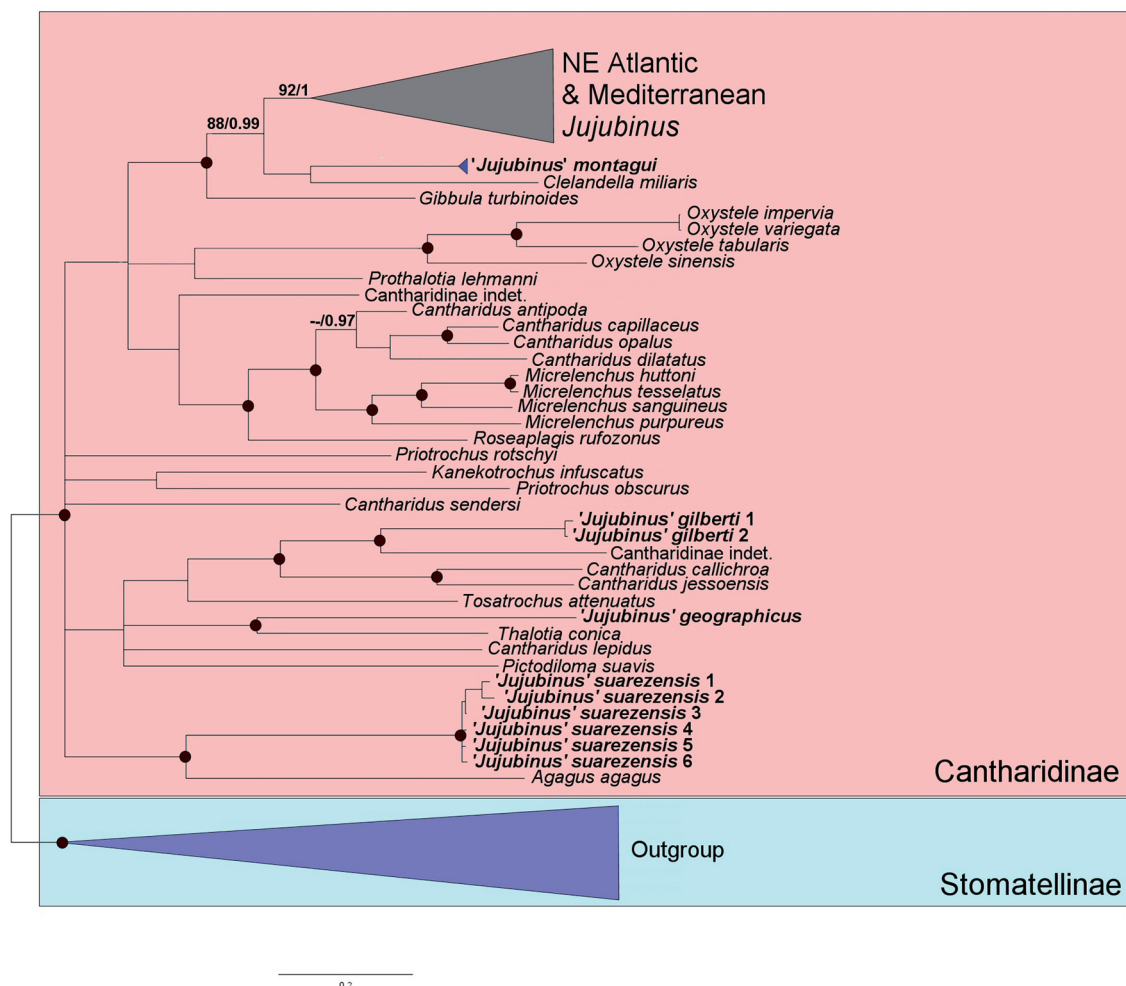


Fig. 1. Phylogenetic relationships among Cantharidinae J.E. Gray, 1857 lineages. The topology was retrieved after a Bayesian analysis of a combined (*cox1* + *16S*) alignment (substitution model for all partitions: GTR+G+I). Numbers at nodes are Maximum Likelihood UFBoot support (10 000 replicates) and Bayesian posterior probabilities (only values >90% UFBoot and >0.95 posterior probability are reported); black dots indicate nodes supported by >95% UFBoot and >0.98 posterior probability. In bold species traditionally ascribed to the genus *Jujubinus* Monterosato, 1884.

Trochus montagui Wood, 1828, which resulted more related to *Clelandella miliaris* (Brocchi, 1814) than to the other *Jujubinus* spp., although with low statistical support (B = 63%; PP = 0.9).

Species delimitation

Only the samples in the clade “NE Atlantic & Mediterranean *Jujubinus*” plus ‘*Jujubinus*’ *montagui* (Wood, 1828) (Fig. 1) have been included in the species delimitation analyses. After a preliminary morphological inspection based on the currently accepted taxonomy, the specimens were ascribed to 13 morpho-SHs. Of these 13 morpho-SHs one (from Giannutri Island) corresponded to an undescribed species, and 12 were linked to available names: *Jujubinus baudoni*, *J. dispar* Curini-Galletti, 1982, *J. exasperatus*, *J. fraterculus* (Monterosato, 1880), *J. gravinae* (Dautzenberg, 1881), *J. montagui*, *J. pseudogravinae*, *J. ruscurianus* (Weinkauff, 1868), *J. striatus*, *J. tingitanus* (Pallary, 1902), *J. unidentatus*, *J. vexationis* Curini-Galletti, 1990. However, part of the specimens assayed herein, matched morphologically several additional nominal taxa, currently listed as synonyms of valid species, which are marked in Supp. file 1.

The distance values for the *cox1* alignment, estimated with the K2P model, ranged from 0 to 19%. The distribution of the pairwise distance values are reported in a frequency histogram (Fig. 2A). The best-scored ASAP partition identified 24 species hypotheses within the dataset, with a threshold K2P distance value of 3.42%. Among them, only nine (*J. gravinae*, *J. pseudogravinae*, *J. sp.* undescribed from Giannutri Island, *J. fraterculus*, *J. montagui*, *J. dispar*, *J. vexationis*, *J. tingitanus*, *J. ruscurianus*) matched directly the morpho-SHs.

The nucleotide substitution models set for each gene were: *cox1* first codon, TN+G; *cox1* second codon, F81; *cox1* third codon, GTR+G; *16S*, HKY+I. The phylogenetic analyses by ML and BI on single gene and combined alignments, retrieved very similar topologies. When represented by several specimens, the ASAP distance-based species hypotheses proved reciprocally monophyletic, all with strong statistical support (Fig. 2B; uncollapsed trees in Supp. file 2: Figs S1, S1A–C).

In a few cases, additional considerations have guided the integrative taxonomy process of species delimitation.

The first best-scored ASAP partition recognised two sister lineages (one from Corsica and one from southern Spain) with moderate genetic divergence (4–5%) slightly above the threshold value, as two distinct species hypotheses. Since no clear-cut diagnostic morphological features were retrieved between the two groups, and given the scanty (and mostly subadult) material available from southern Spain, we conservatively included both lineages in a single species hypothesis (SSH VIII, see below).

The second best-scored ASAP partition identified 26 species hypotheses, with a threshold K2P distance value of 3.11%: this slightly more splitter partition differed for the further splitting of SSH “sartorii” and SSH “elenchoides” into two lineages each. In both cases, the split reflected the geographic distribution of samples (Corsica vs Malta for SSH “sartorii” and Greece vs Cyprus for SSH “elenchoides”). Given the absence of clear-cut morphological differences between the areas, this split could be interpreted as a result of a strong geographic structure, and was therefore not accepted as a proxy of species distinction.

The third best scored ASAP partition (threshold K2P distance value of 4.79%) was instead more lumpier, identifying only 18 species hypotheses. It lumped the SSH “vexationis” with a clade of sequences from Canary Islands, and SSH “sartorii” with SSH “fraterculus”, despite the moderate genetic divergence (3.80–4.32% and 4.42–6.03%, respectively) and the clear morphologically diagnostic features retrieved in both cases. Furthermore, this partition kept in the same species hypotheses four SSH including several sympatric samples from Sicily with relatively high divergence (6.08–7.12%) which should be more plausibly identified as distinct species given the limited dispersal assumed for these trochoideans.

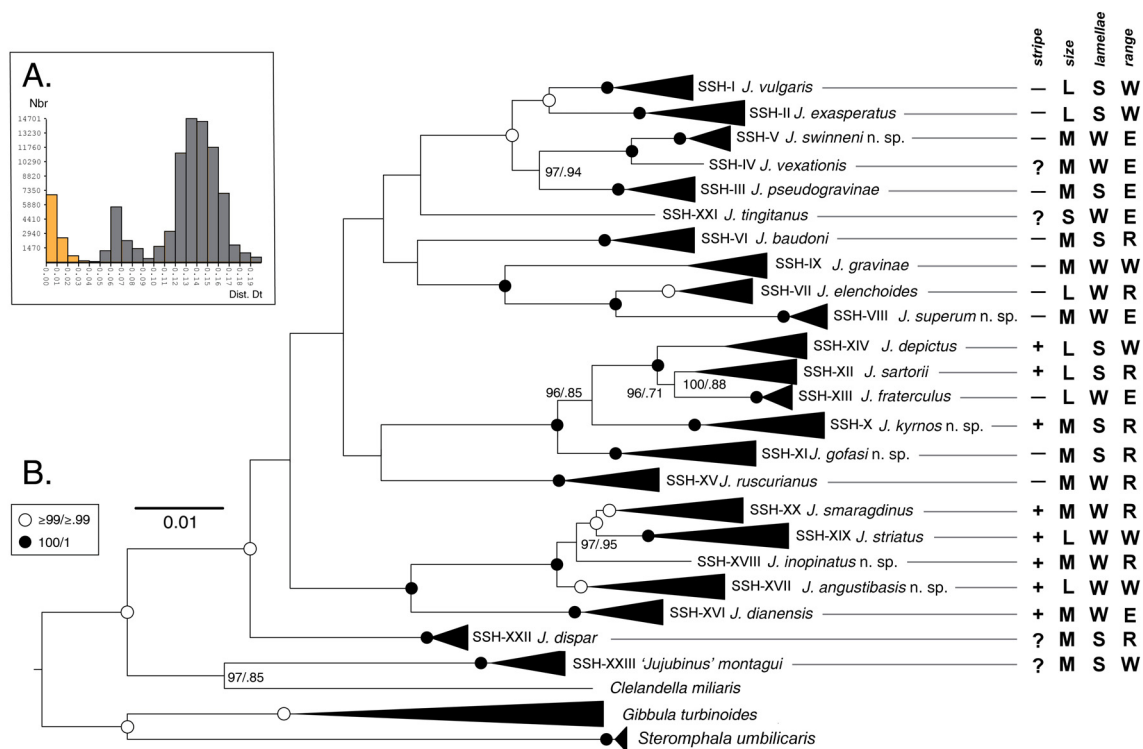


Fig. 2. Relationships among species assayed in this study. **A.** ASAP histogram of the distribution of pairwise K2P genetic distances on the *cox1* alignment (orange, intraspecific distances; grey, interspecific distances). **B.** ML tree based on the combined *cox1* + *16S* dataset. Nodes corresponding to Secondary Species Hypotheses are collapsed. Circle at nodes indicate maximum ML UFboot and BI posterior probability supports. The panel on the right show the states of selected diagnostic characters for each species: stripe, presence (+) or absence (–) of a darker stripe on the terminal part of the snout (see Fig. 4); size, large (L = height ≥ 9 mm), medium (M = height 5–9 mm), small (S = height ≤ 5 mm); lamellae, axial microsculpture on the teleoconch, weak (W) or strong (S); range, wide (W), restricted (R), or endemic to a small area (E).

The integrative 22 lineages representing at this stage our Secondary Species Hypotheses (SSH I–XXII) for *Jujubinus* s.s., plus “*Jujubinus*” *montagui*, were re-investigated for morphology. Finally, we present a taxonomic revision of the retained species, including the description of the new species, and integrating diagnostic features as far as possible.

Systematics

The genus *Jujubinus* is hereby defined as its type species (*Trochus matonii*, see below) and all the north-eastern Atlantic and Mediterranean samples ascribed to this genus that formed a monophyletic group in this study, based on either the molecular phylogenetic results, or clear-cut morphological inference.

Based on the results from the genetic analyses, we recognised, within our northeastern Atlantic dataset, 23 SSH, representing 22 species in *Jujubinus* s. str., plus ‘*Jujubinus*’ *montagui*. In several cases they corresponded to the preliminary morphology-based species hypotheses, and/or could be assigned an available name, but in some cases, they have proven to be undescribed and are introduced as new species here below. We summarize here the taxonomic attributions and will discuss in more detail each species in the Systematics section below (supporting iconography for morphological variation is reported in Supp. file 2: Figs S2–S74).

SSHs I and II both comprised specimens morphologically identified as *J. exasperatus*, but samples of the two groups were genetically clearly distinct, were frequently collected sympatrically and syntopically, and subsequent morphological re-examination showed some diagnostic features, still within two rather variable species. SSH I included specimens corresponding, among others, to *Trochus matonii* Payraudeau, 1792, the type of the genus *Jujubinus*, and to *Trochus vulgaris* Risso, 1826, the oldest available name for this species. Specimens in SSH II matched the morphotype of northern continental Europe and the British Isles, from where *Trochus exasperatus* Pennant, 1777 was described.

SSH III corresponded to the morpho-species *Jujubinus pseudogravinae* Nordsieck, 1973.

SSH IV corresponded to the morpho-species *Jujubinus vexationis* Curini-Galletti, 1990.

SSH VI corresponded to the morpho-species *Jujubinus baudoni* Monterosato, 1884.

SSH VII is here identified as *Jujubinus elenchoides* (Issel, 1878).

SSH IX corresponded to the morpho-species *Jujubinus gravinae* (Dautzenberg, 1881).

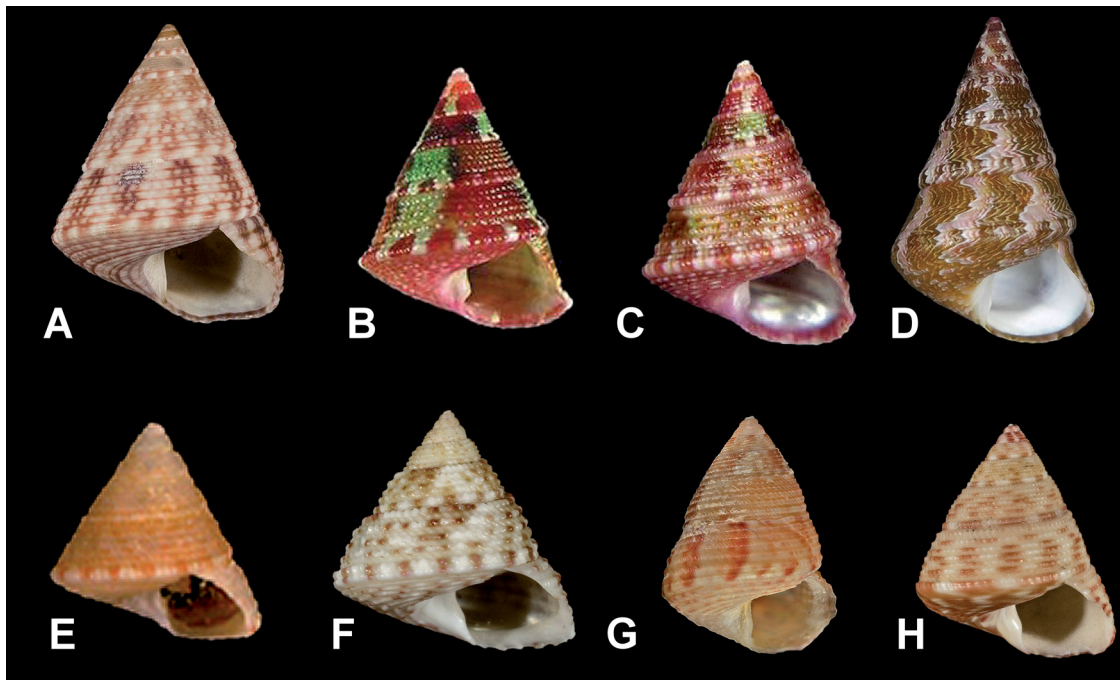


Fig. 3. Representative shells of Indo-Pacific species currently ascribed to *Jujubinus* Monterosato, 1884, which should be excluded from this genus, and eastern Atlantic species of *Clelandella* Winckworth, 1932. **A.** *Trochus suarezensis* P. Fisher, 1878, syntype, Diego Suarez, height 9 mm, MNHN-IM-2000-31311. **B.** ‘*Jujubinus*’ *geographicus* Poppe, Tagaro & H. Dekker, 2006, holotype (W640), Balicasag Island, Philippines, 80–150 m depth. **C.** ‘*Jujubinus*’ *geographicus* Poppe, Tagaro & H. Dekker, 2006, paratype 16, Punta-Engaño, Mactan Island, Philippines. **D.** ‘*Trochus*’ *gilberti* Montrouzier, 1878, Philippines, height 15 mm (courtesy of Conchology Inc., n°1388434). **E.** *Clelandella miliaris* (Brocchi, 1814), height 6.2 mm, off Mauritania, (after Vilvens *et al.* 2011: pl. 1). **F.** *Clelandella dautzenbergi* Gofas, 2005, holotype, Banc Josephine, 240 m depth, height 9.1 mm, MNHN-IM-2000-31120. **G.** *Clelandella artilesi* Vilvens, Swinnen & Deniz, 2011, paratype, W. Sahara, height 7.0 mm, MNHN-IM-2012-2720. **H.** *Clelandella madeirensis* (Gofas, 2005), holotype, off Porto Santo, Madeira, 300–340 m depth, height 7.8 mm, MNHN-IM-2000-22843.

SSH XII is here identified as *Jujubinus sartorii* Aradas & Maggiore, 1840.

SSH XIII corresponded to the morpho-species *Jujubinus fraterculus* Monterosato, 1880

SSH XIV is here identified as *Jujubinus depictus* (Deshayes, 1835).

SSH XV corresponded to the morpho-species *Jujubinus ruscurianus* (Weinkauff, 1868).

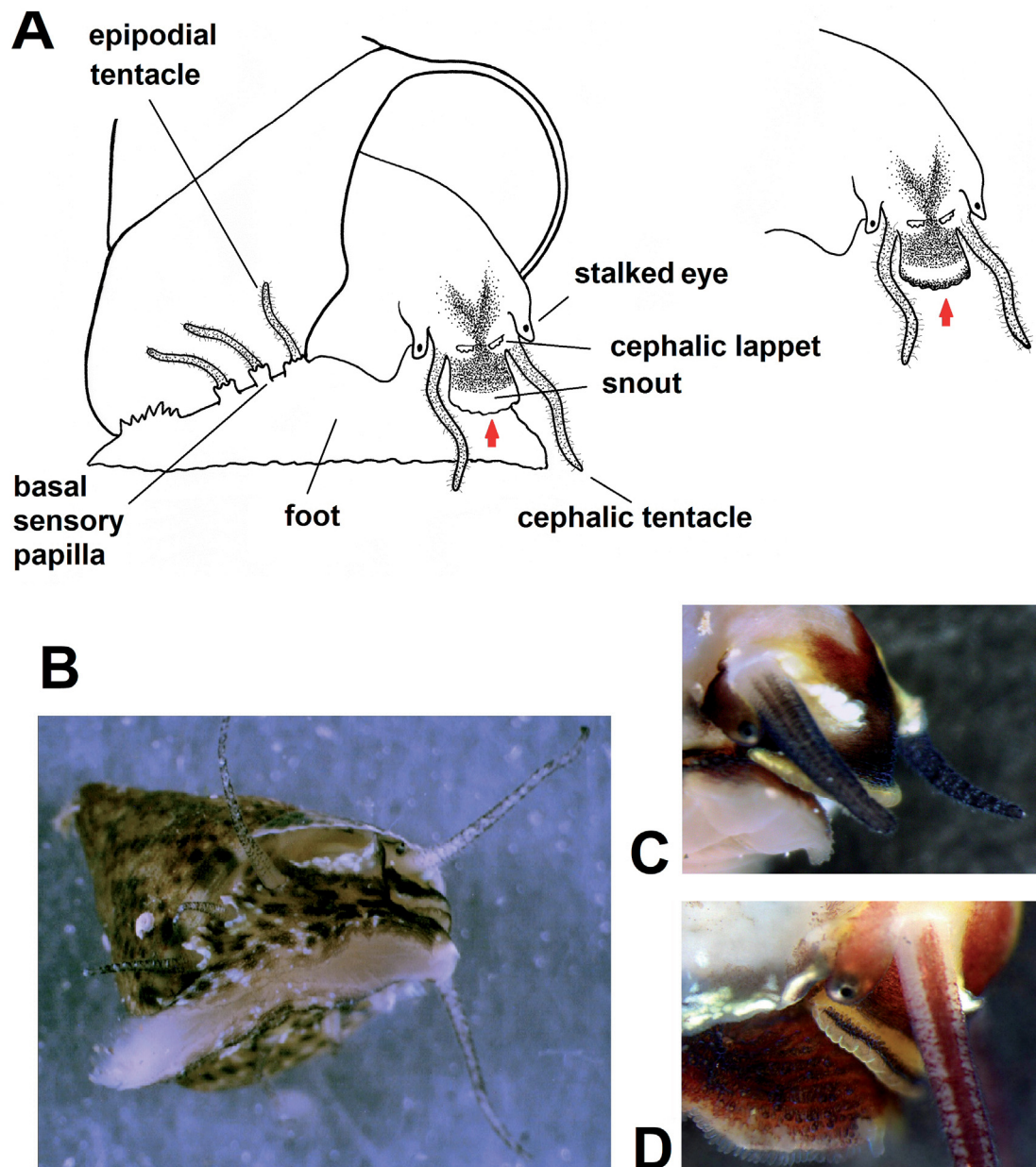


Fig. 4. Head-foot of *Jujubinus* spp. **A.** Sketch of the head-foot of a generalised *Jujubinus* Monterosato, 1884. The red arrows indicate the terminal part of the snout where a darker stripe may be diagnostically present or absent. **B.** *Jujubinus smaragdinus* (Monterosato, 1880) (morphotype *delpreteanus*), Lake Faro, Messina, Sicily (Italy), BAU 2943.1. **C.** *Jujubinus vulgaris* (Risso, 1826), Giannutri Is. (Italy), on *Posidonia oceanica*, 10 m depth. **D.** *Jujubinus depictus* (Deshayes, 1835), Giannutri Is. (Italy), on *P. oceanica*, 20 m depth.

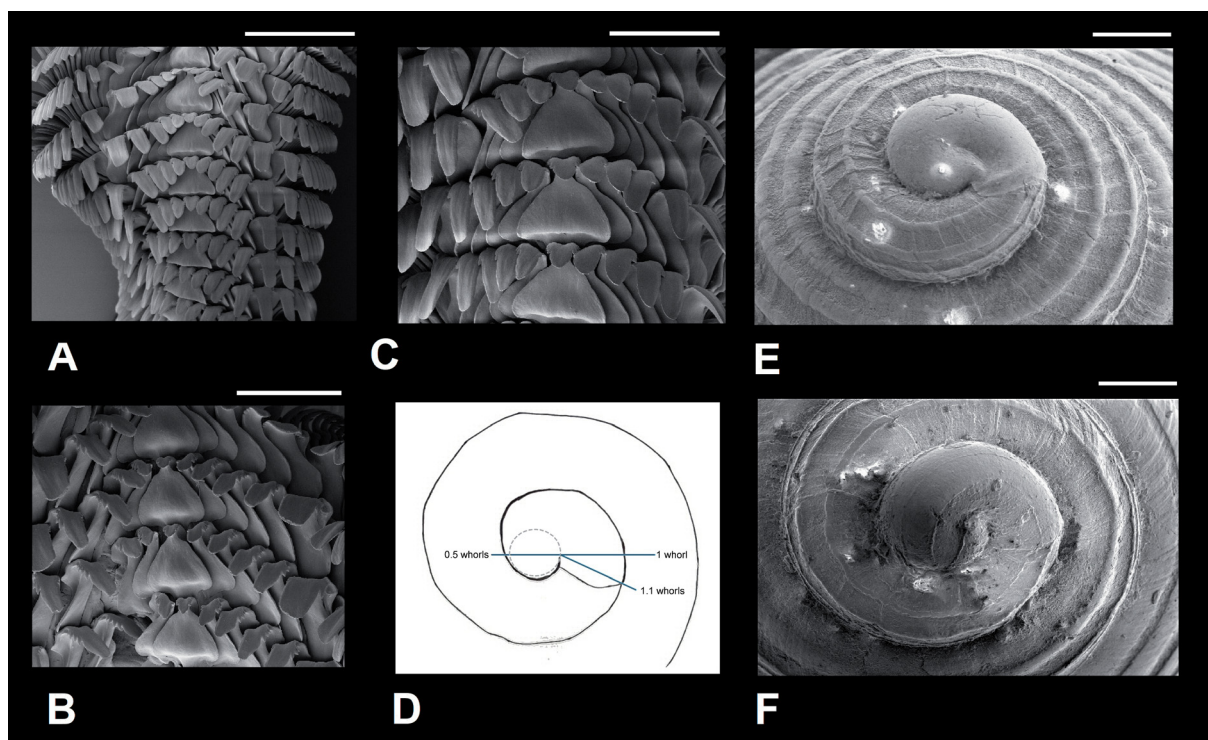


Fig. 5. Radulae and protoconchs of *Jujubinus* spp. **A–C.** *J. vulgaris* (Risso, 1826), Giannutri Is. (Italy), on *Posidonia oceanica* (L.) Delile, 10 m depth (CS-PM). **D.** *J. depictus* (Deshayes, 1835), Giannutri Is. (Italy), on *P. oceanica*, 20 m depth (CS-PM). **E.** The method to count protoconch whorls adopted in this work. **F.** *J. dianiensis* Mariottini, Oliverio & Smriglio sp. nov., Giannutri Is. (Italy), on *Cystoseira mediterranea* Sauvageau, 10 m depth (CS-PM). Scale bars: A, D–E = 200 μ m; B–C, F = 100 μ m.

SSH XIX is here identified as *Jujubinus striatus* (Linnaeus, 1758).

SSH XX is here identified as *Jujubinus smaragdinus* (Monterosato, 1880).

SSH XXI corresponded to the morpho-species *Jujubinus tingitanus* (Pallary, 1902).

SSH XXII corresponded to the morpho-species *Jujubinus dispar* Curini-Galletti, 1982.

SSH V, VIII, X, XI, XVI, XVII, and XVIII are undescribed. They are hereby described as *Jujubinus swinneni* Mariottini, Oliverio & Smriglio sp. nov. (SSH V), *Jujubinus superum* Mariottini, Oliverio & Smriglio sp. nov. (SSH VIII), *Jujubinus kyrnos* Mariottini, Oliverio & Smriglio sp. nov. (SSH X), *Jujubinus gofasi* Mariottini, Oliverio & Smriglio sp. nov. (SSH XI), *Jujubinus dianiensis* Mariottini, Oliverio & Smriglio sp. nov. (SSH XVI), *Jujubinus angustibasis* Mariottini, Oliverio & Smriglio sp. nov. (SSH XVII), and *Jujubinus inopinatus* Mariottini, Oliverio & Smriglio sp. nov. (SSH XVIII), respectively.

Disclaimer

The use of unpublished names (as e.g., those reported in museum labels), is only for the purpose of easier tracking of the samples, and is hence not intended to introduce those names, and should not be considered as a deliberate introduction of new names (ICZN 1999: art. 8.3).

Class Gastropoda Cuvier, 1795
Subclass Vetigastropoda Salvini-Plawen, 1980
Superfamily Trochoidea Rafinesque, 1815
Family Trochidae Rafinesque, 1815
Subfamily Cantharidinae J.E. Gray, 1857

Genus *Jujubinus* Monterosato, 1884

Type species

Trochus matonii Payraudeau, 1826 (by subsequent designation of von Martens 1885: 52, in the *Zoological Record*), accepted as *Jujubinus vulgaris* (Risso, 1826).

Diagnosis

Shell small for the family, slightly turruculate, imperforate, frequently brightly coloured, with obsolete or blunt columellar notch; sculpture of incised spiral lines with or without prosocline lamellae between cords. Soft parts (Fig. 4) with simplified epipodium, simple neck lobes, three long epipodial tentacles with well-developed, basal macropapillae; complex mottled colouration of foot and epipodium. Radula rhipidoglossate ($\infty + 5 + 1 + 5 + \infty$; Fig. 5A–B), typically trochid: rachidian with wide base, sharp, triangular primary cusp and 3–5 small, sharp secondary cusps; laterals gradually increasing in size outward, with triangular, sharp apex, and serrated internal and external edges; inner marginals with long, smooth apex, and median secondary cusps; outer marginals progressively pluricuspidate.

Grammatical gender

Masculine.

Jujubinus vulgaris (Risso, 1826)
SSH I – Fig. 6A–F

Trochus vulgaris Risso, 1826: 129, 313 (no figure).

Trochus dumerili Risso, 1826: 129, 315–316 (no figure).

Trochus matonii Payraudeau, 1827: 126–127, pl. vi figs 5–6.

Trochus unidentatus Philippi, 1844: 150, pl. 25 fig. 8.

Trochus monterosatoi Bucquoy, Dautzenberg & Dollfus, 1884: 367–368, pl. xliii figs 18–19.

Jujubinus africanus Nordsieck, 1973: 10, pl. 1 fig. 7.

Diagnosis

Shell of large size for the genus, elevated, thick, 3–4 spaced spiral cords, elevated and granulated, broad interspaces with strong prosocline lamellae, peripheral cord evident, high height/width ratio.

Type material

Lectotype of *Trochus vulgaris* Risso, 1826

FRANCE • dd; Nice; unknown locality (Nice, designated by Arnaud 1978); MNHN-IM-2000-31374.

Type(s) of *Trochus matonii* Payraudeau, 1827

CORSICA • “L’Ile de Corse”; lost (Virginie Héros, Muséum National d’Histoire Naturelle, France, pers. com., 27 Oct. 2019).

Type(s) of *Trochus unidentatus* Philippi, 1844

SICILY • “Siciliae”, probably in MNdHN (Santiago de Chile).

Syntypes of *Jujubinus striatus* var. *monterosatoi* Bucquoy, Dautzenberg & Dollfus, 1884
FRANCE • 2 dd; Roussillon; MNHN-IM-2000-38199, MNHN-IM-2000-38200.

Holotype of *Jujubinus africanus* Nordsieck, 1973
TUNISIA • dd; Djerba; SMF 341822.

Other material examined

ALGERIA • 7 dd; Alger; MCZR-M-11692 • 1 dd; Alger; (labelled “*Jujubinus quadrigranulatus*”); MCZR-M-11708 • 6 dd; Alger, Bone; MCZR-M-11720 • 1 dd; Oran; MCZR-M-11756 • 10 dd; Oran; MCZR-M-11775 • 2 dd; Oran; “D’Oran”; MCZR-M-11757 • 4 dd; Algeria; MCZR-M-11758.

CORSICA • 3 lv; Petit Pain de Sucre; 42°44.7' N, 9°28.00' E; 19 m depth; used for DNA sequencing; MNHN-IM-2019-4115 to 4117 • 3 lv; off Punta vecchia; 42°59.8' N, 9°27.2' E; 11 m depth; used for DNA sequencing; MNHN-IM-2019-4187 to 4689 • 3 lv; Minelli; 42°42.7' N, 9°27.5' E; 17 m depth; used for DNA sequencing; MNHN-IM-2019-4712 to 4714 • 1 lv; Grand Canyon; 42°44.2' N, 9°28.0' E; 29 m depth; used for DNA sequencing; MNHN-IM-2019-4747 • 1 lv; North Bastia; 42°44.4' N, 9°28.1' E; 20 m depth; used for DNA sequencing; MNHN-IM-2019-5052 • 3 lv; La Louise; 42°41.4' N, 9°27.2' E; 19–18 m depth; used for DNA sequencing; MNHN-IM-2019-5366 to 5368 • 1 lv; Le Sphinx; 42°43.3' N, 9°14.9' E; 17 m depth; used for DNA sequencing; MNHN-IM-2019-5398 • 2 lv; same data as for preceding; MNHN-IM-2019-5399, 5408 • 3 lv; Saint Florent; 42°42.3' N, 9°19.2' E; 3 m depth; used for DNA sequencing; MNHN-IM-2019-5497 to 5499 • 1 lv; North Bastia; 42°44.4' N, 9°28.1' E; 20 m depth; used for DNA sequencing; MNHN-IM-2019-5633 • 4 lv; Saint Florent; 42°41.8' N, 9°18.3' E; 10 m depth; used for DNA sequencing; MNHN-IM-2019-5641 to 5644 • 1 lv; Sec de Negru; 42°46.1' N, 9°20.0' E; 29–16 m depth; used for DNA sequencing; MNHN-IM-2019-5645 • 1 lv; Chapeau du Gendarme; 42°43.0' N, 9°15.9' E; 29 m depth; used for DNA sequencing; MNHN-IM-2019-5646 • 1 lv; Sec de Negru; 42°46.1' N, 9°20.0' E; 26 m depth; used for DNA sequencing; MNHN-IM-2019-5649 • 2 lv; Saint-Florent; 42°43.0' N, 9°18.6' E; 30 m depth; used for DNA sequencing; MNHN-IM-2019-5669, 5670 • 1 lv; Sec de Giraglia; 43°01.7' N, 9°24.4' E; 21 m depth; used for DNA sequencing; MNHN-IM-2019-5687 • 1 lv; Centuri depths; 42°59.3' N, 9°17.8' E; 21 m depth; used for DNA sequencing; MNHN-IM-2019-5886 • 1 lv; Centuri; 42°57.7' N, 9°20.1' E; 30 m depth; used for DNA sequencing; MNHN-IM-2019-5894 • 9 lv; Sec de Giraglia; 43°01.7' N, 9°24.4' E; 21 m depth; used for DNA sequencing; MNHN-IM-2019-5900, 5901, 5914 to 5920 • 6 lv; Miomo; 42°44.7' N, 9°28.0' E; 16 m depth; used for DNA sequencing; MNHN-IM-2019-6313, 6314, 6343 to 6346 • 3 lv; Punta Di U Capicciolu; 41°25.8' N, 9°15.8' E; 5–10 m depth; used for DNA sequencing; MNHN-IM-2019-13092, 13093, 13258 • 2 lv; South of Lavezzi Is.; 41°18.6' N, 9°15.4' E; 15–32 m depth; used for DNA sequencing; MNHN-IM-2019-13602, 13603 • 2 lv; off South coasts; 41°21.8' N, 9°11.6' E; 15–18 m depth; used for DNA sequencing; MNHN-IM-2019-13605, 13606 • 3 lv; Ficaghjola; 42°15.5' N, 8°39.3' E; 15 m depth; used for DNA sequencing; MNHN-IM-2019-16476, 16477, 16488 • 1 lv; Cargèse Port; 42°07.9' N, 8°35.8' E; 7 m depth; used for DNA sequencing; MNHN-IM-2019-16825 • 2 lv; Punta Scandola; 42°43.2' N, 9°27.9' E; 60 m depth; used for DNA sequencing; MNHN-IM-2019-17050, 17051 • 1 lv; Gulf de Girolata; 42°19.2' N, 8°36' E; 30 m depth; used for DNA sequencing; MNHN-IM-2019-17651 • 1 lv; Punta Palazzu, Phoque-moine; 42°22.6' N, 8°33.1' E; 10–15 m depth; used for DNA sequencing; MNHN-IM-2019-18107 • 3 dd; Provence and Corsica; “Coste di Provenza e Corsica” “*Jujubinus festivus*”; MCZR-M-11716.

CROATIA • 2 lv; Rab Island; 15 m depth, *Posidonia*; CS-PM • 3 dd; Dalmazia; (labelled “*Jujubinus mixtus*”); MCZR-M-11702 • 17 dd; 1906; “Adriatico”; (labelled “*Jujubinus mixtus*”); MCZR-M-11702 • 16 dd; Velirat; MCZR-M-11707 • 2 dd; Velirat; 1910; MCZR-M-11707 • 21 dd; Velirat; MCZR-M-11724 • 9 dd; Velirat; (labelled “*Jujubinus alternans*”); MCZR-M-11728 • 10 dd; Velirat; (labelled “*Jujubinus matoni mixta*”); MCZR-M-11750 • 1 dd; Velirat; MCZR-M-11770 • 5 dd; Dalmazia; (labelled “*Jujubinus*

monterosati"); MCZR-M-11724 • 4 dd; Dalmazia; MCZR-M-11725 • 12 dd; Dalmazia; (labelled "*Jujubinus fusca*"); MCZR-M-11728 • 12 dd; Melada; MCZR-M-11740 • 6 dd; Dalmazia; (labelled "*Jujubinus peculiaris*"); MCZR-M-11746 • 3 dd; Dalmazia; MCZR-M-11747 • 1 dd; Puntebianche; (Dalmazia); MCZR-M-11756 • 1 dd; Velirat; MCZR-M-11770.

FRANCE • 2 dd; Nice; MCZR-M-11720 • 4 dd; Toulon; MCZR-M-11745 • 6 dd; Toulon; MCZR-M-11761 • 6 dd; Bandol; '*Jujubinus elenchoidea*'; MCZR-M-11771 • 8 dd; Cannes; MCZR-M-11758 • 7 dd; Cannes; MCZR-M-11769 • 1 dd; Corsica; MCZR-M-11735 • 1 lv; Saint-Raphaël, Varo; used for DNA sequencing; BAU 2661.1 • 1 lv; Calanque de Figuerolles, La Ciotat; 36°34'18.7" N, 26°30'14.3" E; used for DNA sequencing; MNHN-IM-2013-32744.

GREECE • 9 dd; Gulf of Preveza; MCZR-M-11748 • 2 dd; Greece; (labelled "*Jujubinus tricolor*"); MCZR-M-11750 • 11 dd; Patras; MCZR-M-11751 • 2 dd; Patras; MCZR-M-11761 • 10 dd; Conemenos; MCZR-M-11707 • 1 dd; Kefalonia Island, Assos, port; 3 m depth; LT • 2 lv; Analipsi, Astypalea Is.; 36.575946° N, 26.393070° E; 0–1 m depth *Posidonia*; 28–30 Jun. 2017; used for DNA sequencing; BAU 1374, 1376 • 2 lv; Marmàri, Astypalea Is.; 36.564676° N, 26.353297° E; 0.2–0.5 m depth *Posidonia*; 23 Jun. 2017; used for DNA sequencing; BAU 3038.1, 3028.2 • 1 lv; same data as for preceding; used for DNA sequencing; BAU 3039.1 • 1 lv; Analipsi, Astypalea Is.; 36.575946° N, 26.393070° E; 0–1 m depth *Posidonia*; 28–30 Jun. 2017; used for DNA sequencing; BAU 3042.1 • 1 lv; Halkidiki, Marmaras; 40°04'46.2" N, 23°45'48.7" E; used for DNA sequencing; MNHN-IM-2013-32749.

ITALY • 1 lv; Giannutri Is., Punta Secca, stn. GMM 2; 42°15'41" N, 11°06'24" E; 12–13 m depth; used for DNA sequencing; BAU 2668.1 • 2 lv; Giannutri Is.; 42°15'7.05" N, 11°05'31.51" E; used for DNA sequencing; RM3-Jex2, RM3-Jex3 • 4 lv; same data as for preceding; used for DNA sequencing; BAU 1368.1 to 1368.4 • 1 lv; same data as for preceding; used for DNA sequencing; RM3-Jex1 • 2 lv; Giglio Is.; 42°22'7.82" N, 10°55'5.11" E; used for DNA sequencing; RM3-Jex4, RM3-Jex5 • 3 lv; Giglio Is., Cala Cupa; 42°22'06" N, 10°55'12" E; used for DNA sequencing; BAU 2851.1 to 2851.3 • 2 lv; same data as for preceding; used for DNA sequencing; BAU 2910.1, 3 • 1 lv; Argentario, La Caletta; 42°26'40.73" N, 11°6'51.84" E; used for DNA sequencing; RM3-Jex10 • 1 lv; same data as for preceding; used for DNA sequencing; RM3-Jex9 • 2 lv; Tarquinia; 42°26'40.73" N, 11°06'51.84" E; used for DNA sequencing; RM3-Jex11, RM3-Jex12 • 2 lv; Elba Is., Fetovaia; 42°43'58.1" N, 10°09'13.1" E; used for DNA sequencing; MNHN-IM-2013-32666, 32667 • 13 dd; Elba Island, Lacona; 5 m depth; bioclastic sediment; CS-PM • 29 dd; Elba I., Porto Azzurro, Naregno; 3 m depth; bioclastic sediment; LT • 3 dd; Talamone, beached; CS-PM • 2 dd; Isola del Giglio; MCZR-M-11761 • 13 lv; Giglio Island; 15 m depth; *Posidonia* meadow; CS-PM • 13 lv; Giannutri Island; 15 m depth; *Posidonia* meadow; CS-PM • 34 dd; Torre Valdaliga; 25 m depth; bioclastic sediment; CS-PM • 27 dd; Santa Marinella; 20 m depth; bioclastic sediment; CS-PM • 250 dd; Santa Marinella; 0 m depth; beached, in bioclastic sediments; CS-PM • 71 dd; Santa Marinella; fishing boat; CS-PM • 5 dd; Santa Marinella; fishing nets, *Posidonia* residues; LT • 600 dd; Torre Valdaliga, Civitavecchia; 25 m depth; CS-PM • 9 dd; San Felice Circeo; 30 m depth; fishing nets; LT • 4 dd; San Felice Circeo; fishing nets, *Posidonia* residues; LT • 1 dd; San Felice Circeo; 40 m depth; fishing nets; LT • 1 dd; Anzio; MCZR-M-11733 • 50 dd; Ventotene Island; 18–20 m depth; CS-PM • 2 dd; Ventotene Island; fishing boat; CS-PM • 63 dd; Ventotene Island; 20 m depth; bioclastic sediment; CS-PM • 3 dd; Napoli; MCZR-M-11684 • 5 dd; Napoli; MCZR-M-11720 • 4 dd; Napoli; MCZR-M-11723 • 1 dd; "Napoli?"; MCZR-M-11724 • 1 dd; Napoli; (labelled "*Jujubinus histris*"); MCZR-M-11724 • 12 dd; Napoli; (labelled "*Jujubinus histrionella*"); MCZR-M-11733 • 3 dd; Napoli; (labelled "*Jujubinus matoni mitis*"); MCZR-M-11756 • 1 dd; Napoli; MCZR-M-11733 • 11 dd; Napoli; MCZR-M-11733 • 1 dd; Napoli; "*Jujubinus matoni*"; MCZR-M-11733 • 27 dd; Napoli; MCZR-M-11755 • 3 dd; Napoli; amidst sponges ("spugne"); MCZR-M-11758 • 1 dd; Napoli; 1918; "*Jujubinus micropictus*"; MCZR-M-11760 • 1 dd; Napoli; MCZR-M-11733 • 5 dd; Napoli; MCZR-M-11760 • 5 dd; Napoli?; MCZR-M-11776 • 1 dd; Napoli and Capri; MCZR-M-11733 • 8 dd; Capri; MCZR-M-11758

• 7 dd; Capri; MCZR-M-11759 • 1 dd; Capri; “*Jujubinus matoni*”; MCZR-M-11733 • 1 dd; Capri; MCZR-M-11735 • 1 dd; Napoli; MCZR-M-11733 • 4 dd; off Monte Conero; 0 m depth; beached; CS-PM • 67 dd + 13 dd; Marina di Camerota; 8 m depth; bioclastic sediment; LT • 1 dd; Brindisi; 3 m depth; algae; LT • 1 dd; Otranto; beached; CS-PM • 8 dd; Le Castella; 25 m depth; bioclastic sediment; CS-PM • 8 dd; Adriatic; “*Jujubinus similis*”; MCZR-M-11740 • 3 dd; Adriatic; “Adriatico” “*Jujubinus mixtus*”; MCZR-M-11769 • 4 dd; Adriatic; “*Jujubinus tristis*”; MCZR-M-11756 • 6 dd; Adriatic; MCZR-M-11758 • 1 dd; Adriatic?; “Adriatico?”; MCZR-M-11762 • 3 dd; Trieste; MCZR-M-11735 • 3 dd; Trieste; MCZR-M-11747 • 1 dd; Porto Maurizio; “*Jujubinus insignis*”; MCZR-M-11746 • 3 dd; Porto Maurizio; MCZR-M-11746 • 1 dd; Porto Maurizio; 1917; MCZR-M-11761 • 2 dd; Porto Maurizio; MCZR-M-11766 • 4 dd; Chioggia; MCZR-M-11740 • 34 dd; unidentified locality; “Romagnolo”; MCZR-M-11691 • 2 dd; Molfetta; beached; CS-PM • 43 dd; Tricase Marina; 3 m depth; bioclastic sediment; CS-PM • 8 lv; Polignano; 20 m depth; amidst *Posidonia*; CS-PM • 80 dd; Santa Maria di Leuca; 15 m depth; CS-PM • 1 lv; S. Isidoro; 3 m depth; used for DNA sequencing; BAU 1678.

MALTA • 14 lv; Gozo Island, Marsalforn, Xwejni Bay; 36°04'47.83" N, 14°14'51.25" E; CS-PM • 13 lv; Gozo Island, Xlendi Bay; 5 m depth; *Cystoseira*; CS-PM • 6 dd; Malta; MCZR-M-11721 • 5 lv; Malta; used for DNA sequencing; BAU 2674.1–5.

MOROCCO • 6 dd; Casablanca, Mazata, Mazaclon; MCZR-M-11767.

PORTUGAL • 5 dd; Algarve; fishing boat; CS-PM.

SARDINIA • 4 lv; Capo Carbonara; 5 m depth; MO • 10 lv; Cala d’Ambra; 1–5 m depth; MO • 22 dd; Golfo d’Arzachena; beached; CS-PM • 35 dd; La Maddalena Island; 25 m depth; bioclastic sediment; CS-PM • 1 dd; Bay of Cagliari; (labelled “*Jujubinus limulosus*”); MCZR-M-11712 • 1 dd; Alghero; MCZR-M-11718 • 2 dd; Alghero; MCZR-M-11756 • 1 dd; Cagliari; MCZR-M-11720 • 2 dd; Sardinia; MCZR-M-11733 • 1 dd; Sardinia; labelled “*undulata*”; MCZR-M-11738 • 3 dd; Alghero; MCZR-M-11740 • 5 dd; Sardinia; MCZR-M-11742 • 1 dd; Sardinia; MCZR-M-11746 • 14 dd; Sardinia; MCZR-M-11749 • 8 dd; Sardinia; MCZR-M-11757 • 8 dd; Sardinia; MCZR-M-11761 • 4 dd; Sardinia; MCZR-M-11761 • 3 dd; Sardinia; “*Jujubinus tricolor*”; MCZR-M-11761 • 8 lv; San Pietro Is.; 3 m depth; on *Posidonia*; CS-PM • 4 dd; Cagliari; MCZR-M-11733.

SICILY • 22 dd; Palermo; “*Jujubinus tricolor*”; MCZR-M-11709 • 44 dd; Palermo; (labelled “*Jujubinus matoni*”); MCZR-M-11717 • 1 dd; Palermo; MCZR-M-11718 • 94 dd; Port of Palermo; (labelled “*Jujubinus matoni*”); MCZR-M-11719 • 6 dd; Palermo; (labelled “*Jujubinus giacobi*”); MCZR-M-11720 • 3 dd; Palermo; “fondo coralligeno”; MCZR-M-11723 • 1 dd; Palermo; MCZR-M-11724 • 6 dd; Palermo; MCZR-M-11735 • 15 dd; Palermo; MCZR-M-11745 • 9 dd; Palermo; MCZR-M-11749 • 1 dd; Palermo; MCZR-M-11749 • 7 dd; Palermo; MCZR-M-11758 • 2 dd; Palermo; (labelled “*Jujubinus tricolor*”); MCZR-M-11763 • 2 dd; Sciacca; MCZR-M-11773 • 3 dd; Favignana I.; beached; CS-PM • 7 dd; Favignana Is.; MCZR-M-11749 • 1 dd; Linosa I.; 2 m depth; *Posidonia* meadow; CS-PM • 1 dd; Lampedusa; 1901; (“spugne”); MCZR-M-11723 • 1 dd; Lampedusa; (labelled “*Jujubinus disperses*”); MCZR-M-11731 • 5 dd; Lampedusa; beached; CS-PM • 3 dd; Pantelleria Is., Scauri; 13 m depth; bioclastic sediment; LT • 1 dd; Ognina; MCZR-M-11721 • 1 dd; Ognina; MCZR-M-11759 • 3 dd; Messina; (labelled “*Jujubinus matoni rupestris*”); MCZR-M-11721 • 9 dd; Messina; (labelled “*Jujubinus rupestris*”); MCZR-M-11721 • 2 dd; Messina; MCZR-M-11748 • 1 dd; Messina; MCZR-M-11749 • 2 dd; Messina; MCZR-M-11769 • 3 dd; Messina; (labelled “*Jujubinus incertus*”); MCZR-M-11776 • 16 dd; Lipari; MCZR, no number • 1 dd; Lipari; (labelled “*Jujubinus matoni grossesculpta*”); MCZR-M-11738 • 20 dd; Lipari; (labelled “*Jujubinus inflammatus*”); MCZR-M-11742 • 11 dd; Palermo; “*J. matoni Pay Palermo!* = *vulgaris Risso*”; MCZR-M-11685 • 5 lv; San Vito Lo Capo; used for DNA sequencing; BAU 1677.2–6.

SLOVENIJA • 2 lv; Izola; 45°32'51.4" N, 13°42'12.9" E; 4 m depth; on *Posidonia* meadow; used for DNA sequencing; RM3-Jex7, RM3-Jex8 • 1 lv; Izola; 45°32'51.4" N, 13°42'12.9" E; 4 m depth; on *Posidonia* meadow; used for DNA sequencing; BAU 2071.1.

SPAIN • 1 lv; Cabo de Palos, Murcia; 30 m depth; CS-PM • 3 dd; Tarifa; intertidal; tide pools, crabbed; CS-PM • 5 dd; Ibiza; "*Jujubinus monterosatoi*"; MCZR-M-11707 • 29 dd; Velirat and Valencia; vial with unique label, reading "*Jujubinus tricolor*"; MCZR-M-11807 • 31 dd; Valencia; 1915; "*Jujubinus matoni*"; MCZR-M-11734 • 13 dd; Valencia; 1915; "*Jujubinus matoni*"; MCZR-M-11734 • 8 dd; Valencia; "*Jujubinus crenulatus*"; MCZR-M-11749 • 2 dd; Mahón; MCZR-M-11748 • 5 dd; Valencia; "*Jujubinus tricolor*"; MCZR-M-11763 • 35 dd; Cádiz, Santa María; intertidal; tide beds; CS-PM • 1 lv; Benalmádena, Málaga; 36°34.7' N, 4°30.9' W; used for DNA sequencing; BAU 2665 • 1 lv; Cabo de Palos, Murcia; 37°38'08.0" N, 0°41'30.4" W; used for DNA sequencing; MNHN-IM-2013-32680 • 1 lv; Almería; used for DNA sequencing; RM3-Jex13 • 1 lv; Tarifa; 36°0'14.16" N, 5°36'21.32" W; used for DNA sequencing; RM3-Jex6.

TUNISIA • 3 dd; Sfax; MCZR-M-11684 • 1 dd; "Coste d'Africa"; MCZR-M-11746 • 8 dd; "Coste d'Africa"; MCZR-M-11761 • 21 dd; Sfax; MCZR-M-11761 • >30 dd; North of Zarzis; 33°36'28" N, 11°04'04" E; 0–7 m depth; MO • 2 dd; Djerba; 1 m depth; MO • 49 dd; Kerkennah Islands, Sidi Yousef; beached; CS-PM • 89 dd; Djerba Is.; beached; CS-PM • 3 dd; Djerba Island; Beached; LT • 7 dd; Djerba Island; upper infralittoral; ex Katy Nicolay coll; LT • 6 dd; Kerkennah Islands, W Gharbi Island, Sidi Youssef; 0.5 m depth; LT • 3 dd; Djerba Island; ex Mauro Pizzini coll; LT • 2 lv; Gremdi Is.; 34°45'50" N, 11°19'55" E; used for DNA sequencing; BAU 2313.1, 2313.2 • 1 lv; Gharbi Is., Sidi Youssef; 34°45'50" N, 11°19'55" E; used for DNA sequencing; BAU 2315.1 • 1 lv; Djerba Is., Sidi Solimen; 34°02' N, 11°05' E; used for DNA sequencing; MNHN-IM-2013-31944 • 1 lv; Djerba Is., Sidi Jmour; 33°49.88' N, 10°44.83' E; used for DNA sequencing; MNHN-IM-2013-32107 • 1 lv; Djerba Is., Sidi Jmour; 33°49.88' N, 10°44.83' E; used for DNA sequencing; MNHN-IM-2013-32121 • 2 lv; Kerkennah Is., Sharqi Is.; 34°45'16.97" N, 11°20'31.00" E; used for DNA sequencing; RM3-Jk1A, RM3-Jk2A.

TURKEY • 2 lv; Bozcaada Island; 45 m depth; CS-PM • 4 lv; Datça, stn AKD92-02; MO • 10 dd; Datça; 36°42'16.6" N, 27°40'52.3" E; 8 m depth; under stones and brown algae; LT • 12 dd; Datça; 36°42'16.6" N, 27°40'52.3" E; 3–7 m depth; on brown algae; LT.

UNPRECISED GEOGRAPHIC DATA • 5 dd; Mediterranean Sea; (labelled "*Jujubinus matoni*"); MCZR-M-11761 • 3 dd; no data; (labelled "*Jujubinus matoni*"); MCZR-M-11750.

Description (in parentheses data of the lectotype)

SHELL. Shell of large size for the genus, height 5.9–12.6 (10.2) mm, width 4.7–7.3 (6.7) mm, height/width ratio 1.25–1.86, conical, robust. Protoconch seemingly smooth, of ca 1 whorl, 0.21–0.22 mm in width. Teleoconch of 6–7 (6) slightly convex whorls. Sculpture of 3–5 (3) minutely granulose little closely set abapical spiral cords with wide interspaces of about the same strength, and peripheral cord evident formed by 1–5 (4) merged cordlets. Interspaces wide with strong prosocline lamellae. Suture incised. Base convex, with 6–9 concentric reddish or brown spiral cords white dotted and regularly spaced, umbilicus closed also in juveniles, covered with a white callus. Aperture quadrangular, with the columellar callus thickened in the middle portion. Interior of the aperture whitish, nacreous.

COLOURATION. Colour of protoconch and initial teleoconch whorls reddish-greyish; remaining whorls and base white or whitish background with reddish brown to dark-brown or black prosocline or opisthocline lines or blotches of varying size irregularly arranged.

SOFT PARTS. Epipodial tentacles grayish with a whitish stripe, covered by scattered very tiny whitish speckles. Foot background brownish or reddish mottled with longitudinal brown or red stripes and covered by white speckles; sole whitish or creamy. Cephalic tentacles grayish, with two dorsal darker stripes and covered by small light whitish speckles. Eye stalks brownish dorsally, whitish ventrally, covered by brown speckles; eyes black encircled by lighter crown, sometimes white ventrally. Snout brownish to reddish with a creamy terminal band.

Distribution

In the Atlantic it is known with certainty only from Morocco, and Algarve (Portugal). In almost the entire Mediterranean Sea (e.g., Barash & Danin 1992: 34–35, fig. 31a; Portalatina 2008). Almost all records under *Jujubinus exasperatus*, living specimens at depths from 1 to 35 m, rarely down to 60 m.

Remarks

Records in the Atlantic from Scotland and the southernmost British Isles (Poppe & Goto 1991) to Azores, Madeira, Canary Islands (Bucquoy *et al.* 1882; Nordsieck 1968) are probably based on misidentifications. This is the commonest species of the genus in the Mediterranean Sea, very variable morphologically and chromatically. The name *Jujubinus exasperatus* has been largely employed for it, but *Trochus exasperatus* Pennant, 1777 was based on a different species (SSH II, see below). Therefore, many literature records of ‘*Jujubinus exasperatus*’ cannot be unequivocally ascribed to either species. *Trochus vulgaris* Risso, 1826 is the first available name for this species. *Trochus matonii* Payraudeau, 1827 is also this same species, and is the type of the genus *Jujubinus*: the type material (now lost) from Corsica was described as “maculis longitudinalibus angulosis albis et fuscis, aut albis et rubris picta” (Payraudeau 1827: 126–127), clearly referring to two of the most common chromatic forms, with angular longitudinal blotches coloured in either dark and white, or red and white. For the date of publication of Payraudeau’s “*Catalogue descriptif...*” we refer to Falkner *et al.* (2002). The two figured specimens of *Trochus monterosatoi* (Bucquoy, Dautzenberg & Dollfus, 1884: pl. xliii figs 18–19) are clearly *J. vulgaris*, and the very B.D.D. put in the synonymy of their taxon also *Trochus exasperatus* var. *excavata* Monterosato, 1880. *Jujubinus unidentatus* (Philippi, 1844) and *Jujubinus africanus* Nordsieck, 1973 were based on a particular morphotype from Tunisia with light shell, ivory-whitish background with dark-brown to brown-reddish prosocline elongated flames, 5–8 weakly to minutely granulose spiral cords of varying size, base with 7–10 spiral cords with brown-reddish lines, and a very strong notch on the columella. The animal of this form has the same general chromatic pattern as the typical one but is homogeneously lighter and much fainter. The morphotype ‘*unidentatus*’ attains a height of 7.8–10.1 mm, width 4.7–6.2 (ratio 1.42–1.86). See under *J. exasperatus* and *J. pseudogravinae*, for comparative remarks.

Jujubinus exasperatus (Pennant, 1777)

SSH II – Fig. 6G–I

Trochus exasperatus Pennant, 1777: 126, n. 105 (no figure).

Jujubinus corallinus Monterosato, 1884: 46 (no figure).

Jujubinus igneus Sturany, 1896: 30, fig. 2 (ex Monterosato ms).

Diagnosis

Shell of large size for the genus, thick, elevated, 3–4 spaced spiral cords, elevated and granulated, broad interspaces with strong prosocline lamellae, peripheral cord evident, high height/width ratio, colour reddish with whitish sagittal flammule.

Type material

Trochus exasperatus Pennant, 1777

The original description was based on Martini Lister's illustration (Martini Lister 1770: pl. 616 fig. a2) and the relevant material (from the type locality 'England': Martini Lister marked the figure with "A", as for an English shell) is now lost (A. Salvador, Natural History Museum, pers. com., 28 Jul. 2015; M. Carnall, Oxford University Zoology Museum, pers. com. 18 May 2018). A neotype designation based on a genotyped English specimen is desirable to stabilize the use of the name.

Syntypes of *Jujubinus corallinus* Monterosato, 1884

SICILY • 5 dd; Palermo; NMW.1910.29.02042.

Syntypes of *Jujubinus igneus* Sturany, 1896

CROATIA • 3 dd; Pelagruza, Pola Expedition stn 260; 128 m depth; NHMW 72399.

Other material examined

CANARY ISLANDS • 1 dd; Gran Canaria, Sardinia; 20 m depth; MO.

CORSICA • 1 lv; Miomo; 42°45.2' N, 9°28.4' E; 23 m depth; used for DNA sequencing; MNHN-IM-2019-4178 • 2 lv; Minelli; 42°42.7' N, 9°27.5' E; 17 m depth; used for DNA sequencing; MNHN-IM-2019-4711, 4713 • 1 lv; East Cap Corse; 42°53.6' N, 9°30.3' E; 40 m depth; used for DNA sequencing; MNHN-IM-2019-4737 • 1 lv; La Louise, 42°41.4' N, 9°27.2' E, 19–18 m depth; used for DNA sequencing; MNHN-IM-2019-5369 • 2 lv; Gulf de Saint-Florent; 42°44.1' N, 9°19.3' E; 60 m depth; used for DNA sequencing; MNHN-IM-2019-5677, 5887 • 2 lv; Ficaghjola; 42°41.4' N, 9°27.1' E; 18 m depth; used for DNA sequencing; MNHN-IM-2019-6341, 6342 • 1 lv; North Cap Corse; 43°02.6' N, 9°19.9' E; 60 m depth; used for DNA sequencing; MNHN-IM-2019-6377 • 1 lv; Est Ile Forana, 41°33.7' N, 9°23.7' E; 45–46 m depth; used for DNA sequencing; MNHN-IM-2019-13063 • 1 lv; Tête de Cheval; 41°20.3' N, 9°14.5' E; 44 m depth; used for DNA sequencing; MNHN-IM-2019-13551 • 1 lv; Cabo Di Feno; 41°23.4' N, 9°06.2' E; 37 m depth; used for DNA sequencing; MNHN-IM-2019-13691 • 2 lv; Punta Di U Capicciolu; 41°25.7' N, 9°15.9' E; 12–36 m depth; used for DNA sequencing; MNHN-IM-2019-14094, 14095 • 1 lv; Madonetta lighthouse; 41°23.2' N, 9°08.4' E, 37 m depth; used for DNA sequencing; MNHN-IM-2019-14626 • 2 lv; Gulf de Girolata, 42°19.8' N, 8°33.7' E, 46–46 m depth; used for DNA sequencing; MNHN-IM-2019-16457, 16565 • 1 lv; South of Cargèse; 42°07.2' N, 8°35.4' E; 45–48 m depth; used for DNA sequencing; MNHN-IM-2019-16897 • 1 lv; Punta Scandola; 42°20' N, 8°33.6' E; 35 m depth; used for DNA sequencing; MNHN-IM-2019-17047 • 1 lv; N of Gargalo Is.; 42°22.3' N, 8°32.4' E; 26 m depth; used for DNA sequencing; MNHN-IM-2019-17270 • 1 lv; Gulf de Girolata, Ruzaghiu; 42°20.6' N, 8°34.9' E; 60 m depth; used for DNA sequencing; MNHN-IM-2019-17535 • 2 lv; Punta Palazzu; 42°22.8' N, 8°33.2' E; 50 m depth; used for DNA sequencing; MNHN-IM-2019-17613, 17614 • 2 lv; Gulf de Girolata, Ruzaghiu; 42°20.6' N, 8°34.9' E; 60 m depth; used for DNA sequencing; MNHN-IM-2019-17645, 17821.

CROATIA • 27 dd; Velirat; "*Juj. Ignus* v. *coccinella* Velirat 1910 tra laminarie e coralligeno"; MCZR-M-11733.

CYPRUS • 5 dd; Agia Napa; Cape Greco; 34°58'49.0" N, 34°01'02.0" E; 3 m depth; MO.

FRANCE • 1 lv; Brittany, Guérhëon, near Roscoff; used for DNA sequencing; BAU 2067.5, 2067.6 • 5 lv; Brittany, Pointe de l'Arcouest, Ploubazlanec; 48°49'10" N 3°00'26" W; used for DNA sequencing; BAU 2660.1 to 2660.5 • 3 dd; Brest; MCZR-M-11718 • 2 dd; St Lunaire; MCZR-M-11718 • 1 lv; Saint-Raphaël (Varo); BAU 2661.2 • 1 lv; La Ciotat, Calanque de Figuerolles; 36°34'18.7" N, 26°30'14.3" E;

used for DNA sequencing; MNHN-IM-2013-32743 • 1 lv; Saint-Raphaël (Varo); used for DNA sequencing; BAU 2661.2.

GREAT BRITAIN • 4 dd; England; MCZR-M-11718 • 8 dd; Guernsey I.; MCZR-M-11718 • 4 dd; Herm I.; MCZR-M-11749.

GREECE • 1 dd.; Astypalea I.; 10 m depth; fishing nets; LT • 2 lv; Halkidiki, Marmaras; 40°04'46.2" N, 23°45'48.7" E; MNHN-IM-2013-32746, 32751 • 4 lv; Astypalea I., Analipsi; 36.575946° N, 26.393070° E; 0–1 m depth; *Posidonia oceanica* meadow; 28–30 Jun. 2017; used for DNA sequencing; BAU 3040.1 to 3040.4 • 2 lv; same data as for preceding; used for DNA sequencing; BAU 3041.1, 3041.2 • 5 lv; same data as for preceding; used for DNA sequencing; BAU 3044.1 to 3044.4, 3044.6 • 1 lv; Astypalea I., Stenò; 36.574897° N, 26.367907° E; 2–8 m depth; *Posidonia oceanica* meadow; 29 Jun. 2017; used for DNA sequencing; BAU 3043.

ITALY • 1 lv; Elba I., Fetovaia; 42°43'58.1" N, 10°09'13.1" E; used for DNA sequencing; MNHN-IM-2013-32663 • 1 dd; Elba I., Lacona; 5 m depth; bioclastic sediment; CS-PM • 3 dd; Elba I., Porto Azzurro Naregno; 3 m depth; bioclastic sediment; LT • 2 lv; Giglio I.; 42°22'7.82" N, 10°55'5.11" E; used for DNA sequencing; RM3-Jec3, RM3-Jec4 • 1 lv; Giglio I., Cala Cupa; 42°22'06" N, 10°55'12" E; BAU 2910.2 • 2 lv; Argentario, Secca del Corallo; 42°24'3.90" N, 11°5'31.57" E; used for DNA sequencing; RM3-Jec1, RM3-Jec2 • 6 dd; Santa Marinella; fishing nets *Posidonia* residues; LT • 20 dd; Santa Marinella; 20 m depth; bioclastic sediment; CS-PM • 8 dd; Torre Valdaliga; 25 m depth; bioclastic sediment; CS-PM • 2 lv; Secche di Tor Paterno MPA; 41°36'27.01" N, 12°20'49.97" E; used for DNA sequencing; RM3-Jec5, RM3-Jec6 • 1 dd; San Felice Circeo; fishing nets; LT • 3 dd; San Felice Circeo; fishing nets *Posidonia* residues; LT • 18 dd; Capo D'Anzio, 3 miles off; 40 m depth; bioclastic sediment; CS-PM • 4 lv; Giglio I.; 15 m depth; *Posidonia*; CS-PM • 7 lv; Giannutri I.; 15 m depth; *Posidonia*; CS-PM • 2 dd; Ventotene I.; 20 m depth; bioclastic sediment; CS-PM • 2 dd; Marina di Camerota; fishing boat; CS-PM • 16 dd; Porto Cesareo; 20 m depth; fishing nets; LT • 1 dd; Tricase Marina; 3 m depth; bioclastic sediment; CS-PM • 2 dd; Argentario, Capo d'Uomo; 35 m depth; MO • 2 dd; Giannutri I., Punta Secca; 35 m depth; MO • 10 dd; Tor Paterno MPA; 15–70 m depth; MO • 7 sh; Ventotene I.; 40 m depth; fishing nets residuals; MO • 1 dd; Ventotene I., Sconcioglie shoal; 31 m depth; MO • 3 lv; Punta Prosciutto; 40°17'37" N, 17°45'47" E; used for DNA sequencing; BAU 2658.2, 2658.3, 2658.5 • 2 lv; Torre Colimena; 40°17'40" N, 017°45'20" E; 2–7 m depth; Aug. 2007; under rocks; used for DNA sequencing; BAU 1726.1, 1726.3 • 1 lv; Scilla; used for DNA sequencing; BAU 2357.1 • Santa Maria al Bagno; 40°07'40.9" N, 17°59'37.5" E; used for DNA sequencing; BAU 3617 • 1 lv; S. Isidoro, Lecce; used for DNA sequencing; BAU 3620.1.

MALTA • 3 lv; Gozo I., Xlendi Bay; 10 m depth; *Posidonia oceanica* meadow; CS-PM.

MOROCCO • 1 dd; Al Hoceima, Cala Iris; 15 m depth; MO.

SARDINIA • 7 lv; Alghero; 40–80 m depth; fishing nets residuals; MO • 1 lv; Bonifacio Strait; 80 m depth; MO • 8 dd; Capo Caccia, 'Ennio Falco' cave; 5–15 m depth; MO • 7 dd; Bosa Marina; 40 m depth; bioclastic sediment; CS-PM • 25 dd; La Maddalena I.; 25 m depth; bioclastic sediment; CS-PM • 4 dd; Asinara I., Punta La Nave; 15–30 m depth; MO • 5 dd; La Maddalena I.; 80 m depth; fishing nets; LT.

SICILY • 10 dd; Lampedusa I.; 50 m depth; MO • 3 lv; Salina I.; 100–150 m depth; fishing nets residuals; MO • 4 dd; Lampedusa I.; 130 m depth; MO • 1 dd; Favignana I.; beached; CS-PM • 4 dd; Siracusa; 70 m depth; fishing nets residuals; MO • 6 dd; Levanzo I.; 31 m depth; MO • 171 dd; Palermo; "*J. igneus* M. apud Sturany Palermo", "*JuJ. Igneus* Monts vide Sturany Zool. Ergebu. VII, 1896 p. 28, t. II, f. 45 Palermo"; unnumbered sample (Monterosato coll.) • 26 dd; Palermo; "Sbarra", (locality in the Palermo area, currently not identifiable); MCZR-M-11723.

SLOVENIJA • 1 lv; Izola; 45°32'51.4" N, 13°42'12.9" E; 4 m depth; on *Posidonia* meadow; used for DNA sequencing; RM3-Jec8.

SPAIN • 1 dd; Alborán I., “Mediterraneo-92” stn ALB A; 35°56.94' N, 003°00.90' W; 32 m depth; MO • 18 dd; Getares, 4 km S of Algeciras; 20 m depth; LT • 1 lv; Almería; used for DNA sequencing; RM3-Jec7 • 5 lv; Torre de Calahonda, Cabopino; 36°28.3' N, 4°42.4' W; BAU 2666.1 to 2666.5.

TURKEY • 3 dd; Dardanelles Channel; 65 m depth; CS-PM • 1 dd; Istanbul, Yesilkoy; 55 m depth; CS-PM • 2 dd; Dardanelles Channel; 65 m depth; CS-PM.

Description

SHELL. Shell of large size for the genus, height 6.0–12.2 mm, width 4.6–8.2 mm, height/width ratio 1.32–1.78, conical, robust. Protoconch seemingly smooth, of ca 1 whorl, 280–290 µm in width. Teleoconch of 5.5–6.5 slightly convex whorls. Sculpture of 3–4 strong granulose spiral cords of about the same strength, regularly spaced, and a broad peripheral cord formed by 2–3 merged cordlets, very granulose; suture well-marked. Interspaces with strong prosocline lamellae regularly set. Base convex, with 6–8 concentric reddish and white spiral cords regularly spaced, umbilicus closed also in juveniles, covered with a white callus. Aperture quadrangular, with the columellar callus thickened in the middle portion. Interior of the aperture whitish or pinkish, nacreous.

COLOURATION. Colour of protoconch and initial teleoconch whorls glossy red or pinkish; remaining whorls and base with alternating whitish-reddish spiral blotches more or less of the same size.

SOFT PARTS. Epipodial tentacles rosy to reddish, densely covered by red speckles. Foot background reddish mottled with creamy irregularly shaped blotches containing white speckles, dorsally delimited by a brown streak, sole rosy. Cephalic tentacles reddish densely covered by red speckles, with a dorsal rosy stripe. Eye stalks reddish; eyes black encircled by white. Snout reddish with a creamy terminal band.

Distribution

Atlantic Ocean, from the British Isles to Morocco, Azores, Madeira, Selvagens and Canary Islands (e.g., Rolán 1983; Segers *et al.* 2009; Gofas *et al.* 2011; Hernández *et al.* 2011). Entire Mediterranean (e.g., Conti & Rossini 1985; Brunet Navarro & Capdevila 2005; Portalatina 2008; Albano & Sabelli 2009; Vazzana 2010; Manousis 2012; Donnarumma *et al.* 2018; Wölfling *et al.* 2019), living specimens from intertidal down to 60 m, occasionally (in very clear waters) down to 80–100 m deep (deeper records from fishing nets residuals need confirmation).

Remarks

SSH-I and SSH-II were already regarded as distinct species by Monterosato (who used the specific epithets *corallinus* and *igneus* for this species, referring to its most frequent colouration). However, most specialists of Mediterranean molluscs have pooled them into a single very polymorphic *Trochus exasperatus*. Pennant (1777: 126) based the description explicitly on Martini Lister’s figure in the *Historiae Conchyliorum* (Martini Lister 1770: pl. 616 fig. a2), which may apply to both species. However, the description (“*ruberrimus fasciis crebris exasperates*”) clearly indicates SSH-II, in its most typical morphotype, and *Jujubinus vulgaris* seems to be absent in Great Britain from where we have seen no record. *Jujubinus exasperatus* differs from *J. vulgaris* in its strongly tuberculate spiral cords and narrow interspaces vs weaker tubercles and broader interspaces in *J. vulgaris*; the colouration is also diagnostic, red-coraline or brownish background with whitish or yellowish vertical stripes in *J. exasperatus*, vs a cream or whitish background with all variation of vertical stripes and blotches (including reddish or brownish streaks) in *J. vulgaris*.

Jujubinus pseudogravinae Nordsieck, 1973
SSH III – Fig. 6J–L

Jujubinus pseudogravinae Nordsieck, 1973: 12, fig. 3.

Diagnosis

Shell of medium size for the genus, thick, 2–3 spaced spiral cords, elevated and granulated on the first whorls, broad interspaces with strong prosocline lamellae and obvious growth lines, less evident on the last whorls, peripheral cord evident, high height/width ratio.

Type material

Syntype

AZORES • 1 dd; S. Miguel, Ponta Delgada; SMF 341875.

Other material examined

AZORES • 18 dd; unprecised locality; MCZR-M-11761 • 13 dd; S. Miguel, Cais da Ribeirinha; 10 m depth; on stones; CS-PM • 3 dd; Santa Cruz de Flores; tidal pools; MO • 2 lv; São Miguel Is., Caloura; 37°42'24" N, 25°30'31" W; 7 m depth; used for DNA sequencing; BAU 771.1, 771.3.

MADEIRA • 34 dd; unprecised locality; labelled “*J. Madrensis* Monts, copia a Issel”; MCZR-M-30087 • 6 dd; unprecised locality; MCZR-M-30087.

MID ATLANTIC SEAMOUNTS • >200 dd; Gorrings Bank, Gettysburg; 36°31' N, 11°34' W; 71–88 m depth; MO.

Description (in parentheses data of the syntype)

SHELL. Shell of medium size for the genus, height 5.8–8.4 (5.0) mm, width 3.7–8.4 (3.9) mm, height/width ratio 1.31–1.62, conical, solid. Protoconch, of ca 1.2 whorls 0.28–0.29 mm in width, sculptured with sparse micropustules. Teleoconch of 5.5–6.5 (5.5) slightly and solid convex whorls. Sculpture of 2–3 (3) abapical spiral cords of different size and strength and irregularly arranged, the first granulose, and a major peripheral cord formed by 3–5 (3) merged cordlets of different sizes. Suture incised. Teleoconch surface covered by barely visible prosocline growth striae, irregularly set. Base convex, with 7–10 (7) regularly spaced, basal spiral cords flat and well separated umbilicus closed also in juveniles, covered with a white callus. Aperture quadrangular, with the columellar callus thickened in the middle portion. Interior of the aperture whitish, nacreous.

COLOURATION. Colour of protoconch and initial teleoconch whorls whitish; remaining whorls and base greyish or reddish, with alternating reddish and whitish spiral cords of different size, with the upper part of the brownish-reddish or whitish-reddish stripe dotted with white.

SOFT PARTS. Epipodial tentacles purplish-brown. Foot cream to reddish-brownish, mottled with white and reddish blotches mostly on the posterior half; sole creamy whitish. Cephalic tentacles dark-brown dorsally, whitish ventrally. Eye stalks whitish or creamy ventrally, dorsally reddish, eyes black. Snout light or dark brown with a creamy terminal band.

Distribution

Azores Islands (Nordsieck 1973; Curini-Galletti 1982b; Gofas 2005; Ávila *et al.* 2006, 2011; Mariottini *et al.* 2013; Borges *et al.* 2016; Uribe *et al.* 2017; Scaillet & Delongueville 2019) and Gorrings Bank (new record); the records from Madeira based on historical materials need confirmation. Empty shells from a few metres to a depth of 80 m, but living specimens from shallower depth (7 m, our material).

Remarks

Jujubinus pseudogravinae differs from *J. exasperatus* in its 2–3 spiral cords, of irregular shape and size, sculptured with coarse tubercles, occasionally visible on the first teleoconch whorl, versus spiral cords well separated by regular interspaces, sculptured with finer tubercles in *J. exasperatus*. *Jujubinus vulgaris* can be easily separated by its weaker and more regular sculpture, and by the colour, always with a cream or whitish background, very rarely present in *J. pseudogravinae*.

Jujubinus vexationis Curini-Galletti, 1990
SSH IV – Fig. 6M–O

Jujubinus vexationis Curini-Galletti, 1990: 43, pl. 2 figs 5–8.

Diagnosis

Shell of medium size for the genus, not very solid, 5–6 spaced spiral cords, elevated, broad interspaces with prosocline lamellae and fine growth lines, peripheral cord evident, high height/width ratio.

Type material

Holotype

MADEIRA • dd; Porto Moniz; 33° N, 17° W; DSAT (Pisa, Italy).

Paratypes

MADEIRA • 3 dd; same data as for holotype; DSAT (Pisa, Italy) (paratypes B–D) • 2 dd; same data as for holotype; labelled “*C. striatum* L. Madeira”; MCZR-M-TYPE-00018/P (paratypes A, E).

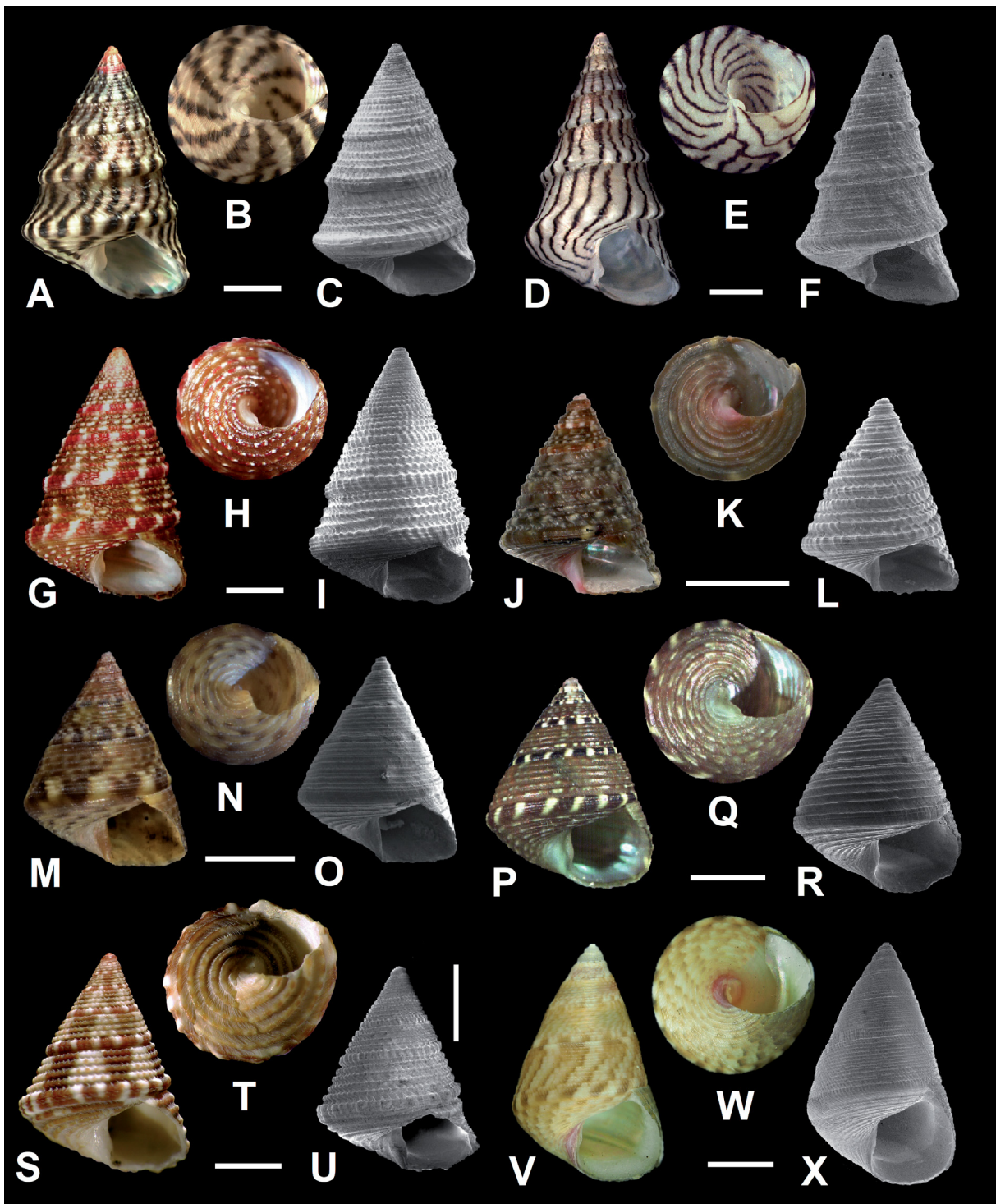
Other material examined

MADEIRA • 34 lv; unprecised locality; MCZR-M-11715 • 1 dd; Porto Moniz; 1912; Tomlin leg.; MCZR-M-11684 • 14 dd; Madeira; MCG collection • 1 dd; unprecised locality; 1912; Tomlin leg.; MCZR-M-11684.

Description (in parentheses data of the holotype)

SHELL. Shell of medium size for the genus, height 6.5–8.0 (6.9) mm, width 5.0–6.0 (6.0) mm, height/width ratio 1.15–1.33, conical, light. Protoconch seemingly smooth, of ca 1 whorl ca 0.20 mm in width. Teleoconch of 6–10 (7) slightly convex whorls. Sculpture of 5–6 (7) flat, spaced abapical spiral cords of about the same strength, and an evident peripheral cord formed by 2–3 (3) merged cordlets; peripheral cord visibly rippled on first two/tree whorls of teleoconch, flat on the others remaining. Suture incised. Teleoconch surface covered by barely visible prosocline growth striae, irregularly set. Base convex, with 5–6 (6) regularly spaced, basal spiral cords large and flat, umbilicus closed also in juveniles, covered with a white callus. Aperture quadrangular, with the columellar callus thickened in the middle portion. Interior of the aperture whitish, nacreous.

Fig. 6 (next page). **A–C.** *Jujubinus vulgaris* (Risso, 1826), height 10.6 mm, Giannutri Island (42°15'7.05" N, 11°05'31.51" E), Tuscany, Italy, on *Posidonia oceanica* (L.) Delile, 10 m depth. **D–F.** *J. unidentatus* (Philippi, 1844), height 9.7 mm. Alataya Island (34°45'37.53" N, 11°19'34.03" E), Kerkennah Islands, Tunisia, on *P. oceanica*, 3 m depth. **G–I.** *J. exasperatus* (Pennant, 1777), height 9.8 mm. Giannutri Island (42°15'07.05" N, 11°05'31.51" E), Tuscany, Italy, on *P. oceanica*, 20 m depth. **J–L.** *J. pseudogravinae* Nordsieck, 1973, CS-PM, height 4.5 mm, Cais da Ribeirinha, S. Miguel Island, Azores, on stones, 10 m depth. **M–O.** *J. vexationis* Curini-Galletti, 1990, MCZR-M-TYPE-00018/P,



paratype E, height 5.0 mm, Porto Moniz, Madeira Island. **P–R.** *J. swinneni* Mariottini, Oliverio & Smriglio sp. nov., MNHN-IM-2000-403009, holotype, height 6.5 mm, Arinaga (27°51'21.24" N, 15°23'46.61" W), Gran Canaria, Canary Islands, low tide, on rocky plateau with small stones (legit Frank Swinnen and Martin Coysman, 2016). **S–T.** *J. baudoni* (Monterosato, 1891), MCZR-00218/L, lectotype, height 6.5 mm, Paulilles, France. **U.** *J. baudoni*, MCZR-00218/P, paralectotype, height 4.7 mm, Paulilles, France. **V–X.** *J. elenchoides* Monterosato, 1884, CS-PM, height 7.4 mm, Daçta (Turkey), on *P. oceanica*, 15 m depth. Scale bars = 2 mm.

COLOURATION. Colour of protoconch and initial teleoconch whorls greyish-whitish; remaining whorls and base cream with alternating dull pinkish-brownish-reddish longitudinal and opisthocline flammules of different size and irregularly arranged.

SOFT PARTS. Not observed.

Distribution

Madeira (Curini-Galletti 1990; Cretella 1992), empty shells in shallow waters or beached.

Remarks

Monochrome specimens are known (Curini-Galletti 1990). *Jujubinus vexationis* can be distinguished from *J. vulgaris*, *J. exasperatus* and *J. pseudogravinae* by its spiral cords without tubercles and the interspaces furrowed by dense prosocline lines; additionally, *J. vexationis* has the sutural cord tuberculate in the first 2–3 teleoconch whorls, a feature never present in the three other species. See under *J. gravinae*, *J. errinae* Smriglio, Mariottini & Giacobbe, 2016 and *J. superum* sp. nov. for comparative remarks.

Jujubinus swinneni Mariottini, Oliverio & Smriglio sp. nov.
urn:lsid:zoobank.org:act:12A01241-73C7-4798-B44D-4BF13D21A1C5
SSH V – Fig. 6P–R

Jujubinus gravinae sensu Rolán & Swinnen 2009: figs 33–39, and sensu Hernández *et al.* 2011: 428, figs 14a–e (not Dautzenberg, 1881)

Diagnosis

Shell of medium size for the genus, solid, 5–6 spaced spiral cords, elevated, granulose, wide interspaces like the cords, with strong prosocline lamellae, peripheral cord very evident, high height/width ratio.

Etymology

The species is named after our friend Frank Swinnen, for his help in finding specimens of *Jujubinus*.

Type material

Holotype

CANARY ISLANDS • 1v (height 6.5 mm, width 4.8 mm); Gran Canaria, Arinaga; 27°51'21.24" N, 15°23'46.61" W; 25 Jan. 2016; low tide, amidst weeds, on rocky plateau with small stones; F. Swinnen and Martin Coysman leg.; used for DNA sequencing; MNHN-IM-2000-40309 (ex BAU2944.1).

Paratypes

CANARY ISLANDS • 1 dd; same data as for holotype; MNHN-IM-2000-403010 (paratype 1) • 1 dd; same data as for holotype; MCZR-00094/P (paratype 2) • 16 lv; same data as for holotype; used for DNA sequencing; BAU2944.2 to BAU2944.5, BAU2945.1 to BAU2945.5, BAU2946.1, BAU2947.1 to BAU2947.4, BAU2948.1, BAU2948.2 (paratypes 3–18) • 8 lv; same data as for holotype; CS-PM (paratypes 19–26) • 4 lv; same data as for holotype; FS (paratypes 27–30).

Other material examined

CANARY ISLANDS • 8 dd; Tenerife, Punta de Teno; on stones at low tide; CS-PM • 30 dd; Gran Canaria, Meloneras; low tide; CS-PM • 5 dd; unprecised locality; “Canarie! D. Tomlin 1919”; MCZR-M-11761.

MADEIRA • 20 dd; unprecised locality; “Madera”, ex Watson collection, labelled as “*Mirulinus watsoni*”; MCZR-M-11715 • 5 dd.; unprecised locality; ex Watson collection; MCZR-M-11715 • 3 dd; unprecised locality; “Madera”, ex Nobre collection; MCZR-M-11715.

Description (in parentheses data of the holotype)

SHELL. Shell of medium size for the genus, height 5.2–6.7 (6.5) mm, width 4.1–4.8 (4.8) mm, height/width ratio 1.20–1.35, conical, shiny in type material. Protoconch of ca 1 whorl 0.23–0.24 (0.24) mm in width, sculptured by one spiral thread. Teleoconch of 5.5–6.0 (5.5) slightly convex whorls. Sculpture of 4–6 (6) spaced abapical spiral cords, smooth or slightly grainy, of about the same strength, and a very evident peripheral cord, slightly shouldered, formed by 4–6 (4) merged cordlets. Fine prosocline growth striae and lamellae, particularly in the interspaces. Suture incised. Base convex and rounded, with 6–7 (7) regularly spaced, flat basal spiral cords; umbilicus closed also in juveniles, covered with a white callus. Aperture quadrangular, with the columellar callus thickened in the lower portion. Interior of the aperture whitish, greyish-greenish, nacreous.

COLOURATION. Colour of protoconch and initial teleoconch whorls whitish, remaining whorls and base bright greenish cream or greenish whitish; spiral cords with alternating spots, whitish or reddish or blackish sutural and peripheral cord articulated in black and white.

SOFT PARTS. Observed in alcohol preserved specimens, no dark terminal strip observed on the creamy band of the snout.

Distribution

Canary Islands, all living specimens collected in the intertidal. The historical records from Madeira in the Monterosato collection need confirmation.

Remarks

Jujubinus swinnyi sp. nov. has been reported by Segers *et al.* (2009: 69, pl. 6 fig. 5) under the name *Jujubinus vexationis*, a distinct species probably endemic to Madeira. In the Monterosato collection are kept three vials, containing a total of 28 shells, of *J. vexationis* (probably all from Madeira) labelled “*J. watsoni*”, “*Mirulinus watsoni*”, and “*Trochus striatus*”, respectively. It has also been confused with *J. gravinae* (e.g., Rolán & Swinnen 2009: figs 33–39; Hernández *et al.* 2011: 428, fig. 14a–e). Poppe & Goto (1991) reported but did not figure *J. gravinae* from the Canary Islands (where it is actually absent) probably referring to *J. swinnyi*. The confusion may have been caused by the colouration of *J. swinnyi* that somehow mimics the sutural and peripheral sculpture of *J. gravinae* (see below). *Jujubinus swinnyi* differs from *J. vexationis* in its less slender shell with a wider base and for the sculpture of regularly spaced cords similar in size, versus the more numerous and irregularly spaced ones of *J. vexationis*; additionally, the characteristic pattern with dull colours of the latter allows an easy separation. *Jujubinus errinae* (endemic to the Messina Strait) also presents a tuberculate sutural cord in the first teleoconch whorls, but with different colouration (spiral cords streaked with red) and marked sculpture (with strong prosocline lamellae in the interspaces) (Smriglio *et al.* 2016; Giacobbe & Renda 2019). See under *J. gravinae* for comparative remarks.

Jujubinus baudoni (Monterosato, 1891)

SSH VI – Fig. 6S–U

Trochus baudoni Monterosato, 1891: 101 (no figure).

Jujubinus baudoni incomparabilis Ghisotti & Melone, 1975: 11–12, unnumbered figure.

Diagnosis

Shell of medium size for the genus, thick, elevated, moderately slender, with 4 spaced spiral cords, elevated and granulose, broad interspaces with strong prosocline lamellae, conspicuous and evident peripheral cord, high height/width ratio.

Type material

Lectotype

FRANCE • dd; Paulilles; MCZR00218/L.

Paralectotypes

CORSICA • 20 dd; Pietranera; “*J. baudoni* var. *incomparabilis*”; MCZR00219/176 to MCZR00219/195.

FRANCE • 133 dd; same data as for holotype; MCZR00219/2 to MCZR00219/133 • 30 dd; Roussillon; MCZR00219/134 to MCZR00219/163 • 12 dd; Département de l’Aude, Pyrénées Orientales; MCZR00219/164 to MCZR00219/175.

Other material examined

CORSICA • 6 lv; Calcataggio, Tour d’Ancone; 42°02’36” N, 08°43’15” E; 15 m depth; 28 Aug. 2012; used for DNA sequencing; BAU 3762, 3763 3765 to 3768 • 2 lv; Tour D’Omigna; 42°08’42.3” N, 8°33’23.2” E; 15 m depth; 27 Aug. 2012; used for DNA sequencing; BAU 3769, 3770. • 4 lv; S of Lavezzi Is., CORSICABENTHOS stn CS49; 41°19’ N, 9°15.8’ E; 30–33 m depth; 19 Oct. 2020; used for DNA sequencing; MNHN-IM-2000-13569 to 13571, 13584 • 3 lv; Large Punta Rossa, CORSICABENTHOS stn CB44; 42°25.5’ N, 8°36.2’ E; 23–32 m depth; 26 May 2021; used for DNA sequencing; MNHN-IM-2000-17991, 17994, 17997 • 1 lv; CORSICABENTHOS stn CS83; 42°21.2’ N, 8°32.1’ E; 52 m depth; 21 May 2021; used for DNA sequencing; MNHN-IM-2000-17889 • 1 lv; Capu Rossu, CORSICABENTHOS stn CB87; 42°25.5’ N, 8°36.2’ E; 23–32 m depth; 26 May. 2021; used for DNA sequencing; MNHN-IM-2000-17626 • 3 lv; Danger du Toro; 41°30.5’ N, 9°23.6’ E; 13–20 m depth; used for DNA sequencing; MNHN-IM-2019-12262 to 12264 • 3 lv; L’Arche; 41°31.7’ N, 9°24.1’ E; 32 m depth; used for DNA sequencing; MNHN-IM-2019-12787, 12789, 12819 • 1 lv; Tête de Cheval; 41°20.3’ N, 9°14.5’ E; 20–30 m depth; used for DNA sequencing; MNHN-IM-2019-13462 • 1 lv; Capu Rossu, 42°14.2’ N, 8°31.9’ E; 56 m depth; used for DNA sequencing; MNHN-IM-2019-18109 • 2 lv; South of Garganellu Is.; 42°21.9’ N, 8°32.3’ E; 3–51 m depth; used for DNA sequencing; MNHN-IM-2019-18141, 18165 • 1 lv; Punta Vecchia-Cala Genovese; 42°59.8’ N, 9°27.2’ E; 11 m depth; used for DNA sequencing; MNHN-IM-2019-4683 • 1 lv; Sec de Nonza; 42°47.2’ N, 9°19.8’ E; 37 m depth; used for DNA sequencing; MNHN-IM-2019-5663 • 1 lv; Punta di Canelle; 42°49.8’ N, 9°18.4’ E; 15 m depth; used for DNA sequencing; MNHN-IM-2019-5863 • 2 lv; Centuri depths; 42°59.3’ N, 9°17.8’ E; 21 m depth; used for DNA sequencing; MNHN-IM-2019-5899, 5902.

SARDINIA • 3 dd; Capo Caccia; 25 m depth; CS-PM • 59 dd; Caprera I.; 25 m depth; CS-PM • 91 dd; La Maddalena I.; 25 m depth; CS-PM • 62 dd; Spargi I.; 20 m depth; CS-PM.

SPAIN • 1 dd; Cadaqués; 4 m depth; CS-PM.

Description

SHELL. Shell of medium size for the genus, height 6.5–7.5 mm, width 4.8–5.8 mm, height/width ratio 1.28–1.35, conical, very robust. Protoconch seemingly smooth, of ca 1 whorl, 0.28–0.29 mm in width. Teleoconch of 5.5–6.5 slightly convex whorls. Sculpture of 4–5 strong very granulose, regularly spaced spiral cords of the same strength, and an evident broad peripheral cord, formed by 2 merged granulose cordlets; suture well-marked. Interspaces with strong, regular, prosocline lamellae. Base convex, with

6–8 concentric reddish and white, regularly spaced spiral cords, umbilicus closed also in juveniles, covered with a white callus. Aperture quadrangular, with the columellar callus thickened in the middle portion. Interior of the aperture whitish, pinkish or greenish, nacreous.

COLOURATION. Colour of protoconch and initial teleoconch whorls glossy red or pinkish; remaining whorls and base with alternating whitish and reddish spirals and irregular blotches.

SOFT PARTS. Observed in alcohol preserved specimens, a dark terminal strip absent on the creamy band of the snout.

Distribution

Jujubinus baudoni is limited to the northern and western Mediterranean Sea, from southern Spain to Corsica and Sardinia (Scaperrotta *et al.* 2011; Spanu 2011; Mariottini *et al.* 2013), with living specimens collected at depths of 15–50 m. As already reported by Mariottini *et al.* (2013), the specimens in the Monterosato collection (MCZR11761) from Azores labelled as “*Calliostoma baudoni*” actually are *J. pseudogravinae*.

Remarks

Little known species with an unmistakable sculpture. Three major colour patterns were so far known: one with prosocline reddish-brown and milky-white flammulae; the second, with emerald-green background, bright orange and/or red flammulae, milky-white prosocline stripes, and white spots on the basal cord (the variety *incomparabilis*); and the third, monochrome brownish-green or with prosocline faint whitish flammules (Mariottini *et al.* 2013). Additionally, we report here peculiar specimens from Caprera Island, with protoconch and initial teleoconch whorls glossy red, greenish base, and small whitish flammulae on the spiral cords.

Jujubinus elenchoides (Issel, 1878) SSH VII – Fig. 6V–X

Trochus striatus var. *elenchoides* Issel, 1878: 436, fig. 6.

Jujubinus aegeensis Nordsieck, 1973: 6–7, 10–12, fig. 13.

Jujubinus elenchoides orientalis Nordsieck, 1973: 6–7, 10–12.

Diagnosis

Shell of large size for the genus, solid, several closely set spiral cords, not elevated, barely granulose, narrow interspaces with closely set and numerous prosocline lamellae and growth lines, peripheral cord not evident, high height/width ratio.

Type material

Lectotypes of *Trochus striatus* var. *elenchoides* Issel, 1878

TURKEY • 2 dd; Cape Barbieri; 20 m depth; “Barbieri (m. 20)” “Isola Barbieri / 20 m / (Issel)!”; MCZR-M-11698-L (designated by Curini-Galletti 1982a).

Paralectotype of *Trochus striatus* var. *elenchoides* Issel, 1878

TURKEY • 1 dd; same data as for lectotype; MCZR-M-11698-P.

Syntype of *Jujubinus aegeensis* Nordsieck, 1973

GREECE • 1 dd; Karpathos Is. (type locality); SMF 341823.

Syntype of *Jujubinus elenchoides orientalis* Nordsieck, 1973

GREECE • 1 dd; Karpathos Is. (type locality); SMF 341821.

Other material examined

CYPRUS • 1 lv; Cape Greco; 34.9860° N, 34.0786° E; 30 m depth; 7 May 2022; on *Posidonia oceanica*; used for DNA sequencing, CYP 082; SZN-MOL0054.

GREECE • 4 lv; Astypalea Is., Analipsi; 36.575946° N, 26.393070° E; 0–1 m depth; 28–30 Jun. 2017; on *Posidonia oceanica*; used for DNA sequencing; BAU 3040.1 to 3040.4 • 2 lv; same data as for preceding; used for DNA sequencing; BAU 3041.1, 3041.2 • 4 lv; same data as for preceding; used for DNA sequencing; BAU 3044.1 to 3044.4 • 1 lv; same data as for preceding; used for DNA sequencing; BAU 3044.6 • 3 dd; Kythnos Is.; 6 m depth; CS-PM • 12 dd; Astypalea Is., Analipsi; 5 m depth; on *Posidonia oceanica*; LT.

MALTA • 1 dd; labelled “coste/Malta”; MCZR-M-11703.

TUNISIA • 2 dd; Gulf of Gabès; labelled “Gabes Pallary”; MCZR-M-11712.

TURKEY • 10 dd; Bozcaada Island; 8 m depth; CS-PM • 9 dd; Datça; 36°42′16.6″ N, 27°40′52.3″ E; 15 m depth; on *Posidonia oceanica*; LT • 2 dd; Datça harbour; 36°43′20.9″ N, 27°41′22.1″ E; 8 m depth; LT.

UNPRECISED LOCALITIES • 15 dd and fragments; Mediterranean coasts of Northern Africa; labelled “C. d’Afr.” (Appolloni *et al.* 2018); MCZR-M-11682 • 10 dd; Mediterranean coasts of Northern Africa; labelled “*J. (Zizyphinus) sartorii*, Aradas. C. di Barberia!” plus “*J. sartorii*, Ar. Coste d’Africa”; MCZR-M-11758 • 4 dd; Adriatic? [probably wrong]; “*Trochus striatus* Gm. Adr. Stoss.”; MCZR-M-11778 • 8 dd; Northern Africa; labelled “*J. sericeus* nelle spugne”; MCZR-M-11683.

Description (in parentheses data of the lectotype)

SHELL. Shell of large size for the genus, height 7.4–13.0 (11.7) mm, width 5.3–7.5 (7.3) mm, height/width ratio 1.43–1.60, conical, shiny but opaque in type material. Protoconch, of ca 1.1 whorls, 0.23–0.24 mm in width, sculptured by sparse micropustules. Teleoconch of 6.5–7.5 (7.5) slightly convex whorls. Sculpture of 12–16 (14) closely set abapical spiral cords of about the same strength, and a not evident peripheral cord, slightly shouldered, formed by 2–3 (2) merged cordlets. Suture incised. Teleoconch surface covered by barely visible prosocline growth striae and lamellae, irregularly set. Base convex and rounded, with 11–13 (12) regularly spaced, basal spiral flat cords, arranged in pairs; umbilicus closed also in juveniles, covered with a white callus. Aperture quadrangular, with the columellar callus thickened in the middle portion. Interior of the aperture whitish, nacreous.

COLOURATION. Colour of protoconch and initial teleoconch whorls bright whitish greyish; remaining whorls and base dark background colour, black, brownish, reddish, with alternating sagittal bands, whitish or reddish or pinkish, which are highlighted depending on the background colour.

SOFT PARTS. Epipodial tentacles whitish, densely covered by red speckles. Foot background whitish mottled with dark spots, sole white. Cephalic tentacles whitish densely covered by dark speckles, with a dorsal dark stripe. Eye stalks brownish dorsally, whitish ventrally; eyes black surrounded by a brown blotch, encircled by white. Snout light or dark brown with a creamy terminal band.

Distribution

Eastern Mediterranean Sea, from the Aegean Sea (Manousis 2012) to eastern Turkey (this work), and Cyprus (Tornaritis 1987, as “*Jujubinus striatus* Linne”), living specimens in very shallow waters (0–1 m)

occasionally down to a depth of 30 m. Also reported in the northern African coasts, from Morocco to Libya, (Ghisotti & Melone 1975) and Malta (MCZR-M-11703 collection): while we are able to confirm its presence in the eastern Mediterranean Sea, the records from Malta and North Africa are almost all based on labels of historical collections and need further checking.

Remarks

Described by Issel (1878) as *Trochus striatus* var. *elenchoides*, it may be argued whether it is to be considered as infrasubspecific or subspecific (ICZN 1999: art. 45.6.4); in any case, it was elevated to specific rank at first by Monterosato (1884: 47), which would make it available from its original introduction by Issel (ICZN 1999: art. 45.6.4.1). Issel (1878: 436) reported the locality “Barbieri (m. 20)” which is actually not an island (as suggested by Monterosato’s label, see also Curini-Galletti 1982a: 219) but rather the small promontory (Capo Barbieri) in correspondence with the ancient locality of Rhoiteion (Troades, northern Anatolia). *Jujubinus elenchoides* differs from *J. ruscurianus* in its narrower interspaces and more numerous spiral cords (4–5 in *ruscurianus* vs 12–15 finer in *elenchoides*), and from *J. vulgaris*, *J. exasperatus* and *J. pseudogravinae* in its smooth, non-tuberculated and more numerous spiral cords. It also differs from *J. swinnyi* sp. nov., *J. vexationis*, and *J. errinae* in its colouration and the larger size and, from the latter two species, for the lack of tubercles on the peripheral cord in the first teleoconch whorls. See under *J. striatus*, *J. depictus*, *J. fraterculus*, *J. superum* sp. nov., *J. inopinatus* sp. nov., *J. kyrnos* sp. nov., *J. sartorii*, *J. smaragdinus*, *J. angustibasis* sp. nov., *J. gofasi* sp. nov., for comparative remarks.

Jujubinus superum Mariottini, Oliverio & Smriglio sp. nov.

urn:lsid:zoobank.org:act:DCC8446D-EA9D-4374-9C3F-EB8CE3FE802C

SSH VIII – Fig. 7A–C

Diagnosis

Shell of medium size for the genus, solid, several closely set spiral cords, not elevated, narrow interspaces with closely set and numerous prosocline lamellae and growth lines, peripheral cord not evident, high height/width ratio.

Etymology

After the ancient Latin name of the Adriatic Sea (*Mare Superum*), used as a noun in apposition.

Type material

Holotype

SLOVENIJA • 1v; Izola; 45°32'51.4" N, 13°42'12.9" E; 4 m depth; on *Posidonia* meadow; used for DNA sequencing; MNHN-IM-2000-40311 (ex BAU2077.1).

Paratypes

SLOVENIJA • 2 1v; Izola; 45°32'51.4" N, 13°42'12.9" E; 4 m depth; on *Posidonia* meadow; used for DNA sequencing; BAU2077.2, BAU2077.3 (paratypes 1–2) • 2 1v; same data as for preceding; RM3-Jis1, RM3-Jis2 (paratypes 3–4) • 7 1v; same data as for preceding; CS-PM (paratypes 5–11).

Description (in parentheses data of the holotype)

SHELL. Shell conical, of medium size for the genus, height 6.0–6.5 (6.0) mm, width 4.7–4.9 (4.7) mm, height/width ratio 1.27–1.34, conical, solid, shiny. Protoconch seemingly smooth, of ca 1 whorl, 0.27–0.28 (0.28) mm in width. Teleoconch of 5.5–6.5 (5.5) slightly convex whorls. Sculpture of 5–6 (5) closely set abapical spiral cords of approximately the same strength, regularly spaced, and a not evident peripheral cord, slightly shouldered, formed by 2 (2) merged cordlets. Suture not very evident.

Teleoconch surface covered by barely visible prosocline growth striae irregularly set and arranged and regularly lamellae in the interspaces. Base convex and rounded, with 7–8 (7) regularly spaced, basal spiral flat cords regularly arranged and with wide interspaces; umbilicus closed also in juveniles, covered with a white callus. Aperture quadrangular, with the columellar callus thickened in the middle portion. Interior of the aperture whitish-greyish, nacreous.

COLOURATION. Colour of protoconch and initial teleoconch whorls bright whitish-greyish; remaining whorls and base dark greyish-blackish background colour, with alternating black and white sagittal stripes of irregular size.

SOFT PARTS. Epipodial tentacles whitish translucent with sparse scattered very tiny white speckles. Foot background creamy or brownish with darker brown blotches and covered by sparse white speckles; sole white. Cephalic tentacles translucent with a dorsal white stripe and irregularly scattered white speckles. Eye stalks whitish or creamy dorsally, brown ventrally; eyes black. Snout light or dark brown with a creamy terminal band.

Distribution

Currently known only for the Istrian peninsula (Slovenija) in shallow waters (4 m deep) on *Posidonia oceanica* (L.) Delile meadows.

Remarks

Jujubinus superum sp. nov. differs from *J. vulgaris*, *J. exasperatus* and *J. pseudogravinae* in its non-tuberculated spiral cords. It differs from *J. swinnyi* sp. nov. in its more slender outline and the different colouration, always with a dark greyish-blackish background. From *J. vexationis*, and *J. errinae* it differs in its larger size, in the lack of tubercles on the peripheral cord in the first teleoconch whorls, and in the colouration (dark greyish-blackish background with sagittal stripes in *J. superum*, cream background with alternating pinkish-brownish-reddish longitudinal and opisthocline flammules in *J. vexationis* and reddish-creamy, with spiral cords and basal cord red interrupted by short white spots in *J. errinae*). From *J. elenchoides* it differs in having fewer but stronger spiral cords (5–6 in *J. superum* vs 12–15 weaker cords in *J. elenchoides*). See under *J. striatus*, *J. depictus*, *J. fraterculus*, *J. daniensis* sp. nov., *J. inopinatus* sp. nov., *J. kyrnos* sp. nov., *J. sartorii*, *J. smaragdinus*, *J. angustibasis* sp. nov., *J. gofasi* sp. nov., for comparative remarks.

Jujubinus gravinae (Dautzenberg, 1881) SSH IX – Fig. 7D–F

Trochus gravinae Dautzenberg, 1881: 119, note 1 (no figure).

Jujubinus laeviusculus Monterosato, 1890 (no figure).

Jujubinus parvosiculus Ghisotti & Melone, 1975: 206, unnumbered figure.

Diagnosis

Shell of medium size for the genus, solid, 4–5 spaced spiral cords, elevated, broad interspaces with numerous prosocline growth lines, peripheral cord evident and rippled, high height/width ratio.

Type material

Syntypes

FRANCE • 4 dd; Cannes, Cap Croisette (type locality); ex Dautzenberg collection; MCZR-M-11689/S • other syntypes; Cannes, Cap Croisette; Dautzenberg collection; RBINS I.G. 10591.

Other material examined

CORSICA • 4 dd; Bastia; Caziot leg., 1896; MCZR-M-11689 • 5 dd; Corsica; Del Prete leg.; MCZR-M-11689 • 19 dd; L'Île Rousse, "Les Olivieres"; 42°38'01.4" N, 8°57'03.3" E; camping shore, beached; LT • 1 lv; Calcataggio, Tour d'Ancone; 42°02'36" N, 8°43'15" E; 15 m depth; 28 Aug. 2012; used for DNA sequencing; BAU 3764 • 3 lv; Lavezzi Is., 41°20' N, 9°15.6' E; 0–2 m depth; used for DNA sequencing; MNHN-IM-2019-13574, 13598, 13600 • 2 lv; Punta Di Capineru; 41°27.4' N, 9°02.4' E; 0–1 m depth; used for DNA sequencing; MNHN-IM-2019-13679, 13690 • 3 lv; Cargèse Port; 42°07.9' N, 8°35.8' E; 7 m depth; used for DNA sequencing; MNHN-IM-2019-16793, 16822, 16852.

CROATIA • 9 dd; Brač; CS-PM.

FRANCE • 4 dd; La Ciotat; MCZR-M-11689 • 4 dd; Cannes; MCZR-M-11689 • 1 dd; Roussillon; MCZR-M-117747.

ITALY • 5 dd; Livorno, Ardenza; MCZR-M-11684 • 1 dd; Elba I., Porto Azzurro, Naregno; bioclastic sediment; LT • 15 lv; Giannutri I.; *Cystoseira*; CS-PM • 62 dd; Giannutri I.; 15 m depth; bioclastic sediment; CS-PM • 3 lv; Giannutri I.; 42°15'7.05" N, 11°05'31.51" E; used for DNA sequencing; RM3-174-Jgra1, RM3-175-Jgra2, RM3-176-Jgra3 • 130 lv; Giannutri I.; 11–25 m depth; on algae; CS-PM • 1 dd; Argentario; 30 m depth; MO • 5 dd; Civitavecchia, Sant'Agostino; beached; CS-PM • 5 lv; Civitavecchia, Sant'Agostino; on *Posidonia*; CS-PM • 3 dd; Civitavecchia; beached; CS-PM • 3 dd; Palo Laziale; MO • 22 lv; Ventotene I., Cala Rossano; 40°48'00.1" N, 13°25'53.8" E; 1.5–3 m depth; on brown algae; LT • 3 dd; Taranto; Abate Gravina legit; MCZR-M-11689.

SARDINIA • 5 dd; La Maddalena I.; MO • 1 dd; Asinara I.; 25 m depth; MO • 13 dd; Stintino, Roccaruja; beached; CS-PM • 6 dd; Alghero; MCZR-M-11689 • 3 dd; Capocaccia; beached; CS-PM • 32 dd; Gulf of Arzachena; CS-PM • 2 lv; Baccu Mandara; 39°09'27.8" N, 9°23'06.8" E; 1–3 m depth; amidst algae, used for DNA sequencing; BAU 2078.1, BAU 2078.3 • 9 dd; Bosa Marina; beached; CS-PM • 4 dd; Siniscola, Santa Lucia; 7 m depth; on brown algae; LT • 14 dd; La Maddalena I.; 25 m depth; bioclastic sediment; CS-PM • 6 dd; Gulg of Arzachena; beached; CS-PM.

SICILY • 3 lv; Ognina, Catania, north of the port; 37°31'55.4" N, 15°07'14.3" E; 0.5–3 m depth; on brown algae; LT • 7 lv; Catania, Stazzo; 37°39'24.0" N, 15°11'59.0" E; 0.5–4 m depth; on brown algae; LT • 10 lv; Capo San Vito, Macari; 38°08'22.8" N, 12°44'14.2" E; 1–4 m depth; on brown algae; LT • 6 lv; Favignana I.; 4 m depth; on brown algae; LT • 25 dd plus, 4 dd; Palermo; MCZR-M-11689 • 8 dd; Messina; Sullioti leg.; MCZR-M-11689 • 6 dd; Acitrezza; MO • 24 dd; Ognina; MCZR-M-11684 • 4 dd; Sciacca; MCZR-M-11689 • 90 dd; Favignana I.; CS-PM • 5 dd; Lampedusa Cala Maluc; 8 m depth; CS-PM • 22 dd; Pantelleria; MCZR-M-11689.

SPAIN • 1 dd; Valencia; MCZR-M-11689.

Description

SHELL. Shell of medium size for the genus, height 5.1–6.5 (6.3) mm, width 4.6–5.2 mm, height/width ratio 1.12–1.31, conical, not very bright. Protoconch, of ca 1 whorl, 0.24–0.25 mm in width, sculptured by one spiral thread. Teleoconch of 4.5–6.0 slightly convex whorls. Sculpture of 4–5 flat, closely set abapical spiral cords of about the same strength, a rippled peripheral cord formed by 4–5 merged cordlets, and 6–7 regularly spaced, basal flat spiral cords. Suture incised. Teleoconch surface covered by barely visible prosocline growth striae, irregularly set. Base convex, umbilicus closed also in juveniles, covered with a white callus. Aperture quadrangular, with the columellar callus thickened in the middle portion. Interior of the aperture whitish or pinkish nacreous.

COLOURATION. Colour of protoconch and initial teleoconch whorls whitish-pinkish; remaining whorls and base with cream or whitish background, with brownish-reddish flammules of different size, peripheral cord white dotted.

SOFT PARTS. Epipodial tentacles translucent, covered by scattered very tiny white speckles. Foot background creamy or reddish mottled with brownish or reddish and white blotches; sole whitish or creamy. Cephalic tentacles translucent, with a dorsal white stripe. Eye stalks brownish dorsally, whitish ventrally; eyes black encircled by white. Snout brownish to reddish with a creamy terminal band.

Distribution

Mediterranean Sea, from the Adriatic to the Alboran Sea, in 0.5–25 m depth; not reported for the eastern basin by Ghisotti & Melone (1975), but recently and erroneously reported for the Aegean Sea by Manousis (2012: 92, first unnumbered figure) who figured a juvenile specimen of the *J. striatus* complex. Atlantic, from the Portuguese coasts to Dakar, Senegal (Cretella 1992); the record under this name from the Canary Islands (Rolán & Swinnen 2009: figs 33–39; Hernández *et al.* 2011: 428, fig. 14a–e), actually represents *Jujubinus swinneyi* sp. nov. (see under this species).

Remarks

Jujubinus gravinae has a very peculiar sculpture with the peripheral cord regularly and markedly crenulated which makes it easily diagnosed – for instance – from *J. vexationis* and *J. errinae* that exhibit this crenulation only on the first 2–3 teleoconch whorls. *Jujubinus swinneyi* sp. nov., similar in the general aspect, can be easily diagnosed by the complete lack of tubercles on the peripheral cord and for the different colouration, bright greenish cream or greenish whitish, with alternating whitish or reddish or blackish spots on the peripheral cord vs cream or whitish background, with brownish-reddish flammules of *J. gravinae*. *Jujubinus ruscurianus*, *J. elenchoides* and *J. superum* sp. nov. lack any sutural and peripheral crenulation on all teleoconch whorls. *Jujubinus gravinae* differs from *J. vulgaris*, *J. exasperatus* and *J. pseudogravinae* in its non-tuberculated spiral cords.

See under *J. striatus*, *J. depictus*, *J. fraterculus*, *J. daniensis* sp. nov., *J. inopinatus* sp. nov., *J. kyrnos* sp. nov., *J. sartorii*, *J. smaragdinus*, *J. angustibasis* sp. nov., *J. gofasi* sp. nov., *J. tingitanus*, for comparative remarks.

Jujubinus kyrnos Mariottini, Oliverio & Smriglio sp. nov.
urn:lsid:zoobank.org:act:819B7669-092B-458A-A0EC-348F18395D6A
SSH X – Fig. 7G–I

Diagnosis

Shell of medium size for the genus, solid, 5–7 spaced and dimensionally regular spiral cords, elevated, broad interspaces with strong prosocline lamellae and fine growth lines, peripheral cord evident, high height/width ratio.

Etymology

The species is named from one of the names of Corsica in ancient Greek, ‘Κύρνος’ (= ‘Kyrnos’), used as a noun in apposition.

Type material

Holotype

CORSICA • lv (7.1 (H) × 5.0 (W) mm); Capo Rosso, Torra di Turhju (type locality), CORSICABENTHOS stn CB32; 42°14.4' N, 8°33.1' E; 14 m depth; used for DNA sequencing; MNHN-IM-2019-17191.

Paratypes

CORSICA • 1 lv (6.5 (H) × 4.9 (W) mm); Punta Muchillina, CORSICABENTHOS stn CB40; 42°20.1' N, 8°33.3' E; 10 m depth; used for DNA sequencing; MNHN-IM-2019-18126 • 1 lv (9.8 (H) × 6.0 (W) mm); Le Sphinx, CORSICABENTHOS stn CF02; 42°43.3' N, 9°14.9' E; 17 m depth; used for DNA sequencing; MNHN-IM-2019-5397 • 1 lv; North of Gargalo Is., CORSICABENTHOS stn CB31; 42°22.3' N, 8°32.4' E; 26 m depth; used for DNA sequencing; MNHN-IM-2019-17184 • 1 lv; same data as for preceding; used for DNA sequencing; MNHN-IM-2019-17269 • 1 lv; same data as for preceding; used for DNA sequencing; MNHN-IM-2019-17281 • 1 lv; Punta di Ficaghjola, CORSICABENTHOS stn CB33; 42°15.3' N, 8°37.3' E; 21 m depth; used for DNA sequencing; MNHN-IM-2019-17324.

Other material examined

SPAIN • 1 lv; Almería, Cabo de Gata, Playazo de Rodalquilar; 36°51'28" N, 2°00'06" W; 10 m depth; subadult, used for DNA sequencing; BAU 2858.2 • 1 lv; Murcia, Cabo de Palos; 37°38'08.0" N, 0°41'30.4" W; subadult, used for DNA sequencing; MNHN-IM-2013-32869.

Description (in parentheses data of the holotype)

SHELL. Shell of medium size for the genus, height 3.7–7.2 (7.1) mm, width 3.2–5.0 (5.0) mm, height/width ratio 1.16–1.44, conical, cyrtocoid outline, quite robust, not very bright. Protoconch seemingly smooth, of ca 1 whorl, 0.28–0.29 (0.29) mm in width. Teleoconch of 7–7.5 flat whorls. Sculpture of 5–7 flat, spiral cords regularly spaced of about the same strength, with wide interspaces sculptured with strong prosocline lamella, the 2 peripheral ones (bigger) forming the evident peripheral cord, 6–7 closely spaced flat basal cords. Suture incised. Teleoconch surface covered by barely visible prosocline growth striae rather regularly set. Base convex, umbilicus closed also in juveniles, covered with a white callus. Aperture quadrangular, columellar callus thinner in the basal portion. Aperture whitish or pearly-greyish-greenish nacreous.

COLOURATION. Colour of protoconch and first teleoconch whorls whitish-greyish or reddish white, remaining whorls reddish or blackish grey, with irregularly sparse whitish flammules of various sizes; peripheral cord reddish or grayish and slightly dotted with white in the first whorls (more evidently in sub-adult specimens).

SOFT PARTS. Epipodial tentacles whitish, densely covered by tiny purplish speckles interconnected to create an irregular network. Foot background reddish or creamy, densely mottled with brown or reddish-brown irregularly shaped blotches; sole white. Cephalic tentacles whitish, with a dorsal purplish stripe and covered by small purplish speckles. Eye stalks reddish or brownish; eyes black. Snout dark brown, creamy terminal band with a thin dark terminal strip.

Distribution

Corsica, at depths of 10–26 m. Additional material, here conservatively considered as conspecific, from Cabo de Gata and Cabo de Palos, in southern Spain.

Remarks

This species is diagnosed by the rather heavy shell with wide and regular but shallow spiral interspaces, and by the not very thick columella with the callous columellar tooth not prominent. It differs from *J. vulgaris*, *J. exasperatus* and *J. pseudogravinae* by the non-tuberculated spiral cords; from *J. gravinae*, *J. vexationis* and *J. errinae* by the absence of the typical tubercles on the peripheral cord and by the different colouration; from *J. ruscurianus* by the more slender outline and the different sculpture with narrower and less incised spaces. It differs from *J. swinmeni* sp. nov. by the slender outline, the different colouration and the absence of sutural crenulation on the whorls of the teleoconch. It differs

from *J. elenchoides* by its smaller size and by the sculpture formed by 5–7 spiral cords, vs 12–16 in *J. elenchoides*. It differs from *J. superum* sp. nov. in its larger size, its different colouration (reddish and/or whitish, with whitish and greyish flammules in *J. kyrnos* sp. nov. vs more uniform background with characteristic oblique black and whitish stripes in *J. superum*) and the sculpture formed by a smaller number of spiral cords (6–7 in *J. kyrnos* vs 12–16 in *J. superum*). *Jujubinus kyrnos* differs from *J. elenchoides* in its base with an acute and non-rounded angle and in the evident spiral cords (6.7 in *J. kyrnos* vs 12–15 in *J. elenchoides*). See under *J. depictus*, *J. sartorii*, *J. fraterculus*, *J. gofasi* sp. nov., *J. dianiensis* sp. nov., *J. striatus*, *J. smaragdinus*, *J. inopinatus* sp. nov., *Jujubinus angustibasis* sp. nov., *J. dispar* and *J. tingitanus* for comparative comments.

Jujubinus gofasi Mariottini, Oliverio & Smriglio sp. nov.
urn:lsid:zoobank.org:act:D39C23A9-FD4C-48BC-BDD8-00BB77D11941
SSH XI – Fig. 7J–L

Diagnosis

Shell of medium size for the genus, solid, 5–6 spaced spiral cords, elevated, granulose, wide interspaces like the cords, with strong prosocline lamellae, peripheral cord very evident, high height/width ratio.

Etymology

The species is named after Serge Gofas, for his great contribution to malacology.

Type material

Holotype

SPAIN • 1 lv (6.8 (H) × 5.5 (W) mm); Málaga (type locality); 2–5 m depth; used for DNA sequencing; MNHN-IM-2000-40312 (ex BAU2075.1).

Paratypes

SPAIN • 1 lv; same data as for holotype; used for DNA sequencing; MCZR-M-TYPE 00095 (ex BAU2075.3) (paratype 1) • 3 lv; same data as for holotype; BAU2066.3 (paratype 2), BAU2066.5 (paratype 3), BAU2068.2 (paratype 4) • 5 lv; same data as for holotype; MO (paratypes 5–9) • 10 lv; same data as for holotype; CS-PM (paratypes 10–19) • 6 lv; same data as for holotype; JMP (paratypes 20–25) • 3 lv; Almería; 20–30 m depth; trawled; used for DNA sequencing; RM3-Jst7 to RM3-Jst9 (paratypes 26–28) • 4 lv; Almería; CS-PM (paratypes 29–32).

Other material examined

FRANCE • 10 lv; Brittany, Ploubazlanec, Baie de Launay; 48°48'5" N, 3°00'10" W; intertidal; used for DNA sequencing; BAU 2659.1 to 2659.5, BAU 2662.1 to 2662.5.

GREAT BRITAIN • 2 dd; Jersey; “*J. striatus* Jersey England d. Chaster .95”; MCZR-M-11680.

MOROCCO • 31 dd; Tangeri; “Tanger *Jujub. Depictus* De dd. Tangeri (M. Pallary)”; MCZR-M-11681 • 5 dd; Tangeri; “Tanger *J. depictus* De dd. Tangeri”; MCZR-M-11694.

Description (in parentheses data of the holotype)

SHELL. Shell of medium size for the genus, height 6.4–8.8 (5.8) mm, width 4.9–6.8 (5.8) mm, height/width 1.21–1.38 conical, solid, slightly cyrtocoid, rather shiny. Protoconch seemingly smooth, of ca 15 whorl, 0.25–0.26 (0.25) mm in width. Teleoconch of 6.5 (5.5) slightly convex whorls. Sculpture of 5–6 (6) strong, closely set abapical spiral cords of about the same strength, including the 2–3 (3) peripheral ones forming the strong peripheral cord, and 6–7 (7) regularly spaced, basal weaker spiral cords and flat. Interspaces with thick and strong regularly set prosocline lamellae. Suture well incised.

Teleoconch surface covered by barely visible prosocline growth striae, rather regular. Base convex, umbilicus closed also in juveniles, covered with a white callus. Aperture quadrangular, with columellar callus thickened in the middle portion. Interior of the aperture whitish/greyish, nacreous.

COLOURATION. Colour of protoconch and initial teleoconch whorls whitish or greyish; remaining whorls and base cream or blackish background with alternating large blackish/whitish blotches.

SOFT PARTS. Observed in alcohol preserved specimens, dark terminal strip on the creamy band of the snout.

Distribution

Ranging from the Mediterranean of southern Spain to the Atlantic, southward along the coasts of Morocco and northward to Brittany (France), and Jersey Is. (UK), living specimens from the intertidal to 5 m deep.

Remarks

In some specimens the background colour is blackish with alternating large whitish blotches.

It differs from *J. exasperatus*, *J. pseudogravinae* and *J. gravinae* in the lack of tubercles on the spiral cords; from *J. vulgaris* in the more numerous spiral cords (5–6 in *J. gofasi* sp. nov. vs 3 in *J. vulgaris*) and the colouration (cream or blackish with alternating large blackish-whitish blotches in *J. gofasi* vs white or whitish background with reddish brown in *J. vulgaris*); from *J. vexationis* (Madeira) in its larger size and the different sculpture (7–8 weak spiral cords, with slight undulations of the peripheral cord in the first 2–3 teleoconch whorls, broad interspaces with fine prosocline lines in *J. vexationis* vs 6 strong spiral cords and narrow adorned with strong prosocline lamellae in *J. gofasi*).

From *J. swinnyi* sp. nov. (Canary Islands) it differs in its stronger sculpture (with the prosocline lamellae crossing the spiral cords, whereas fine growth lines and lamellae are present mostly in the interspaces in *J. swinnyi*).

It differs from *J. depictus* in the more numerous spiral cords (3–4 in *J. depictus* vs 5–6 in *J. gofasi* sp. nov.) and weaker sculpture; from *J. sartorii* in the spiral cords with narrower interspaces and with more marked axial lamellae; from *J. kyrnos* sp. nov. in its large size, the colouration (cream or whitish background, with blackish and greyish flammules in *J. kyrnos* vs darker background with alternating large blackish blotches in *J. gofasi*), and the more numerous spiral cords (3 in *J. kyrnos* vs 5–6 in *J. gofasi*); from *J. ruscurianus* in its stronger sculpture with narrower interspaces with more marked lamellae; from *J. elenchoides* in its smaller size, and the fewer cords (12–16 spiral cords in *J. elenchoides* vs 5–6 in *J. gofasi*); from *J. fraterculus* in its weaker sculpture with less marked prosocline lamellae in the interspaces; from *J. superum* sp. nov. in its colouration (dark greyish-blackish background in *J. superum* vs cream or blackish background with alternating large blackish blotches in *J. gofasi*) the larger size and the more marked sculpture with (vs very fine lamellae in the interspaces of *J. superum*).

Jujubinus sartorii Aradas & Maggiore, 1840
SSH XII – Fig. 7M–O

Jujubinus sartorii Aradas & Maggiore, 1840: 11–12.

Calliostoma (Jujubinus) goniobasis Coen, 1937: 157, pl. ii fig. 16.

Diagnosis

Shell of large size for the genus, solid, 5–6 spaced spiral cords, elevated, granulose, interspaces twice as broad as the cords, with strong prosocline lamellae, peripheral cord evident, high height/width ratio.

Type material

Syntypes

SICILY • 1 dd; Acirezza (type locality); University of Catania, Aradas collection • 2 dd; Acitrezza; Civico Museo di Storia Naturale, Milano, Mo28763, Mo28771.

Other material examined

CORSICA • 2 lv; Sec St Antonio, CORSICABENTHOS stn CSXX; 41°20.4' N, 9°10.9' E; 43 m depth; used for DNA sequencing; MNHN-IM-2019-13658, 13659 • 2 lv; off South coasts, CORSICABENTHOS stn CSXX; 41°20.4' N, 9°10.8' E; 42 m depth; used for DNA sequencing; MNHN-IM-2019-14585, 14586.

CROATIA • 4 dd; Velirat; “*Jujubinus goniobasis* Coen, 1937 fide Monterosato”; MCZR-M-11728.

CYPRUS • 14 dd; Kerinia; (13 dd+1 dd form *concinus*) “Kerinia (Cipro) Lm. 1899+vr. Kerinia copia a Coen”; MCZR-M-11707.

FRANCE • 6 dd; coasts of the Pyrénées-Orientales; “Roussillon”; MCZR-M-11774.

GREECE • 4 dd; Preveza; “Spiaggia di Prevesa, Jonio”; MCZR-M-11735.

MALTA • 17 dd; unprecised locality; as “*Mirulinus rudi-striatus*, Monts. Malta!”; MCZR-M-11702 • 24 dd; unprecised locality; “Malta”; MCZR-M-11732 • 1 dd; unprecised locality; “Malta”; MCZR-M-11758 • 2 lv; Gozo Is., Xwejni Bay; 36°04'48.62" N, 14°14'50.80" E; 10 m depth; on *P. oceanica*, used for DNA sequencing; BAU2676.1, BAU2676.2.

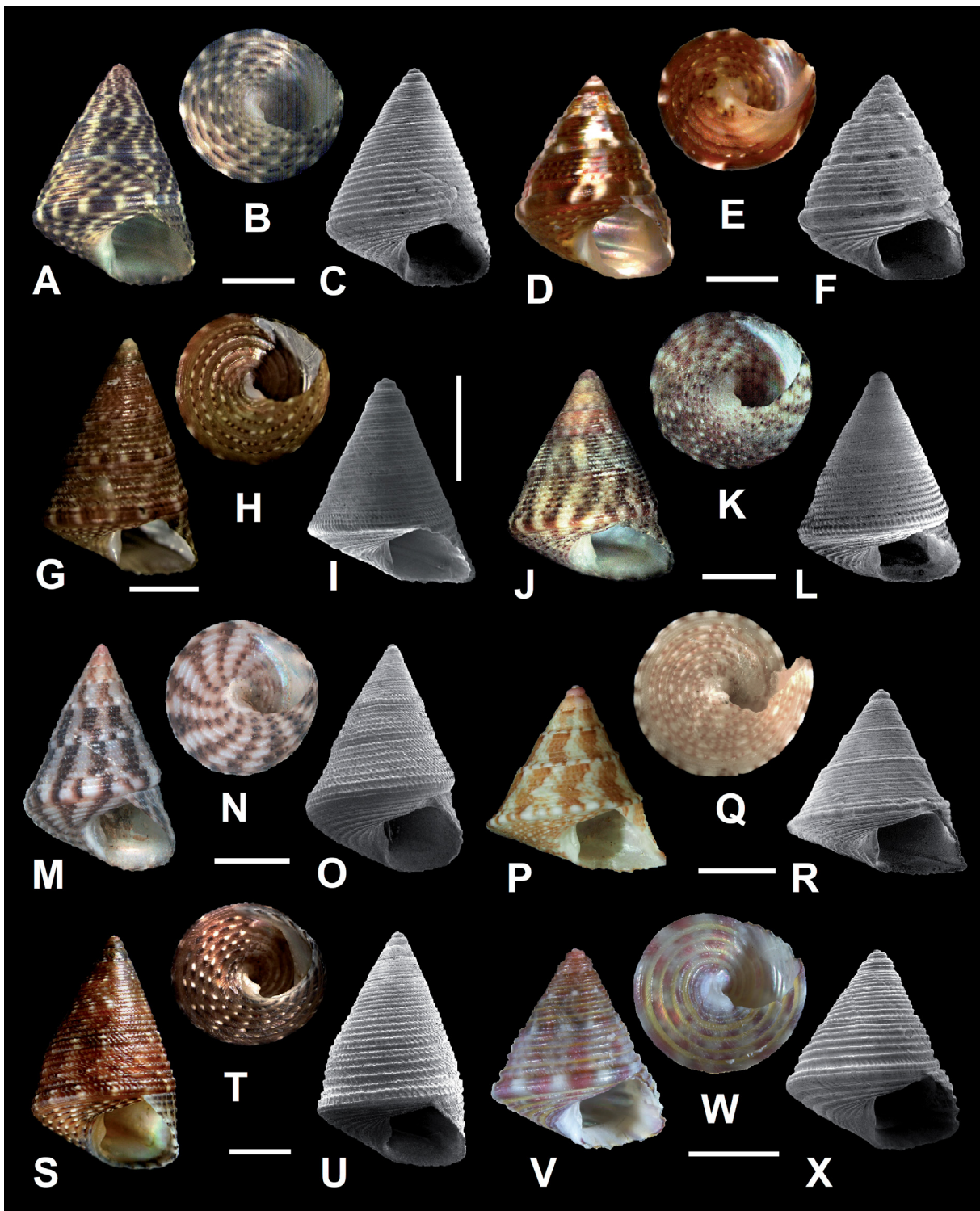
SICILY • 12 dd; Palermo, Arenella; “Arenella”; MCZR-M-25224 • 2 dd; Lampedusa; “Lampedusa”; MCZR-M-11766 • 11 dd; Palermo, Romagnolo; “Romagnolo (coraliné) 12 giug. 1907”; MCZR-M-11756 • 8 dd; Palermo, Romagnolo; “vr. Romagnoli monts copia a Cossmann 1913”; MCZR-M-11707.

Description

SHELL. Shell of large size for the genus, height 6.5–10.3 mm, width 5.6–7.1 mm, height/width ratio 1.34–1.45, conical, light. Protoconch seemingly smooth, of ca 1 whorl, 0.34–0.35 mm in width. Teleoconch of 6.5–7.0 slightly convex whorls. Sculpture of 5–6 flat, closely set abapical spiral cords of about the same strength, including the 2–3 peripheral ones forming the peripheral cord, slightly shouldered, and 8–9 regularly spaced, basal spiral cords large and flat. Suture well incised. Teleoconch surface covered by barely visible prosocline growth striae irregularly set and interspaces adorned with strong prosocline lamellae. Base convex, umbilicus closed also in juveniles, covered with a white callus. Aperture quadrangular, with columellar callus thickened in the median portion. Interior of the aperture whitish, nacreous.

COLOURATION. Colour of protoconch and initial teleoconch whorls bright whitish- pinkish; remaining whorls and base cream or whitish striated by fine brownish-reddish opisthocline or orthocline lines.

Fig. 7 (next page). **A–C.** *Jujubinus superum* Mariottini, Oliverio & Smriglio sp. nov., holotype, MNHN-IM-2000-40311, height 6.0 mm, Izola (45°32'51.4" N, 13°42'12.9" E), Slovenija, on *Posidonia oceanica* (L.) Delile, 4 m depth (legit Armando Macali). **D–F.** *J. gravinae* (Dautzenberg, 1881), CS-PM, height 5.9 mm, Giannutri Island (42°15'7.05" N, 11° 5'31.51" E), Tuscany, Italy, on *Cystoseira mediterranea* Sauvageau, 3 m depth. **G–H.** *J. kyrnos* Mariottini, Oliverio & Smriglio sp. nov., holotype, MNHN-IM-2019-17191, height 7.1 mm. CORSICABENTHOS, stn CB32, 14 m depth. **I.** *J. kyrnos*, BAU 2858.2, height 3.7 mm, Playazo de Rodalquilar (36°51'28" N, 2°00'06" W), Spain. **J–L.** *J. gofasi* Mariottini, Oliverio & Smriglio sp. nov., holotype, MNHN-IM-2000-40312 (ex-BAU2075.1), height 6.8 mm,



Málaga, Spain. **M–O.** *J. sartorii* Aradas & Maggiore, 1840, RUC, syntype of *Trochus sartorii*, height 10.2 mm. Acitrezza, Sicily, Italy. **P–R.** *J. fraterculus* Monterosato, 1889, CS-PM, height 5.4 mm, Borj El Hsar (34°42'38" N, 11°09'04" E), Kerkennah Islands, Tunisia. **S–U.** *J. depictus* (Deshayes, 1835), CS-PM, height 8.2 mm, Giannutri Island (42°15'07.05" N, 11°05'31.51" E), Tuscany, Italy, on *P. oceanica*, 20 m depth. **V–X.** *J. ruscurianus* (Weinkauff, 1868), BAU2858.1, height 4.5 mm, Playazo de Rodalquilar, Spain. Scale bars = 2 mm.

SOFT PARTS. Epipodial tentacles whitish, densely covered by tiny purplish speckles interconnected to create an irregular network and sparingly white spots. Foot background reddish-creamy or reddish-brown mottled with darker blotches and basal white strips; sole white. Cephalic tentacles whitish, with a dorsal purplish stripe and densely covered by small purplish speckles. Eye stalks red-brownish; eyes black encircled by dark brown with a ventral white spot. Snout reddish, creamy terminal band with a thin dark terminal strip.

Distribution

Sicily (Aradas & Maggiore 1840), Lampedusa, Cyprus and Malta; Corsica; Puntebianche (Veli Rat) Croatia (Coen 1937); living specimens at depths of 10–42 m.

Remarks

In the Monterosato collection, one vial (MCZR-M-11728) is preserved containing 4 specimens with the label handwritten by Monterosato reading “*goniobasis* Mont. Velirat!”, which clearly refers to the taxon subsequently described as *J. goniobasis* Coen, 1937. Despite the slightly more elevated form, the sculpture is very similar to that of *J. sartorii*, and we consider the two taxa as synonyms.

Jujubinus sartorii differs from *J. exasperatus*, *J. pseudogravinae*, *J. gravinae* and *J. daniensis* sp. nov. in the complete or partial absence of tubercles on the spiral cords; from *J. vexationis* (Madeira) and *J. swinnyi* sp. nov. (Canary Islands) in its stronger sculptures; from *J. superum* sp. nov. and *J. vulgaris* in its stouter outline, and stronger sculpture; from *J. ruscurianus* (Western Mediterranean) in its usually larger size and stronger sculpture (strong lamellae in the interspaces in *J. sartorii* vs fine prosocline lamellae in *J. ruscurianus*); from *J. elenchoides* in its smaller size and a fewer and stronger spiral cords; from *J. kyrnos* sp. nov. in its more slender shape and stronger sculpture (strong lamellae in the interspaces in *J. sartorii* vs fine prosocline lamellae in *J. ruscurianus*); from *J. depictus* mostly in the outline (more cyrtocoid in *J. depictus*) colouration (bright whitish-pinkish in *J. sartorii* vs reddish, reddish brown or whitish-reddish background with white blotches in *J. depictus*). See under *J. fraterculus*, *J. gofasi* sp. nov., *J. daniensis*, *J. striatus*, *J. smaragdinus*, *J. inopinatus* sp. nov., *J. angustibasis* sp. nov., *J. dispar*, for comparative remarks.

Jujubinus fraterculus Monterosato, 1880
SSH XIII – Fig. 7P–R

Jujubinus fraterculus Monterosato, 1880: 220 (no figure).

Diagnosis

Shell of large size for the genus, not very solid, 4–5 elevated, flat, equidistant spiral cords, interspaces with fine prosocline lamellae, peripheral cord very evident, high height/width ratio.

Type material

Syntypes

TUNISIA • 8 dd; Sfax; “*Monotrochus fraterculus* Monts Spugne di Sfax!”; MCZR-M-11705/S • 26 dd; Sfax; “*M. fraterculus* Monts (Zyziph.), Boll. Malacologico Italiano 1880 p. 220 spugne di Sfax” MCZR-M-11705/S • 2 dd; Gulf of Gabès; “Golfo di Gabes”; MCZR-M-11705/S • 6 dd; “Sfax”; MCZR-M-11705/S • 13 dd; Mediterranean coasts of Northern Africa [unprecised locality]; “Africa”; MCZR-M-11758/S • 8 dd; Mediterranean coasts of Northern Africa [unprecised locality]; labelled “C. d’Afr.” (Appolloni *et al.* 2018); MCZR-M-11758/S.

Other material examined

TUNISIA • 1 dd; Sfax; “smaragd. vr. Altior Mts Sfax, spugne”; MCZR-M-11761 • 34 dd; N of Zarzis; 33°36'28" N, 11°04'04" E; 0–7 m depth; MO • 3 dd; Djerba I.; 0.5 m depth; lagoon bioclastic sediment; LT • 1 dd; Djerba I.; beached; MO • 3 sh; Kerkennah; beached; MO • 4 dd; Kerkennah, Borj El Hsar Is.; beached; CS-PM • 150 dd; Kerkennah, Sidi Yousef; beached; CS-PM • 4 dd; Kerkennah, West of Gharbi I., Sidi Youssef; 0.5 m depth; LT • 2 lv; Kerkennah, Gharbi I., Sidi Youssef; 34°45'50" N, 11°19'55" E; 0–1 m depth; used for DNA sequencing; BAU 2314.1–2 • 1 lv; Kerkennah, Chergui I.; 34°43'21" N, 11°09'21" E; 0–2 m depth; used for DNA sequencing; BAU 2311.1 • 1 lv; Kerkennah, Chergui I.; 34°43'21" N, 11°09'21" E; 0–2 m depth; used for DNA sequencing; BAU 2312.1 • 4 dd; unprecised locality; “*Jujubinus* sp. C. di Barberia”; MCZR-M-11762.

Description

SHELL. Shell of large size for the genus, height 10.0–11.0 mm, width 7.5–8.0 mm, height/width ratio 1.34–1.38 conical, light. Protoconch seemingly smooth, of ca 0.8 whorls, 0.25–0.26 mm in width. Teleoconch of 5.5–6.5 slightly convex whorls. Sculpture of 4–5 flat, closely set abapical spiral cords of about the same strength, including the 2 peripheral ones forming the peripheral cord, slightly shouldered, and 6–7 regularly spaced, basal spiral cords large and flat. Spiral interspaces with thick and strong prosocline lamellae regularly set. Suture incised. Base convex, umbilicus closed also in juveniles, covered with a white callus. Aperture quadrangular, with the columellar callus thickened in the middle portion. Interior of the aperture whitish, nacreous.

COLOURATION. Colour of protoconch and initial teleoconch whorls whitish or greyish; remaining whorls and base cream or brownish with alternating notches of colour brownish-reddish

SOFT PARTS. Observed in alcohol preserved specimens, no dark terminal strip is present on the creamy band of the snout.

Distribution

Kerkennah Islands (Gulf of Gabès, Tunisia), as a variety of *J. unidentatus* (Ghisotti & Melone 1975). Specimens reported under this name by Scuderi & Terlizzi (2012) from Apulia belong to another species. Currently *J. fraterculus* is known only from the Gulf of Gabès, Tunisia, and it can be considered endemic to that area; living specimens at depths of 0–2 m.

Remarks

Jujubinus fraterculus differs from *J. exasperatus*, *J. pseudogravinae*, *J. gravinae* and *J. daniensis* sp. nov. in the complete or partial absence of tubercles on the spiral cords; from *J. vexationis* (Madeira), *J. swinnyi* sp. nov. (Canary Islands) and *J. ruscurianus* (western Mediterranean), in the more slender outline and stronger sculpture (with marked striae in the spiral interspaces in *J. fraterculus* vs thin prosocline striae in *J. swinnyi* and *J. ruscurianus*); from *J. superum* sp. nov. and *J. vulgaris* in its stouter outline, and more marked sculpture; from *J. elenchoides* in its smaller size, and the fewer and slightly more marked spiral cords; from *J. kyrnos* sp. nov., in its more slender shape and more marked prosocline lamellae in the interspaces; from *J. depictus* in its more slender outline (vs a more cyrtoconoid one in *J. depictus*) and in the colouration (whitish or greyish or brownish in *J. fraterculus* vs wine reddish, reddish brown or whitish-reddish background with white blotches in *J. depictus*); from *J. sartorii* in its smaller size with narrower base and more angled periphery, and in the colouration (whitish or greyish or brownish of *J. fraterculus* vs bright whitish-pinkish *J. sartorii*). See under *J. gofasi* sp. nov., *J. daniensis*, *J. striatus*, *J. smaragdinus*, *J. inopinatus* sp. nov., *J. angustibasis* sp. nov., *J. dispar*, for comparative remarks.

Jujubinus depictus (Deshayes, 1835)
SSH XIV – Fig. 7S–U

Trochus depictus Deshayes, 1835: 140, pl. 18 figs 23–25.

Diagnosis

Shell of large size for the genus, solid, 3–4 spaced and raised spiral cords, broad interspaces with very strong prosocline lamellae and fine growth lines, peripheral cord evident, high height/width ratio.

Type material

Syntypes

GREECE • 1 dd; Peloponnese; “Morea” (type locality); MCZR-M-11682/S ex collection Deshayes • 8 dd; Peloponnese; “Morea”; MNHN-IM-2.000-31.122.

Other material examined

CORSICA • 4 lv; Saint Florent; 42°42.3' N, 9°19.2' E; 9 m depth; used for DNA sequencing; MNHN-IM-2019-5498, 5671, 5688, 5903 • 1 lv; Sec de Giraglia; 43°01.7' N, 9°24.4' E; 21 m depth; used for DNA sequencing; MNHN-IM-2019-6378 • 1 lv; Centuri depths; 42°59.5' N, 9°17.5' E; 36 m depth; used for DNA sequencing; MNHN-IM-2019-6379 • 4 lv; North Cap Corse; 43°02.6' N, 9°19.9' E; 60 m depth; used for DNA sequencing; MNHN-IM-2019-6380, 6381, 6429, 12734 • 1 lv; North-West Cap Corse; 42°59.6' N, 9°17.6' E; 41 m depth; used for DNA sequencing; MNHN-IM-2019-12745 • 2 lv; Golfu di Sant'Amanza; 41°25.2' N, 9°14' E; 24 m depth; used for DNA sequencing; MNHN-IM-2019-12840, 12841 • 3 lv; Baie de Figari; 41°28.3' N, 9°04' E; 0–1 m depth; used for DNA sequencing; MNHN-IM-2019-12852, 14030, 16774 • 1 lv; Sec St Antonio; 41°20.4' N, 9°10.9' E; 43 m depth; used for DNA sequencing; MNHN-IM-2019-17049 • 1 lv; between Gargalo Is. and Garganellu Is.; 42°22' N, 8°32.5' E; 28–30 m depth; used for DNA sequencing; MNHN-IM-2019-17620 • 1 lv; Punta Scandola; 42°20' N, 8°33.6' E; 12–17 m depth; used for DNA sequencing; MNHN-IM-2019-17621 • 1 lv; Punta Muchillina; 42°20.1' N, 8°33.3' E; 10 m depth; used for DNA sequencing; MNHN-IM-2019-18474.

CROATIA • 1 dd; unprecised locality; “Dalm.”; MCZR-M-11740.

FRANCE • 13 dd; Cannes; “*Jujubinus heilmanni* Monts Cannes! ms” plus “Cannes 1885”; MCZR-M-11708 • 1 dd; Bandol; “Bandol D. Chatelet”; MCZR-M-11735.

GREECE • 3 dd; Crete, Kanari; “Kanari-Creta Maltzan”; MCZR-M-11735.

ITALY • 7 dd; Elba I., Lacona; 10 m depth; bioclastic sediment; CS-PM • 28 dd; Elba I., Porto Azzurro, Naregno; 3 m depth; bioclastic sediment; LT • 2 lv; Elba I., Fetovaia; 42°43'58.1" N, 10°09'13.1" E; used for DNA sequencing; MNHN-IM-2013-32668, 32670 • 2 lv; Elba Is., Fetovaia; 42°43'58.1" N, 10°09'13.1" E; used for DNA sequencing; MNHN-IM-2013-5495, 5496 • 21 lv; Giannutri I.; 15 m depth; *Posidonia*; CS-PM • 5 lv; Giannutri I.; 42°15'7.05" N, 11°5'31.51" E; used for DNA sequencing; BAU 1793.2, 1793.4, RM3-Jco1 to RM3-Jco3 • 1 lv; Giannutri Is., Punta Secca, stn. GMM 2; 42°15'41" N, 11°06'24" E; 12–13 m depth; used for DNA sequencing; BAU 2668.2 • 2 lv; Giglio Is., Italy; 42°22'7.82" N, 10°55'5.11" E; used for DNA sequencing; RM3-Jco4, RM3-Jco5 • 4 dd; Santa Marinella; 15–20 m depth; fishing nets with *Posidonia* residues; LT • 27 dd; Torre Valdaliga; 25 m depth; bioclastic sediment; CS-PM • 4 dd; Marina di Camerota; 25 m depth; bioclastic sediment; CS-PM • 29 dd; La Maddalena Island; 25 m depth; bioclastic sediment; CS-PM • 37 dd; Golfo d'Arzachena; beached; CS-PM • 3 dd; Argentario; 30 m depth; MO • 2 dd; Giglio Is.; “Isola del Giglio 1917-Di Gestro”; MCZR-M-11761 • 50 dd; Giannutri Is.; 30 m depth; CS-PM • 8 dd; Capo Linaro; 35 m depth; MO • 15 dd; Tor Paterno MPA; 23–33 m depth; MO • 1 dd; Napoli; “*Jujubinus concinnus*

var. *rubra* Porro Napoli”; MCZR-M-11711 • 10 dd; Napoli; “Mixtus. Monts Napoli-Bacoli (Praus) 900”; MCZR-M-11702 • 3 dd; Napoli; “Napoli”; MCZR-M-11758 • 10 dd; Napoli; “*J. litoralis* Brusina Napoli!”; MCZR-M-11758 • 8 dd; Napoli; “*M. crassus* M. l, Napoli”; MCZR-M-11740 • 2 dd; Capri Is.; “Napoli Capri Z. mullip.”; MCZR-M-11758 • 4 dd; Capo Palinuro Occhi cave; 12 m depth; MO • 5 dd; Brindisi; 3 m depth; algae; LT.

SICILY • 55 dd; Palermo; “Pal. poco profondo”; MCZR-M-11746 • 2 dd; Salina Is.; 35 m depth; MO • 1 dd; Siracusa; “Siracusa”; MCZR-M-11735 • 4 dd; Isola delle Correnti; 18 m depth; MO • 2 dd; Marettimo Is.; 20 m depth; MO • 14 dd; Levanzo Is., Punta Altarella; 37°59' N, 12°21' E; 25 m depth; MO • 1 dd; Favignana; 5 m depth; on *Posidonia oceanica*; LT • 8 dd; Lampedusa Is.; “*Juj. rectoconicus*. M. Lampedusa”; MCZR-M-11740 • 5 dd; Pantelleria Is.; 30 m depth; MO • 6 dd; Pantelleria Bank; 37°10' N, 12°05' E; 20–50 m depth; MO.

Description

SHELL. Shell of large size for the genus, height 7.9–9.7 mm, width 5.3–6.1 mm, height/width ratio 1.36–1.75, conical, robust, slightly cyrtoconoid, not very bright. Protoconch seemingly smooth, of ca 1 whorl, 0.29–0.30 mm in width. Teleoconch of 7–7.5 flat and inclined spirals whorls. Sculpture of 5–6 spiral cords of about the same strength, separated by deep and wide interspaces regularly spaced with wide interspaces, including the 2–3 peripheral ones forming the peripheral cord. Whole teleoconch surface strongly sculptured by thick prosocline lamellae, regularly spaced. Base convex adorned with 7–8 spiral cords with wide interspaces sculptured by strong prosocline lamellae, umbilicus closed also in juveniles, covered with a whitish callus. Suture incised but not very evident. Aperture quadrangular, with the columellar callus not very thick in the basal portion. Interior of the aperture whitish or greenish-greyish nacreous.

COLOURATION. Colour of the shell variable, reddish, reddish-brown or whitish-reddish background with sparse white blotches, occasionally with broad vertical whitish-beige oblique bands; base reddish, with blackish and whitish flammulae of different size, peripheral cord spotted with red, black and white.

SOFT PARTS. Epipodial tentacles whitish, densely covered by tiny purplish speckles interconnected to create an irregular network. Foot background reddish or reddish-brown mottled with longitudinal darker stripes; sole white. Cephalic tentacles whitish, with a dorsal purplish stripe and densely covered by small purplish speckles. Eye stalks reddish or brownish; eyes black encircled by dark brown with a ventral white spot. Snout light or dark brown, creamy terminal band with a thick dark terminal strip.

Distribution

Mediterranean, from southern France, Italy, Sicily, Croatia and Greece; living specimens at depths of 0–45 m, occasionally down to 60 m.

Remarks

Despite having very seldom been reported, this is not a rare species. Ghisotti & Melone (1975: 170, fig.) treated it as a subspecies of *J. striatus* (“*Jujubinus striatus* (L.), es. variegato tendente alla ssp. *depictus*”), and in the same work they referred it to two forms with no taxonomic value: “*J. striatus depictus* (Desh.) forma *magnificus* Coen coll. Coen, da Palermo” and “*J. striatus depictus* (Desh.) forma *concinus* MTS coll. Coen, da Napoli” (1975: 173, fig.). This is not *Trochus concinns* Philippi, 1846 (currently *Turbo*). The actual range may be wider than currently known, simply due to misidentification with other taxa (e.g., *Jujubinus striatus* and related species: see below). It differs from *J. exasperatus* in the absence of tubercles on the spiral cords and in its colour pattern usually dominated by brownish with less red-reddish, whereas red is largely dominant in most *J. exasperatus* populations. *Jujubinus pseudogravinae* is also similar to *J. depictus*, but the latter differs in its smaller average size, the more marked and regular

sculpture, with spiral cords and regular interspaces vs a sculpture with spiral cords and interspaces of different sizes in *J. pseudogravinae*. It differs from *J. ruscurianus* (Western Mediterranean), *J. vexationis* (Madeira) and *J. swinnyi* sp. nov. (Canary Islands) in its stronger sculpture and larger size. From *J. elenchoides* it differs in its smaller size, the fewer spiral cords (12–16 in *elenchoides* vs 5–6 in *depictus*) and the stronger sculpture; from *J. gravinae*, in the different sculpture, with tuberculous peripheral cord, never present in *J. depictus*. From *J. superum* sp. nov. (northern Adriatic), it differs in the colouration (dark greyish-blackish background colour with irregular black and white sagittal stripes in *J. superum* vs reddish, reddish brown or whitish-reddish background with white blotches in *depictus*). From *J. kyrnos* sp. nov., it differs in its sculpture (spaced and smooth abapical spiral cords in *J. depictus* vs weaker sculpture of flat and closely set abapical spiral cords in *J. kyrnos*). See under *J. sartorii*, *J. fraterculus*, *J. gofasi* sp. nov., *J. daniensis* sp. nov., *J. striatus*, *J. smaragdinus*, *J. inopinatus* sp. nov., *J. angustibasis* sp. nov., and *J. dispar*, for comparative remarks.

***Jujubinus ruscurianus* (Weinkauff, 1868)**
SSH XV – Fig. 7V–X

Trochus ruscurianus Weinkauff, 1868: 367.

Jujubinus guanchus Curini-Galletti, 1985: 139, figs 5–11.

Diagnosis

Shell of medium size for the genus, rather solid, 4–5 spaced spiral cords, elevated, broad interspaces with thick prosocline lamellae and growth lines, peripheral cord evident, high height/width ratio, colour red.

Type material

Syntypes of *Trochus ruscurianus* Weinkauff, 1868

ALGERIA • 3 dd; Algier (type locality); MCZR-M-11780/S, ex Weinkauff.

Holotype of *Jujubinus guanchus* Curini-Galletti, 1985

CANARY ISLANDS • dd; Lanzarote Is., harbour of Arrecife (type locality); 28°57' N, 13°32' W; USNM 784714.

Paratypes of *Jujubinus guanchus* Curini-Galletti, 1985

CANARY ISLANDS • 1 dd; same data as for holotype; USNM 784715 (paratype D) • 2 dd; same data as for holotype; RBINS 388-26439 (paratypes A, C).

Other paratypes in the collections G.T. Poppe (Mactan) and M. Curini-Galletti (Sassari).

Other material examined

ALGERIA • 3 dd; Oran; labelled “*Calliostoma ruscurianus* Weinkauff. Oran, récoltes Paul Pallary”; MCZR-M-11780 • 2 dd; Oran; ex Pallary collection; MCZR-M-11779 • 14 dd; Alger; labelled “Porto di Algeri (Lhotellier)” ex Pallary collection; MCZR-M-11780 • 4 dd; Alger; labelled “*Trochus ruscurianus* Weink-Algieri”; MCZR-M-11780 • 1 dd; Alger; labelled “*T. ruscurianus*, Alger! Weink.”; MCZR-M-11780.

CANARY ISLANDS • 1 lv; Lanzarote I., Puerto del Carmen, Playa de Matagorda; 28°55'55.59" N, 13°36'46.62" W; used for DNA sequencing, corresponding to *J. guanchus*; BAU 3771–3773 • 4 dd; Lanzarote Is., Arrecife; 2 m depth; MO.

MOROCCO • 100 dd; Al Hoceima; beached; young and adult shells; CS-PM • 1 dd; Ceuta; beached; CS-PM • 4 lv; Torres de Alcalá, Cala Iris; 1–4 m depth; on brown algae; LT.

SPAIN • 3 dd; Getares, Punta Carnero; beached; CS-PM • 51 dd; Algeciras, Getares; 20 m depth; washing of algae; LT • 6 lv; Getares, 4 km S of Algeciras; 20 m depth; washing of algae; LT • dd; Málaga; 25 m

depth; CS-PM • 1 dd; Málaga; 2 m depth; CS-PM • 3 dd; Murcia, Águilas; MO • 3 dd; Málaga; 3 m depth; CS-PM • 2 dd; Cadiz; 2 m depth; CS-PM • 1 lv; Málaga; used for DNA sequencing; BAU 2076 • 5 lv; Málaga, Benalmádena; 36°35.3' N, 4°31.7' W; used for DNA sequencing; BAU 2664.1 to 2664.5 • 1 lv; Playazo de Rodalquilar; 36°51' 28" N, 2°00' 06" W; used for DNA sequencing; BAU 2858.1.

Description

SHELL. Shell of medium size for the genus, height 4.3–5.7 mm, width 3.7–4.7 mm, height/width ratio 1.16–1.30, conical, shiny in type material. Protoconch seemingly smooth, of ca 1 whorl 0.26–0.27 mm in width. Teleoconch of 5.5–6.0 slightly convex whorls. Sculpture of 5–6 spaced abapical spiral cords, smooth, of about the same strength, including the 2–3 peripheral ones forming the peripheral cord, and 7–8 regularly spaced, basal spiral flat cords. Suture incised. Teleoconch surface covered by thick, yet barely visible prosocline growth lamellae, irregular set. Base convex and rounded, umbilicus closed also in juveniles, covered with a white callus. Aperture quadrangular, with the columellar callus thickened in the lower portion. Interior of the aperture greenish whitish, nacreous.

COLOURATION. Colour of protoconch and initial teleoconch whorls whitish reddish or pinkish, remaining whorls and base bright reddish whitish or creamy white; spiral cords with alternating flammules, cream or reddish or yellowish, with yellow stripes in the interspaces. Sutural and peripheral cord articulated in red and cream or white.

SOFT PARTS. Observed in alcohol preserved specimens, no dark terminal strip is present on the creamy band of the snout.

Distribution

Western Mediterranean, Alboran Sea until Almería, southern Spain and Algeria (Weinkauff 1867; Curini-Galletti & Palazzi 1980; Curini-Galletti 1982b; Sánchez-Moyano *et al.* 2000); living specimens at depths of 1–20 m. In the neighbouring Atlantic from the Berlenga Islands and South Portugal to Morocco. Canary Islands (Pallary 1920; Cretella 1993; Gofas *et al.* 2011; Alf *et al.* 2020) probably referring to the morphotype described as *J. guanchus*.

Remarks

This is a morphologically very characteristic and common species in the western Mediterranean and neighbouring Atlantic. Morphologically, it can be diagnosed from *J. exasperatus*, *J. pseudogravinae*, *J. gravinae*, *J. errinae* and *J. vexationis* by the lack of tubercles or undulations on sutural cords and basal cords and for the strong spiral cords regularly spaced by deep interspaces. It differs from *J. striatus*, *J. depictus*, *J. fraterculus*, *J. superum* sp. nov., *J. inopinatus* sp. nov., *J. kyrnos* sp. nov., *J. sartorii*, *J. smaragdinus*, *J. angustibasis* sp. nov., *J. gofasi* sp. nov., and *J. superum* in the less marked sculpture with apparently smooth interspaces due to the very weak prosocline growth lines. The specimens in the Monterosato collection, with the label autograph by Weinkauff, are likely syntypes, and were the only available source to confirm the actual identity of this taxon (the original Weinkauff collection having largely been dispersed: Curini-Galletti & Palazzi 1980). Curini-Galletti (1985) described *J. guanchus* from the Canary Islands, based on a particular morphotype with ca six teleoconch whorls separated by incised sutures, and a sculpture of four smooth spiral cords crossed by numerous very fine markedly prosocline growth lines; the background colour is shiny olive-green, with white blotches arranged in irregular longitudinal band across the whorls and the peripheral cord, the basal ridges with regularly white dotted. We have assayed three specimens from Lanzarote, morphologically corresponding to typical *J. guanchus*, which proved to be genetically indistinguishable from Western Mediterranean typical *J. ruscurianus*. *Jujubinus poppei*, has been described on syntopic samples from Lanzarote, differing from *J. guanchus* in the different number of spiral cords (6–7 in *J. poppei* vs 4 in *J. guanchus*).

See under *J. gravinae*, and *J. superum* sp. nov. for detailed comparative remarks.

Jujubinus dianiensis Mariottini, Oliverio & Smriglio sp. nov.
urn:lsid:zoobank.org:act:30C0A441-53A9-4266-A5CF-B2B44133479C
SSH XVI – Fig. 8A–C

Diagnosis

Shell of medium size for the genus, not very solid, 6–7 spaced spiral cords, elevated, narrow interspaces with prosocline lamellae, peripheral cord evident, high height/width ratio.

Etymology

The species name is after Dianium, the ancient name of Giannutri Island.

Type material

Holotype

ITALY • 1 lv; Giannutri I., Punta San Francesco (type locality); 42°15'14" N, 11°06'13" E; 10–15 m depth; used for DNA sequencing; MNHN-IM-2000-30318 (ex BAU2667.5).

Paratypes

ITALY • 1 lv; same data as for holotype; paratype 1, MNHN-IM-2000-30319 • 2 lv; same data as for holotype; paratypes 2–3, MZB-60155, MZB-60156 • 1 lv; same data as for holotype; paratype 4, BAU2359.6 • 2 lv; same data as for holotype; paratypes 6–7, 12, MCZR-M-TYPE00097 • 34 lv; same data as for holotype; paratypes 5, 8–11, 13–40, CS-PM • 3 lv; Giannutri Is., Italy; 42°15'7.05" N, 11°05'31.51" E; 10–15 m depth; used for DNA sequencing; RM3-Jdia1 to RM3-Jdia3.

Other material examined

CORSICA • 1 lv; Tour de Sponsaglia; 41°29.2' N, 9°17.2' E; 16 m depth; used for DNA sequencing; MNHN-IM-2019-12258 • 1 lv; same data as for preceding; used for DNA sequencing; MNHN-IM-2019-12259 • 1 lv; Punta di U Capricciolu; 41°25.7' N, 9°15.9' E; 5–25 m depth; used for DNA sequencing; MNHN-IM-2019-14245.

ITALY • 6 lv; Giglio Island; 10 m depth; *Cystoseira*; CS-PM • 277 lv and dd; Giannutri I.; 15 m depth; *Posidonia* and *Cystoseira*; CS-PM • 17 dd; Giannutri I.; 18 m depth; bioclastic sediment; CS-PM • 10 lv; Giannutri I., Italy; 42°15'7.05" N, 11°5'31.51" E; used for DNA sequencing; BAU 2359.1 to 2359.10 • 5 lv; Giannutri I., Punta Secca, stn GMM 2; 42°15'41" N, 11°06'24" E; 12–13 m depth; used for DNA sequencing; BAU 2667.1 to 2667.5 • 3 lv; same data as for preceding; used for DNA sequencing; BAU 2669.1 to 2669.3 • 2 lv; same data as for preceding; used for DNA sequencing; BAU 2671.1, 2671.2 • 1 lv; same data as for preceding; used for DNA sequencing; BAU 2672 • Giannutri Is., 'Le Cerniette', stn GMM 1; 42°15'10" N, 11°05'32" E; 10–17 m depth; used for DNA sequencing; BAU 3653 • Giannutri Is.; 42°15'7.05" N, 11°5'31.51" E; 10–15 m depth; used for DNA sequencing; RM3-Jgi1, RM3-Jgi2.

Description (in parentheses data of the holotype)

SHELL. Shell of medium size for the genus, height 5.4–8.0 (7.5) mm, width 3.7–5.5 (5.0) mm, height/width ratio 1.35–1.51, conical, not very solid, not very bright. Protoconch, of ca 1 whorl, width 0.24–0.25 (0.24) mm, sculptured by two spiral threads. Teleoconch of 5.5–6.5 (6.5) slightly convex whorls. Sculpture of 6–7 (6) prominent spiral cords of equal strength, interspaces well incised and slightly shouldered, and 6–7 narrow basal cords, regularly spaced, with interspaces wider than the cords. Peripheral cord pronounced, rounded and divided by a furrow, which produces four/five very light and parallel cords of the same size. Suture evident and well incised. Teleoconch surface covered by thick prosocline growth striae, irregularly set. Base convex, umbilicus closed also in juveniles, covered with a

white callus. Aperture quadrangular, columellar callus thickened in the middle portion, internally whitish or pinkish nacreous.

COLOURATION. Colour of protoconch and initial teleoconch whorls whitish-pinkish; remaining whorls and base with predominantly blackish brown background, with whitish blotches anteriorly bordered with dark brown line.

SOFT PARTS. Epipodial tentacles rosy or creamy, covered by scattered very tiny white. Foot background creamy or reddish mottled with brownish, reddish or white blotches; sole white. Cephalic tentacles whitish or purplish, with a dorsal whitish stripe and covered by small light white speckles. Eye stalks brownish dorsally, whitish ventrally; eyes black encircled by white. Snout brownish to reddish, a creamy terminal band with a thin dark terminal stripe.

Distribution

Currently known only from the type locality (Giannutri Island) and the neighbouring Giglio Island, and from Corsica; living specimens at depths of 10–18 m.

Remarks

A small proportion of specimens shows a reversed colouration, with whitish background with axial irregular reddish-brown blotches, very rare reddish specimens. There is a percentage of 10% of specimens with the peripheral cord tuberculate until the last whorl. This is among the species of *Jujubinus* with the most restricted known range (along with *J. catenatus* Ardovini, 2006, *J. errinae*, *J. curinii* Bogi & Campani, 2006, *J. trilloi* Smriglio, Di Giulio & Mariottini, 2014, *J. eleonora* Smriglio, Di Giulio & Mariottini, 2014, *J. roseus* Smriglio, Mariottini & Oliverio, 2026, and *J. alboranensis* Smriglio, Mariottini & Oliverio, 2015). This species can be confused with *Jujubinus gravinae*, which co-occurs at the type locality and has a very similar teleoconch colouration. However, *J. daniensis* sp. nov. differs in its slenderer outline and the peripheral cord with tubercles only on the first whorls vs tubercles on the peripheral cord of all whorls in *J. gravinae*. *Jujubinus daniensis* differs from *Jujubinus angustibasis* sp. nov., *J. kyrnos* sp. nov., *J. superum* sp. nov., *J. gofasi* sp. nov., *J. elenchoides* Monterosato, 1884, *J. ruscurianus*, *J. vulgaris*, *J. depictus*, *J. sartorii*, and *J. fraterculus* in the tubercles on the peripheral cord of the early whorls, absent in the other species. It also differs from *J. exasperatus* and *J. pseudogravinae* in the lack of tubercles on the spiral cords; from *J. vexationis* (Madeira) and from *J. swinnyi* sp. nov. (Canary Islands) in the lack of the spiral cords on the peripheral cord and for the narrower base.

Jujubinus angustibasis Mariottini, Oliverio & Smriglio sp. nov.

urn:lsid:zoobank.org:act:B77E0260-2AD4-42A8-8A7E-BDAEA7F3A4DF

SSH XVII – Fig. 8D–F

Diagnosis

Shell of large size for the genus, elevated and robust, with dense, raised and non-granulose spiral cords, wide interspaces, sculptured by weak, minute and prosocline lamellae; distinct peripheral cord, narrow base, umbilicus closed, high height/width ratio.

Etymology

The species name is from the Latin ‘*angustus*’ (= ‘narrow’) and ‘*basis*’ (= ‘base’), referring to the narrow base.

Type material

Holotype

SICILY • 1v; Costa Saracena-Castelluccio (type locality); 37°18'33.68" N, 15°07'58.08" E; 5 m depth; on *P. oceanica*; used for DNA sequencing; MNHN-IM-2000-40314 (ex RM3-Jst4).

Paratypes

SICILY • 2 lv; same data as for holotype; used for DNA sequencing; RM3-Jst5, RM3-Jst6.

Other material examined

CORSICA • 1 dd; Bastia; “Bastia (Caziot)”; MCZR-M-11761 • 3 dd; Bastia; “JuJ. di Bastia”; MCZR-M-11738.

CROATIA • 27 dd; Zara; “*Zizyphinus parvulus* Brus. non Phil. Zara”; MCZR-M-11702 • 6 dd; Velirat; “Pictus Monts. Velirat!”; MCZR-M-11754 • 79 dd plus, 17 dd; Velirat; “*J. turritus* I più Velirat Dal. Copia a Tomlin ed altri e al D^r. Bavay 1916” “varie forme Velirat!! 1910”; MCZR-M-11778 • 1 dd; Molat; “Melada (Klec.)”; MCZR-M-11748 • 1 dd; Velirat; “Velirat! 1909”; MCZR-M-11761 • 2 dd; Velirat; “Velirat!! (Dalm.) 1910”; MCZR-M-1177.

FRANCE • 2 dd; Nice; “Nice (Caziot)”; MCZR-M-11694.

GREECE • 5 dd; Athens Varkiza; 12 m depth; bioclastic sediment; LT • 2 dd; Paros; “Paros vr. Kviegis”; MCZR-M-11738 • 3 dd; Mt. Athos; “Mt Athos”; MCZR-M-11738 • 3 dd; Crete, Kanari; “Kanari-Creta-Maltzan”; MCZR-M-11738 • 2 lv; Vai, Astypalea Is., Greece; 36°35'13" N, 026°24'10" E; 1–6 m depth; 24 Jun. 2017; under rocks, used for DNA sequencing; BAU 1375.1, 1375.2 • 4 lv; Vai, Astypalea Is., Greece; 36°35'13" N, 026°24'10" E; 1–6 m depth; 24 Jun. 2017; under rocks, used for DNA sequencing; BAU 3037.1 to 3037.4.

ITALY • 4 dd; Genova; “Zampa – Genova Bofill”; MCZR-M-11681 • 2 dd; Torre Valdaliga; 20 m depth; bioclastic sediment; CS-PM • 1 dd; Civitavecchia; LT • 2 dd; Ponza Is.; 3 m depth; LT • 1 dd; Anzio harbour; “Porto D’Anzio”; MCZR-M-11761 • 12 dd; Napoli; “Napoli”; MCZR-M-11681 • 2 dd; Napoli; “Napoli”; MCZR-M-11681 • 9 dd; Napoli; “Napoli (Praus)”; MCZR-M-11723 • 1 dd; Napoli; “*JuJ. concinnus* vr. *Rubra* Napoli (Praus) 1906”; MCZR-M-11711 • 3 dd; Napoli; “Nap.”; MCZR-M-11748 • 4 dd; Napoli; “Napoli”; MCZR-M-11758 • 2 dd; Napoli?; “carminum Napoli?”; MCZR-M-11760 • 1 dd; Napoli; “Napoli”; MCZR-M-11770 • 24 dd; Capri I.; “Capri! (Bellini)”; MCZR-M-11681 • 3 dd; Capri I.; “Capri”; MCZR-M-11723 • 102 dd; Le Castella; 25 m depth; bioclastic sediment; CS-PM • 1 dd; Tricase; “Tricase (Adriatico)”; MCZR-M-11735 • 43 dd; Monopoli; beached; CS-PM • 8 dd; Brindisi; 4 m depth; bioclastic sediment; LT • 2 dd; Tricase Marina; 3 m depth; bioclastic sediment; CS-PM • 2 dd; Porto Cesareo; 3 m depth; bioclastic sediment; CS-PM • 1 lv; Lecce, S. Isidoro; used for DNA sequencing; BAU 1679.3 • 3 lv; Torre Colimena; 40°17'40" N, 017°45'20" E; 2–7 m depth; Aug. 2007; under rocks; used for DNA sequencing; BAU 1726.2, 1726.4, 1726.5 • 3 lv; Punta Prosciutto; 40°17'37" N, 17°45'47" E; used for DNA sequencing; BAU 2658.1, 2658.4, 2658.6 • 1 lv; Nardò, Santa Maria al Bagno; used for DNA sequencing; BAU 3051.1 • 1 lv; Otranto, Punta Remiti; used for DNA sequencing; BAU 3050.1.

SARDINIA • 23 dd; unprecised locality; “*striatus* L. Sardegna”; MCZR-M-11685 • 1 dd; unprecised locality; “Sard.^a”; MCZR-M-11712 • 1 dd; unprecised locality; “Sardegna!!”; MCZR-M-11758.

SICILY • 8 dd; Palermo; “Palermo”; MCZR-M-11694 • 10 dd; Palermo; “*Jujubinus depictus* Desh = *sartori* = *gravesi* vr. Palermo”; MCZR-M-11681 • 2 dd; Palermo; “Palermo”; MCZR-M-25359 • 34 dd; Palermo; “*Mirulinus elenchoides* Monts Palermo” [including 3 dd of *Jujubinus exasperatus* in the same

vial], ex coll. Beltrani; MCZR-M-25293 • 24 dd; Palermo; “*Mirulinus elenchoides* Monts Palermo”; MCZR-M-25293 • 47 dd; Palermo, Arenella; “*Mirulinus finitimus*, M. Arenella!”; MCZR-M-11714 • 7 dd; Palermo; “Paler.”; MCZR-M-11759 • 1 dd; Palermo; “Pal! Feb. 1916”; MCZR-M-11759 • 18 dd; Palermo, Aspra; “*J. depictus* Pal. All’Aspra giug. 85”; MCZR-M-11759 • 17 dd; Palermo, harbour; “*Jujubinus depictus* De dd. Var. ex col. Rada Palermo. Beltrani” [2 dd of *Jujubinus exasperatus* in the same vial]; MCZR-M-11759 • 92 dd; Palermo; “Palermo! *J. multistriatus* Monts. Inedito”; MCZR-M-11772 • 24 dd; Palermo; “*J. multistriatus* Monts pallescens assieme al tipo Palermo”; MCZR-M-11772 • 18 dd; Palermo; “Palermo”; MCZR-M-11749 • 18 dd; Palermo; “*JuJ. Depictus* di Romagnolo D. Roccard 1903”; MCZR-M-11749 • 15 dd; Palermo; “var. *fulvo-picta* Paler.” in a single vial together with 3 shells of *J. striatus*; MCZR-M-11749 • 1 dd; Palermo; “Pal.”; MCZR-M-11757 • 20 dd; Palermo harbour; “*J. depictus* porto di Palermo”; MCZR-M-11681 • 1 dd; Ustica Is.; “Ustica! 1918”; MCZR-M-11759 • 3 lv; San Vito Lo Capo, Sicily; used for DNA sequencing; BAU 2074.1 to 2074.3 • 27 dd; Favignana Is.; beached; CS-PM • 3 dd; Lipari Is.; “Lipari” [plus 6 dd with no data]; MCZR-M-11682 • 1 lv; Castel di Tusa; 3 m depth; on *Posidonia oceanica*; CS-PM • 12 dd; Messina, Ognina; “Ognina Brug”; MCZR-M-11684 • 21 dd; Messina; “*J. depictus* vr *funerea* Sull. Boll. Mal.Ital. 1889 Messina”; MCZR-M-11681 • 10 lv; Costa Saracena-Castelluccio; 37°18'33.68" N, 15°07'58.08" E; 5 m depth; on *Posidonia oceanica*; CS-PM • 5 dd; Messina, Ognina; “Ognina”; MCZR-M-11684 • 19 dd; Trapani; “Trapani”; MCZR-M-11684 • 1 dd; Trapani; “Trap?”; MCZR-M-11684 • 5 dd; Catania, Ognina, N of port; 37°31'55.4" N, 15°07'14.3" E; 0.5–3 m depth; on brown algae; LT • 9 dd; Ognina; fishing nets; LT • 29 dd; Gulf of Catania; fishing nets; LT • 1 dd; Gulf of Catania; fishing nets; LT • 2 dd; Messina; “Messina”; MCZR-M-11756 • 2 dd; Messina; “Messina (Sullioti)”; MCZR-M-11759 • 9 dd; Trapani; “Trapa[ni]”; MCZR-M-11759 [+ 1 dd of *Jujubinus gravinae* in the same vial] • 1 dd; Ognina; “*J. pulchellus* Ognina! M.”; MCZR-M-11759 • 4 dd; Sciacca; “Sciacca”; MCZR-M-11772 • 8 dd; Messina; “*Zizyphinus incertus* Monts Messina!” [including 2 dd labelled “D. Praus Nap?”, and 3 dd of *Jujubinus exasperatus* in the same vial]; MCZR-M-11776 • 13 dd; Trapani; “Trapani”; MCZR-M-11758, MT • 11 dd; Messina; “Messina! *funereus*, Sull”; MCZR-M-11711 • 1 dd; Messina; “*J. armillatus*. Messina Monts. *Jujubinus Renieri* ms. = *depictus*, vr *elegans* Sull. 1889, p. 69”; MCZR-M-11711 • 1 dd; Messina, Santa Romina; “*J. funereus*, Sull. S. Romina Messina Bull. Mal. Ital. 1889, p. 69 come *J. depictus* vr-*funereus*”; MCZR-M-11711 • 1 dd; Magnisi; “Magnisi”; MCZR-M-11770 • 7 dd; unprecised locality; “Sicilia”; MCZR-M-11770.

SPAIN • 1 dd; Almería; “Almeria Spain Tr. *Smaragdinus?*”; MCZR-M-11760 • 17 dd; Menorca Is., Mahón; “Mahon”; MCZR-M-11694.

Description (in parentheses data of the holotype)

SHELL. Shell of large size for the genus, height 6.3–10.2 (7.6) mm, width 4.6–7.2 (4.8) mm, height/width ratio 1.36–1.58 (1.58), conical, light. Protoconch of ca 1 whorl, 0.24–0.25 (0.24) mm in width, sculptured by two spiral threads. Teleoconch of 6.5–7.5 (7.0) slightly convex whorls. Sculpture of 4–7 (7) flat, closely set abapical spiral cords of about the same strength, 2–3 (3) peripheral ones forming the peripheral cord, slightly stepped, and 5–6 (6) regularly spaced, basal spiral cords large and flat. Suture little incised. Teleoconch surface covered by barely visible prosocline irregularly set growth striae, and small but evident prosocline lamellae in the interspaces. Base convex, umbilicus closed also in juveniles, covered with a white callus. Aperture quadrangular, with the columellar callus thickened in the middle portion. Interior of the aperture whitish, greyish, nacreous.

COLOURATION. Colour of protoconch and initial teleoconch whorls bright greyish or brownish or greenish; remaining whorls and base with alternating brownish-greyish and greenish colour blotches, with scattered small whitish patches on the spiral cords.

SOFT PARTS. Epipodial tentacles translucent, densely covered by scattered very tiny black and white speckles. Foot background creamy mottled with brown or reddish irregularly-shaped blotches, and covered by white speckles; sole white. Cephalic tentacles translucent, with two dorsal brown stripes and densely covered by small whitish and brownish speckles. Eye stalks brownish dorsally, creamy ventrally; eyes black. Snout dark brown, a creamy terminal band with a thin dark terminal stripe.

Distribution

Almost the entire Mediterranean Sea, from Spain to Greece; living specimens at depths of 1–7 m.

Remarks

It differs from *J. exasperatus* and *J. pseudogravinae* in the lack of tubercles on the spiral cords; from *J. gravinae*, *J. daniensis* sp. nov. and *J. vexationis* in the absence of tubercles or undulations on the peripheral cord; from *J. swinnyi* sp. nov. (from Canary Islands) in its larger size and different colouration (whorls and base with alternating brownish-greyish-greenish colour patches on the spiral cords in *J. angustibasis* sp. nov. vs alternating whitish or reddish or blackish spots on spiral cords in *J. swinnyi*); from *J. depictus*, *J. sartorii*, *J. fraterculus*, *J. gofasi* sp. nov., and *J. smaragdinus* in its weaker sculpture and barely evident prosocline lamellae in the interspaces; from *J. superum* sp. nov. and *J. kyrnos* sp. nov. in its larger size and different colouration (brownish-greyish-greenish colour patches on the spiral cords in *J. angustibasis* vs dark greyish-blackish background in *J. superum* and whitish greyish or beige in *J. kyrnos*); from *J. ruscurianus* in its more slender outline and less marked and more spaced spiral cords; from *J. elenchoides* in its fewer spiral cords; from *J. inopinatus* sp. nov. in its less slender outline and narrower spiral interspaces; from *J. striatus* in its narrower base; from *J. vulgaris* in its more numerous spiral cords (4–6 in *J. angustibasis* vs 3 in *J. vulgaris*).

Jujubinus inopinatus Mariottini, Oliverio & Smriglio sp. nov.

urn:lsid:zoobank.org:act:C964DC4E-B3DB-443F-9FA6-A680933ADF98

SSH XVIII – Fig. 8G–I

Diagnosis

Shell of medium size for the genus, solid, slender, 5 spaced and elevated spiral cords, broad interspaces with fine prosocline lamellae and growth lines, peripheral cord evident, high height/width ratio.

Etymology

The name *inopinatus* is from the Latin: ‘unexpected’.

Type material

Holotype

SICILY • 1v; San Vito Lo Capo (type locality); used for DNA sequencing; MNHN-IM-2000-40313 (ex BAU1680).

Other material examined

ITALY • 1 dd; Napoli; labelled “Nap!”; MCZR-M-00092.

Description (in parentheses data of the holotype)

SHELL. Shell of medium size for the genus, height 9.0–9.1 (9) mm, width 5.7–6.0 (5.7) mm, height/width ratio 1.51–1.58 (1.58). Protoconch seemingly smooth, of ca 1 whorl, ca 0.29 mm in width. Teleoconch of 6.5–7.5 (7.5) slightly convex whorls. Sculpture of 5 not very strong and not granulose spiral cords of about the same strength and regularly spaced, including the 2 peripheral ones, forming the broad peripheral cord; well-marked suture. Interspaces with fine and dense prosocline lamellae regularly set.

Base convex, with 5–6 concentric black and white spiral cords regularly spaced, umbilicus closed also in juveniles, covered with a white callus. Aperture quadrangular, with the columellar callus thickened in the middle portion. Interior of the aperture whitish nacreous.

COLOURATION. Colour of protoconch and initial teleoconch whorls glossy pinkish with whitish blotches, with spiral cords articulated in black and white.

SOFT PARTS. Not known.

Distribution

Species currently known only from the type locality, San Vito Lo Capo, Sicily, and Gulf of Naples, Italy: the holotype has been collected at unprecised depth, but in very shallow waters.

Remarks

Jujubinus inopinatus sp. nov. is currently known from only two specimens. It is very similar to *J. angustibasis* sp. nov., but the molecular analysis (on the holotype) warrants very confidently the separation. The paratype was found in the Monterosato collection (MCZR-M-11760) and it is almost identical in shape and colouration to the holotype; it is possible that other specimens exist in public or private collections, misidentified as '*J. striatus*' (with reference to *J. angustibasis*). It differs from *J. exasperatus* and *J. pseudogravinae* in the lack of tubercles on the spiral cords; from *J. gravinae*, *J. daniensis* sp. nov. and *J. vexationis* in the absence of tubercles or undulations on the peripheral cord; from *J. striatus* in its more slender outline and in the more spaced spiral cords and finer basal cords; from *J. elenchoides* in its smaller size and the fewer spiral cords; from *J. superum* sp. nov. and *J. kyrnos* sp. nov., in its larger size and the reddish colour (absent in the other two species); from *J. depictus*, *J. sartorii*, *J. fraterculus*, *J. gofasi* sp. nov. and *J. smaragdinus* in its weaker sculpture with finer prosocline lamellae in the interspaces; from *J. ruscurianus* in the more slender outline and the fewer, more spaced and less marked spiral cords; from *J. vulgaris* in the more numerous spiral cords (5 vs normally 3 in *J. vulgaris*) with narrower interspaces.

Jujubinus striatus (Linnaeus, 1758)

SSH XIX – Fig. 8J–L

Trochus striatus Linnaeus, 1758: 759 (no figure).

Jujubinus aequistriatus Monterosato, 1884: 108 (no figure).

Diagnosis

Shell of large size for the genus, very solid, 5–6 well spaced spiral cords, elevated, deep interspaces with internally strong prosocline spaced apart lamellae, peripheral cord evident, high height/width ratio.

Type material

Lectotype of *Trochus striatus* Linnaeus, 1758

MEDITERRANEAN • dd; Mediterranean (type locality); lectotype here designated; LSL.508, The Linnean Society.

Paralectotypes of *Trochus striatus* Linnaeus, 1758

MEDITERRANEAN • 6 dd; Mediterranean; Peter Dance's label PZ 0010802; LSL.508, The Linnean Society.

Syntypes of *Jujubinus aequistriatus* Monterosato, 1884

SICILY • 45 dd; Palermo; NA.; labelled “Tr. (*Jujub.*) *aequistriatus* Palermo!”; MCZR-M-11688/S • 8 dd; Palermo, Mondello; NA.; labelled “*J. aequistriatus* Monts detrito Mondello” • 8 dd; Palermo, Mondello; NA.; labelled “*J. Aequistriatus* Mont. Detrito Mondello”; MCZR-M-11688 • 25 dd; Palermo, Arenella; NA.; labelled “*aequistriatus* di Arenella, 1918 assieme al littoralis”; MCZR-M-11521 • 3 dd; Palermo and Trapani; NA.; labelled “Paler Trapa”; MCZR-M-11694.

Other material examined

ALGERIA • 4 dd; Annaba; “Bône-Alg. Hangenmuller”; MCZR-M-11682 • 5 dd; Algeri; “Algeri (Joly)”; MCZR-M-11682 • 7 dd; Oran; “*attenuans* Oran e Argelia Pallary”; MCZR-M-11682 • 2 dd; unprecised locality; “coll Weink.”; MCZR-M-11682.

CROATIA • 1 dd; Brac I.; “Dalm. Bras”; MCZR-M-11682.

FRANCE • 13 dd; Brest; “*Tr. Striatus* L. Brest dedit Petit”; MCZR-M-11680 • 25 dd; Grand Camp-Maisy; “*Mi. striatus* L. Grand Camp-Calvados, dedit Chapar”; MCZR-M-11680 • 1 dd; Arcachon; “*JuJ. Striatus*, Auct. Arcachon! Atl-Franc”; MCZR-M-11680 • 2 dd; La Ciotat; “La Ciotat!. Bartesago”; MCZR-M-11712 • 3 dd; Bandol; “Bandol 1908”; MCZR-M-11735 • 4 dd; La Ciotat; “La Ciotat”; MCZR-M-11743 • 7 dd; Port Vendres; “*Trochus striatus* Lin. Port Vendre”; MCZR-M-11776 • 2 dd; Toulon; “Toulon (Caziot)”; MCZR-M-11775 • 12 dd; unidentified locality; “Portane Pauls littoral”, ex coll Pallary; MCZR-M-11775.

GREAT BRITAIN • 3 dd; unprecised locality; “England”; MCZR-M-11694 • 6 dd; Falmouth; “*Trochus striatus* L. Riants Falmouth”; MCZR-M-11756 • 6 dd; Devonshire; “*Trochus striatus* L. Jorbay Devonshire” plus “*Mi. striatus* L. Jorbay (Devon.) England dedit Venticuss”; MCZR-M-11757 • 5 dd; Guernsey I.; “Is Guernsay”; MCZR-M-11694.

GREECE • 1 dd; Astypalea I.; 10 m depth; fishing nets; LT • 28 dd; Astypalea I., near Maltezana; 10 m depth; on *Posidonia oceanica*; LT.

ITALY • 2 dd; Castiglioncello; “Castiglioncello”; MCZR-M-11757 • 6 dd; Terracina; “Terracina”; MCZR-M-11748 • 2 dd; Anzio; “Porto d’Anzio. Da Praus col nome di *mixtus* sine loco! D. R.”; MCZR-M-11682 • 1 dd; Anzio, harbour; “Porto d’Anzio”; MCZR-M-11735 • 1 dd; Napoli; “*hieroglyphus*. Monts. Napoli!”; MCZR-M-11748 • 1 dd; Napoli; “*propinquus* Monts desiderato Napoli”; MCZR-M-11749 • 1 dd; Napoli; “Napoli”; MCZR-M-25224 • 1 dd; Chioggia; “Chioggia Chiamenti”; MCZR-M-11758 • 1 dd; Taranto?; “Taranto? (D. Praus)”; MCZR-M-11758.

LYBIA • 1 dd; Tripoli; “Tripolit Marsa al Kmescia”; MCZR-M-11757.

MALTA • 1 dd; unprecised locality; “Malta”; MCZR-M-11682 • 1 dd; unprecised locality; “Malta?”; MCZR-M-11720 • 2 dd; unprecised locality; “Malta”; MCZR-M-11735 • 1 dd; unprecised locality; “ubi? Malta?”; MCZR-M-11758 • 2 lv; Gozo Is., Xwejni Bay; 36°04’48.62” N, 14°14’50.80” E; 10 m depth; on *P. oceanica*, used for DNA sequencing; BAU 2675.1–2.

MOROCCO • 1 dd; Tanger; “Tanger”; MCZR-M-11758 • 9 dd; Casablanca; “*J. strigosus* (Gm) Ph Casa Blanca Marocco”; MCZR-M-11715.

PORTUGAL • 5 dd; Setubal, Portinho de Arrabida; fishing boat; CS-PM.

SARDINIA • 6 dd; Cagliari; “Cagliari Fra Piero 1892”; MCZR-M-11682 • 49 dd; San Pietro I.; “*JuJ. microconus* copia a Pallary S. Pietro-Sard. Hangenmuller”; MCZR-M-11712 • 8 dd; Golfo

d'Arzachena; beached; CS-PM • 1 dd; unprecised locality; "Sardegna"; MCZR-M-11712 • 9 dd; unprecised locality; "Sard! De Ribbis 1912"; MCZR-M-11743 • 1 dd; unprecised locality; "Sardegna"; MCZR-M-11748 • 1 dd; unprecised locality; "(Praus) Sardegna"; MCZR-M-11749 • 1 dd; unprecised locality; "Sardegna Chafers"; MCZR-M-11758 • 1 dd; unprecised locality; "Sardegna M^{me} Bibbin"; MCZR-M-11758 • 1 dd; unprecised locality; "Sardegna"; MCZR-M-11770.

SICILY • 12 dd; Palermo; "Pal. Euggeus 1912"; MCZR-M-11684 • 4 dd; Palermo; "Paler"; MCZR-M-11684 • 1 dd; Palermo; "Pal."; MCZR-M-11684 • 2 dd; Palermo; "Prominulus Pal. Littorale"; MCZR-M-11684 • 7 dd; Palermo; "*J. rotulatus* Palermo"; MCZR-M-11711 • 40 dd; Palermo; "*JuJ.* Di Pal. Nel Porto. 89"; MCZR-M-11711 • 5 dd; Palermo; "Palermo"; MCZR-M-11715 • 4 dd; Palermo; "P", written on the cork stopper of the vial; MCZR-M-11735 • 3 dd; Palermo; "var. *fusco-picta* Paler." [in a single vial together with 15 shells of *J. angustibasis*]; MCZR-M-11749 • 6 dd; Palermo; "P", written on the cork stopper of the vial; MCZR-M-11735 • 4 dd; Palermo; "nel Porto di Palermo", freak; MCZR-M-11761 • 14 dd; Palermo; "Porto di Pal!"; MCZR-M-25359 • 9 dd; Palermo, harbour; "Porto di Palermo"; MCZR-M-11735 • 5 lv; Palermo, Barcarello; 3 m depth; used for DNA sequencing; BAU 2069.1, 2069.3 to 2069.6 • 1 dd; Palermo, Romagnolo; "*Romagnolo det. Beltrani, 1918*"; MCZR-M-11749 • 1 dd; Palermo?; "*Trochus unidentatus* var-*Philippi* Palermo? Da Benoit"; MCZR-M-11761 • 1 dd; Palermo, Punta Raisi; 38°10'47.0" N, 13°05'21.1" E; beached; LT • 3 dd; Trapani; "Trap"; MCZR-M-11684 • 3 dd; Trapani; "Trapa"; MCZR-M-11684 • 12 dd; Favignana I.; beached; CS-PM • 5 dd; Favignana I.; beached; CS-PM • 1 dd; Mazzara del Vallo?; "Mazzara?"; MCZR-M-11746 • 1 dd; Sciacca; "*pulchrae-colorata* Sciacca"; MCZR-M-11756 • 3 lv; Castellammare del Golfo; 38°01'48.05" N, 12°52'58.32" E; 2 m depth; used for DNA sequencing; RM3-Jst1 to RM3-Jst3 • 8 dd; Ognina; "Trap. 2 Ognina"; MCZR-M-11756 • 3 dd; Messina; "*J. renieri*, Messina lo stesso alle Baleari"; MCZR-M-11758 • 2 lv; Mezzoforno-Cefalù; 5 m depth; *Posidonia*; CS-PM • 1 dd; Lampedusa; "Lampedusa"; MCZR-M-11746 • 2 dd; Lampedusa; "Lampedusa"; MCZR-M-11749.

SPAIN • 4 dd; Algeciras; "Algeciras (Kobelt) anche di Gibilterra (Tomlin)"; MCZR-M-11682 • 43 dd; Getares, 4 km S of Algeciras; 20 m depth; washing of algae; LT • 2 dd; Gibraltar; "Gibilterra (Ponsonby)"; MCZR-M-11680 • 3 dd; Gibraltar; "Gibilterra"; MCZR-M-11681.

Description (in parentheses data of the lectotype)

SHELL. Shell of large size for the genus, height 7.0–12.3 (6.8) mm, width 6.1–8.2 (5.3) mm, height/width ratio 1.35–1.51, conical, very solid. Protoconch seemingly smooth, of ca 1 whorl, 0.31–0.32 µm in width. Teleoconch of 7.5 (7.5) slightly convex whorls. Sculpture of 5–7 (6) flat, closely set abapical spiral cords of about the same strength, including the 2–3 (3) peripheral ones forming the peripheral cord, slightly shouldered, and 8–9 (9) regularly spaced, basal spiral cords narrow and marked. Suture incised. Teleoconch surface covered by barely visible prosocline growth striae, and strong prosocline lamellae. Base convex, umbilicus closed also in juveniles, covered with a white callus. Aperture quadrangular, with the columellar callus thickened in the middle portion. Interior of the aperture whitish, nacreous.

COLOURATION. Colour of protoconch and initial teleoconch whorls bright pinkish-cream; remaining whorls and base cream or hazelnut colour striated by fine brownish-reddish opisthocline or orthocline lines.

SOFT PARTS. Epipodial tentacles translucent, densely covered by very tiny white speckles. Foot background creamy mottled with brown or reddish irregularly-shaped blotches, and covered by white and brownish speckles; sole white. Cephalic tentacles translucent, with two dorsal brown stripes and covered by small whitish and brownish speckles. Eye stalks brownish dorsally, creamy ventrally; eyes black. Snout dark brown, a creamy terminal band with a thin dark terminal stripe.

Distribution

Atlantic, from Great Britain to Spain, and across the entire Mediterranean Sea; living specimens at depths of 2–10 m.

Remarks

The binomen *Jujubinus striatus* has been widely used in the past for specimens belonging to a number of species (several cryptic), not all of them phylogenetically related. We restrict here the concept of *Trochus striatus* to the broad-based specimens in the series of Linnean original syntypes because the narrow-base forms are a complex of different species, as evidenced by the present work. We note that a single shell of the Linnean type series is a specimen of *J. angustibasis* sp. nov. Therefore, we have selected one of the broad-based specimens as lectotype of *Trochus striatus*, to stabilize the use of the name. *Jujubinus striatus* differs from *J. vexationis*, *J. swinnyi* sp. nov., *J. elenchoides*, *J. superum* sp. nov., *J. gofasi* sp. nov., *J. kyrnos* sp. nov., *J. daniensis* sp. nov., and *J. fraterculus* in its broad base and the less slender outline; from *J. depictus*, *J. ruscurianus*, and *J. sartorii* in the more regular and less marked sculpture; from *J. gravinae* in its larger size and the peripheral cord not crenulated.

Jujubinus smaragdinus (Monterosato, 1880)
SSH XX – Fig. 8M–O

Trochus pumilio Philippi, 1844: 226 (no figure) (not *Trochus pumilio* Dillwyn, 1817).

Trochus smaragdinus Monterosato, 1880: 46–47 (no figure).

Jujubinus delpreteanus Sullioti, 1889: 28–30 (no figure).

Diagnosis

Shell of medium size for the genus, elevated, solid, 5–7 well spaced spiral cords with not very deep interspaces with internally numerous prosocline lines and lamellae, peripheral cord evident, high height/width ratio.

Type material

Trochus smaragdinus (lot MCZR-M-11700, label in the box: “*T. (Zizyphinus) striatus*, Lin. var. *smaragdina*, Monts Boll. M. Ital. 1880, p. 220. C. D’Afr.!”).

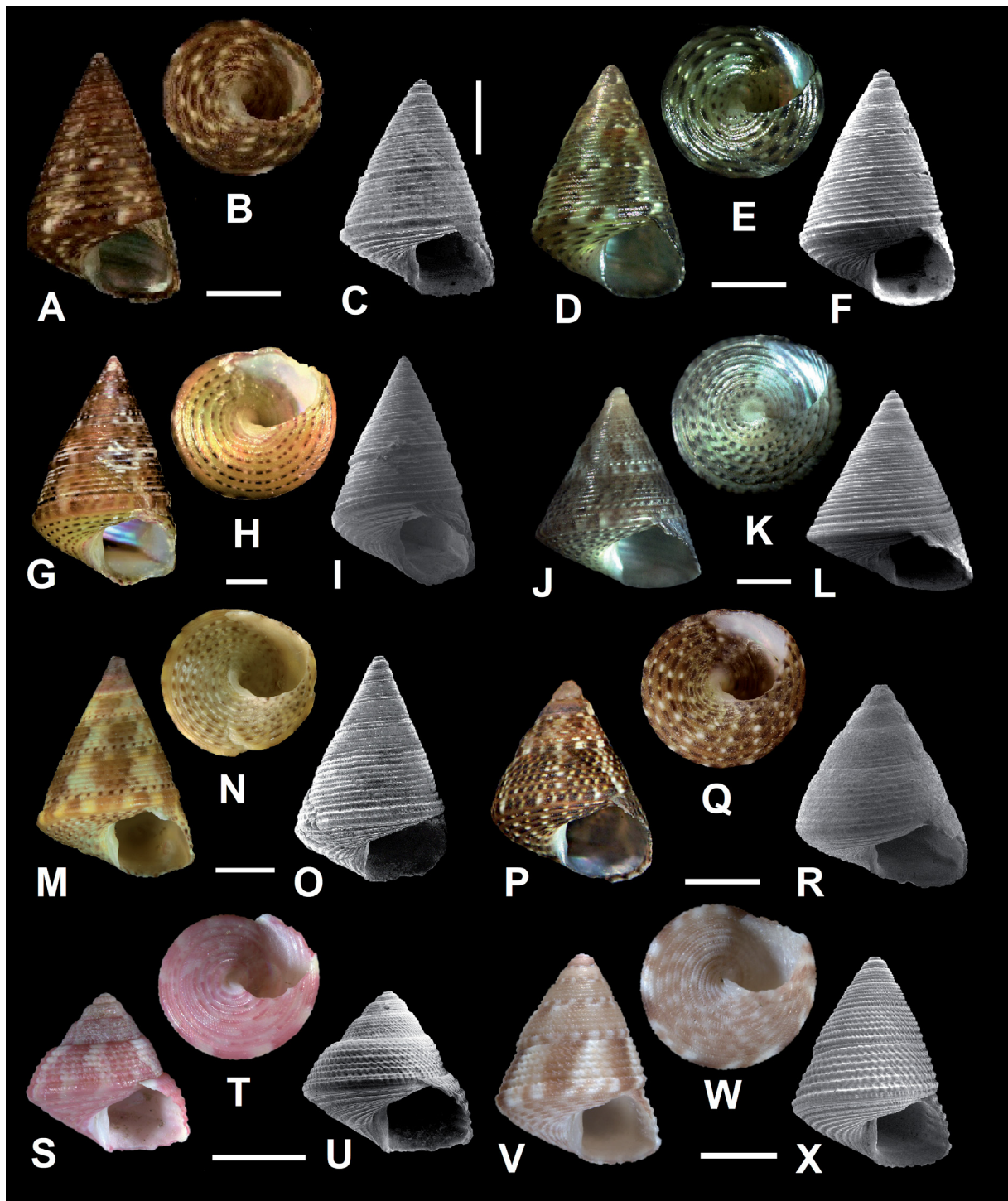
Lectotype of *Trochus smaragdinus* Monterosato, 1880

TUNISIA • dd; Sfax; labelled “*Mirulinus smaragdinus* Monts. Sfax”; lectotype here designated; MCZR-M-11700/L

Paralectotypes of *Trochus smaragdinus* Monterosato, 1880

TUNISIA • 6 dd; labelled “*Mirulinus smaragdinus* Monts. Sfax”; MCZR-M-11700/P • 154 dd; unprecised locality; “*Jujubinus smaragdinus* C. d’Africa”; MCZR-M-11700/P • 4 dd; unprecised locality; labelled “*Jujubinus smaragdinus* Monts. Coste d’Africa”.

Fig. 8 (next page). **A–B.** *Jujubinus daniensis* Mariottini, Oliverio & Smriglio sp. nov., holotype, MNHN IM 2000-30318 (ex BAU2667.5), height 7.5 mm, Giannutri Island (42°15′07.05″ N, 11°05′31.51″ E), on *Cystoseira mediterranea* Sauvageau, 14 m depth. **C.** *J. daniensis*, paratype 7, MCZR-M-TYPE00097/P, height 6.1 mm, Giannutri Island (42°15′07.05″ N, 11°05′31.51″ E), on *C. mediterranea*, 14 m depth. **D–F.** *J. angustibasis* Mariottini, Oliverio & Smriglio sp. nov., holotype, MNHN-IM-2000-40314, height 7.6 mm, Costa Saracena-Castelluccio (37°18′33.68″ N, 15°07′58.08″ E), Sicily, on *Posidonia oceanica* (L.) Delile, 5 m depth. **G–I.** *J. inopinatus* sp. nov. Mariottini, Oliverio & Smriglio sp. nov., holotype, MNHN-IM-2000-40313, San Vito Lo Capo, Sicily. **J–L.** *J. striatus* (Linnaeus, 1758), CS-PM, height



7.7 mm, Castellammare del Golfo (38°01'48.05" N, 12°52'58.32" E), 2 m depth. **M–O.** *J. smaragdinus* (Monterosato, 1880), CS-PM, height 7.6 mm, Borj El Hsar (34°42'38" N, 11°09'04" E), Kerkennah Islands, Tunisia, beached. **P–R.** *J. delpreteanus* Sullioti, 1889, CS-PM, height 5.8 mm, Faro Lake (38°15'57" N, 15°37'50" E), Messina, Sicily, on *Cymodocea nodosa* Asch., 0.2 m depth. **S–U.** *J. dispar* Curini-Galletti, 1982, CS-PM, height 3.4 mm, off Málaga, Spain, 50 m depth (legit José M. Martín Pérez). **V–X.** *J. montagui* (Wood, 1828), CS-PM, height 5.5 mm, Anzio, Latium, Italy, trawled, 50 m depth. Scale bars = 2 mm.

Syntypes of *Jujubinus delpreteanus* Sullioti, 1889

The original material in the Sullioti collection is lost (M. Tancredi, Museo Civico di Storia Naturale “Giacomo Doria”, Genova, Italy, pers. com., 12 Dec. 2018).

SICILY • 5 dd; Messina, Lake Faro; labelled “Faro di Messina”; MCZR-M-25224-S, ex Sullioti collection.

Other material examined

Morphotype *smaragdinus*

TUNISIA • 77 dd; Kerkennah, Borj El Hsar; beached; CS-PM • 5 dd; Kerkennah, West of Gharbi Island, Sidi Youssef; 0.5 m depth; lagoon bioclastic sediment; LT • 3 dd; Djerba I.; beached; LT • 1 dd; Djerba I.; 0.5 m depth; lagoon bioclastic sediment; LT • 2 lv; Djerba I., Borj Jellij; 33°53.05' N, 10°43.58' E; 0–1 m depth; used for DNA sequencing; MNHN-IM-2013-31801-2 • 1 lv; Djerba I., Sidi Jmour; 33°49.88' N, 10°44.83' E; 0–1 m depth; used for DNA sequencing; MNHN-IM-2013-31891 • 4 lv; Djerba I., Sidi Jmour; 33°49.88' N, 10°44.83' E; 0–1 m depth; used for DNA sequencing; MNHN-IM-2013-31988, 31998, 32000, 32113 • 2 lv; Djerba I., Sidi Solimen; 34°02' N, 11°05' E; 0–1 m depth; used for DNA sequencing; MNHN-IM-2013-31920, 31923.

Morphotype *delpreteanus*

FRANCE • 13 dd; Toulon; France; labelled “*J. propinquus*”; MCZR-M-E12/16 • 98 dd; Toulon; labelled “*J. propinquus* Monts. Toulon inedito”, “*Toulon (Vimont)*”; MCZR-M-11727 • 82 dd; Toulon; labelled “*Mirulinus propinquus*. M. Toulon!”; MCZR-M-11727.

SICILY • 13 dd; Messina, Lake Faro; 0.2 m depth; amidst *Cystoseira*; CS-PM • 2 dd; Messina, Lake Ganzirri; CS-PM • 6 lv; Messina, Lake Ganzirri; 38°15'44.5" N, 15°37'32.0" E; 0.5–1 m depth; used for DNA sequencing; BAU 2943.1 to BAU 2943.6 • 2 dd; Messina, Lakes (Faro and/or Ganzirri); labelled “*Trochus pumilio*”; MCZR-M-11269 • 2 dd; Messina, Lake Ganzirri; 2 m depth; LT • 20 lv; Lake Ganzirri; Messina; CS-PM.

Description (in parentheses data of the lectotype)

Morphotype *smaragdinus*

SHELL. Shell of medium size for the genus, height 6.8–8.0 (6.8) mm, width 4.0–4.5 (4.0) mm, height/width ratio 1.70–1.80, conical, light. Protoconch seemingly smooth, of ca 1 whorl, 0.20–0.21 μ m in width. Teleoconch of 5.5–6.5 (6.5) slightly convex whorls. Sculpture of 8–10 (8) flat, closely set abapical spiral cords of about the same strength, including the 2–3 (2) peripheral ones forming the peripheral cord, slightly shouldered, and 8–10 (8) regularly spaced, basal spiral cords large and flat. Suture well incised. Teleoconch surface covered by barely visible prosocline growth striae, irregularly set. Base convex, umbilicus closed also in juveniles, covered with a white callus. Aperture quadrangular, with the columellar callus thickened in the middle portion. Interior of the aperture whitish-greenish, nacreous.

COLOURATION. Colour of protoconch and initial teleoconch whorls whitish-greenish; remaining whorls and base greenish adorned with alternating yellowish and white patches on the spiral cords.

SOFT PARTS. Unknown for the open sea morphotype.

Morphotype *delpreteanus*

Epipodial tentacles translucent, densely covered by scattered tiny black (some white) speckles. Foot background creamy mottled with irregularly-shaped brown blotches (sometimes dotted), and covered by white speckles; sole white. Cephalic tentacles translucent, with a dorsal irregular and interrupted

white stripe, and covered by small whitish and brownish speckles. Eye stalks brownish dorsally, creamy ventrally; eyes black. Snout dark brown, a creamy terminal band with a thin dark terminal stripe.

Distribution

Jujubinus smaragdinus as genetically tested is known with certainty from the Gulf of Gabès, Tunisia (Monterosato 1880), with living specimens at depths of 0–1 m. We have examined samples morphologically very similar to the Tunisian material, from the Aegean and Ionian seas (see also Scuderi & Terlizzi 2012: 39, pl. 3 fig. 6, from Apulian Ionian Sea, as '*J. fraterculus*'), but these need to be tested genetically.

The morphotype *delpreteanus* occurs in the coastal lakes of Pantano Piccolo and Ganzirri (Messina, Sicily) (Sulliotti 1889; Curini-Galletti & Palazzi 1979, as *Trochus pumilio* Philippi, 1844; Giacobbe 2012; Scuderi *et al.* 2019), at depths of 0.5–2 m. Specimens in the lot MCZR-M-11727, from “Toulon”, France (possibly the Hyères salines, including the Étang de Pesquiers) are morphologically strikingly similar to the Sicilian *delpreteanus* morphotype.

Remarks

We have tested Sicilian samples from a coastal lake environment, corresponding to the nominal taxon *J. delpreteanus* characterised by an impoverished sculpture, with denser but weaker spiral cords and a dark blackish-brown monochrome colouration. Given the relatively low genetic divergence between the Tunisian open sea form corresponding to *Trochus smaragdinus*, and the Sicilian coastal lake samples corresponding to *J. delpreteanus* (<3%), and despite the striking morphological differences, we conservatively consider them as belonging to a single species. *Trochus pumilio* has been considered either as a synonym of *Gibbula adriatica* (Philippi, 1844) by Ghisotti & Melone (1975) or as a subspecies of *Jujubinus striatus* (*J. striatus pumilio*) by Curini-Galletti & Palazzi (1979), identical with *J. delpreteanus*; we agree with the latter identification. However, *Trochus pumilio* is a junior homonym of *Trochus pumilio* Dillwyn, 1817, currently accepted as *Obeles pumilio* (Dillwyn, 1817) (Pulmonata, Geomitridae).

The open sea form of *J. smaragdinus* differs from *J. striatus* in its typical greenish-yellowish-whitish colour pattern, the smaller size, the more evident prosocline lamellae in the interspaces. It differs from *J. exasperatus*, *J. pseudogravinae*, *J. vulgaris*, *J. gravinae*, and *J. daniensis* sp. nov. in its less marked sculpture in all teleoconch whorls; from *J. depictus*, *J. sartorii*, *J. ruscurianus* in the weaker and more regular sculpture with barely evident prosocline lamellae; from *J. elenchoides* in its smaller size and the fewer spiral cords; from *J. superum* sp. nov. in the different colouration (dark greyish-blackish in *J. superum*, greenish with whitish spots in *J. smaragdinus*). Colouration is also diagnostic with *J. kyrnos* sp. nov., *J. fraterculus*, *J. gofasi* sp. nov., and *J. vexationis* (Madeira).

See under *J. delpreteanus*, *J. inopinatus* sp. nov., *J. angustibasis* sp. nov., and *J. dispar* for comparative remarks.

Jujubinus tingitanus (Pallary, 1902) SSH XXI – Fig. 8S–U

Gibbula tingitana Pallary, 1902: 315 (no figure).

Gibbula tingitana var. *nigra* Pallary, 1902: 315 (no figure).

Gibbula tingitana var. *dilatata* Pallary, 1920: 66 (no figure).

Gibbula tingitana var. *pyramidata* Pallary, 1920: 66 (no figure).

Diagnosis

Shell small for the genus, with scalariform body whorls, hint of umbilical fissure, low height/width ratio.

Type material

Syntypes

MOROCCO • 1 syntype; Tanger (type locality); MCZR-M-30081/S • 1 syntype; Tanger; MNHN-IM-2.000-32.439.

Other material examined

MOROCCO • 79 dd; Al Hoceima, Cala Iris; 3 m depth; CS-PM.

SPAIN • 3 dd; Algeciras; 10 m depth; CS-PM • 1 lv; Málaga; 2 m depth; under rocks; CS-PM • 4 lv; Getares; 0–1 m depth; washing sea-weeds; MO.

Description

SHELL. Shell small for the genus, height 2.3–4.0 mm, width 2.4–3.8 mm, height/width ratio 0.95–1.05, body with stepped whorls, angled shoulder. Protoconch seemingly smooth, of ca 1 whorl, 0.21–0.22 mm in width. Teleoconch of 3.5–4.0 convex whorls. Sculpture of 9 abapical spiral cords of various sizes; 3–4 smaller on the shoulder, 2 strongly keeled cords (the abapical peripheral) with a large interspace sculptured by two tiny cords, regularly spaced. Suture scarcely incised. Teleoconch covered by barely visible, wavy, regularly spaced prosocline lamellae, more evident in the wide interspace between the two large, keeled cords. Base convex, with 7 spiral, regularly spaced cords, with dense prosocline lamellae in interspaces, umbilicus narrowly open, white. Aperture quadrangular, internally whitish, nacreous, iridescent in fresh specimens.

COLOURATION. Colour of protoconch and teleoconch whorls whitish or light beige, opaque, with small (occasionally large) darker spots and blotches (brown or red).

SOFT PARTS. Epipodial tentacles translucent, whitish, covered by scattered tiny white speckles. Foot background creamy mottled with irregularly-shaped brown to blackish lateral bands (sometimes dotted), and covered by white or yellowish speckles; sole whitish. Cephalic tentacles translucent whitish, with a white or yellow stripe. Eye stalks creamy ventrally; eyes black. Snout variable, whitish to dark brown or black.

Distribution

Western Mediterranean and Ibero-Moroccan Gulf. From southern Spain (Málaga), and North African coast (Algeria and Morocco), across the Strait of Gibraltar area (Jeffreys 1883; Monterosato 1890; Pallary 1902, 1920; Schirò 1971; Ghisotti & Melone 1972; Verduin 1979; and as *Gibbula ditropis*: Manzoni 1871; Van Aartsen *et al.* 1984; Scaperrotta *et al.* 2010; Gofas *et al.* 2011); living specimens at depths of 0–1 m.

Remarks

This species has been almost invariably considered as a member of the genus *Gibbula* (s. lat.) until it was recently reassigned to *Jujubinus* based on molecular phylogenetics (Uribe *et al.* 2017), which is confirmed here. We highlight that juveniles of *J. tingitanus* and *J. gravinae* show very similar outlines, in turn very different from, e.g., *Steromphala ricketti* (Payraudeau, 1826), suggesting that *J. tingitanus* with its peculiar adult morphology, may represent a case of pedomorphosis (Fig. 9A–F).

Monterosato (1890: 144) reported a single very small specimen from Sicily, off the coast of Palermo, identified by Jeffreys as *Gibbula ditropis*. Despite an accurate search at MCZR in the Monterosato collection, this specimen could not be found, and we keep this record as doubtful. *Trochus ditropis* S. Wood, 1848, is a very similar, but distinct fossil species from the Pliocene (Coralline and Red Crag) of England (see also Verduin 1979).

Jujubinus dispar Curini-Galletti, 1982
SSH XXII – Fig. 8V–X

Jujubinus dispar Curini-Galletti, 1982b: 89, pl. 1 fig. 1.

Diagnosis

Shell of medium size for the genus, with strong spiral cords, high and very grainy, broad interspaces with strong prosocline lamellae, distinct peripheral cord, wide base, umbilicus closed, low height/width ratio.

Type material

Holotype

Not found.

Paratypes

MOROCCO • 36 dd; Morocco, Tangeri (type locality); MCZR-M-11751/P.

Other material examined

SPAIN • 9 dd; Málaga; 60 m depth; trawled; CS-PM • 1 dd; Málaga; 80 m depth; CS-PM • 34 lv; Málaga; 20–30 m depth; CS-PM • 4 lv; Málaga; 20–30 m depth; used for DNA sequencing; BAU-2079.1 to BAU-2079.4 • 2 dd; Málaga Bay; 100–150 m depth; fishing nets; LT • 4 dd; Getares; 15 m depth; greyish-green colour form; CS-PM • 6 dd; Algeciras; beached; MO.

MOROCCO • 4 dd; Ceuta, El Nacho; MO.

Description

SHELL. Shell of medium size for the genus, height 4.9–5.7 mm, width 3.9–5.4 mm, height/width ratio 1.12–1.25, conical, light. Protoconch seemingly smooth, of ca 1 whorl, 0.35–0.36 mm in width. Teleoconch of 4.5–5.5 (5.5) slightly convex whorls. Sculpture of 4–5 (5) prominent, closely set abapical spiral cords of about the same strength, including the 2–3 (2) peripheral ones forming the peripheral cord, slightly shouldered, and 4–5 (4) regularly spaced, basal spiral cords large and flat. Suture incised. Teleoconch surface covered by strong prosocline growth striae, irregularly set. Base convex, umbilicus closed also in juveniles, covered with a white callus. Aperture quadrangular, with the columellar callus thickened in the middle portion. Interior of the aperture whitish, or pinkish nacreous.

COLOURATION. Colour of protoconch and initial teleoconch whorls bright red; remaining whorls and base with alternating brownish-reddish adorned by white-greyish patch of different size (also in the holotype).

SOFT PARTS. Unknown.

Distribution

Strait of Gibraltar (Curini-Galletti 1985; Gofas *et al.* 2011), Morocco and Mauritania coasts (Curini-Galletti 1982b, 1985; Cretella 1993) Western Mediterranean, Alboran Sea, Spanish coasts; living specimens at depths of 20–30 m.

Remarks

It differs from *J. exasperatus*, *J. pseudogravinae*, *J. gravinae*, *J. daniensis* sp. nov., and *J. vexationis* (Madeira) in the absence of tubercles or undulations on the peripheral cord; from *J. swinnyi* sp. nov. (Canary Islands) in its colouration (brownish-reddish with white-greyish blotches of varying size in *J. dispar* vs bright greenish-cream or greenish-whitish with alternating whitish or reddish or blackish spots on spiral cords in *J. swinnyi*). *Jujubinus depictus*, *J. sartorii*, *J. fraterculus*, *J. gofasi* sp. nov., and *J. smaragdinus* all have evident sculptures and prosocline lamellae in the interspaces similar to *J. dispar*; however, the sculpture is more marked in *J. dispar*, with the spiral cords crossed by very sharp prosocline lamellae giving a wrinkled appearance to the entire teleoconch, including the base.

It differs from *J. superum* sp. nov., *J. kyrnos* sp. nov., and *J. angustibasis* sp. nov. in its larger size and stronger sculpture, and in the different colouration (brownish-reddish with white-greyish patches of different size in *J. dispar* vs dark greyish-blackish background in *J. superum*, whitish greyish or beige in *J. kyrnos*, brownish-greyish-greenish colour patches on the spiral cords in *J. angustibasis*; from *J. ruscurianus* in its more slender outline, the fewer, less evident and more spaced spiral cords, and the more marked prosocline lamellae (vs fine very close streaks in *J. ruscurianus*); from *J. elenchoides* in the fewer spiral cords (4–5 vs 12–16 in *J. elenchoides*) and the marked prosocline lamellae (almost lacking in *J. elenchoides*); from *J. inopinatus* sp. nov. in its less slender outline, narrower interspaces with marked prosocline lamellae (almost lacking in *J. inopinatus*); from *J. striatus* (Linnaeus, 1758) and *J. vulgaris* (Risso, 1826) in the stronger sculpture and less slender outline.

Jujubinus montagui (Wood, 1828)
SSH XXIII – Fig. 3N

Trochus montagui Wood, 1828: 18, pl. 6 fig. 43.

Trochus parvulus Philippi, 1844: 155, pl. 25 fig. 11.

Diagnosis

Shell of medium size for the genus, not very high, strong, sparse, raised and very grainy spiral cords, wide interspaces, and very sculptured by prosocline lamellae, distinct peripheral cord, narrow base, umbilicus closed, high height/width ratio.

Type material

Syntypes of *Trochus montagui* Wood, 1828

IRELAND • 5 dd; Ireland (type locality); J.E. Gray collection; NHMUK 1968623,

***Trochus parvulus* Philippi, 1844**

Type material (from Italy, Reggio Calabria, Pezzo) lost (Óscar Alfredo Gálvez Herrera, Museo Nacional de Historia Natural, Santiago de Chile, Chile, pers. com., 12 Feb. 2020; Christine Zorn, Museum für Naturkunde, Berlin, Germany, pers. com., 26 Feb. 2020).

Other material examined

CORSICA • 5 dd; Bastia; Caziot leg.; MCZR-M-E12-11715 • 14 dd; Capo Corso; 95–105 m depth; MO • 4 dd; Capo Corso; 60 m depth; residuals of fishing boats; CS-PM • 3 lv; Gulf de Saint-Florent; 42°44.1' N, 9°19.3' E; 60 m depth; used for DNA sequencing; MNHN-IM-2019-5675, 5676, 5678 • 1 lv; North Cap Corse; 42°59.8' N, 9°18.6' E; 95 m depth; used for DNA sequencing; MNHN-IM-2019-6259 • 1 lv; East of Bastia; 42°41.2' N, 9°27.7' E; 50 m depth; used for DNA sequencing; MNHN-IM-2019-6402 • 2 lv; Large Punta di u Capicciolu; 41°24.3' N, 9°16.9' E; 71–71 m depth; used for DNA sequencing; MNHN-IM-2019-12120, 12423 • 1 lv; South of Gulf de Porto Novo; 41°29.7' N, 9°17.8' E; 48–51 m depth; used

for DNA sequencing; MNHN-IM-2019-12694 12695 • 1 lv; Large Porto-Vecchio; 41°32.8' N, 9°27.2' E; 89–90 m depth; used for DNA sequencing; MNHN-IM-2019-12797 • 2 lv; off South coasts; 41°21' N, 9°10.6' E; 73–73 m depth; used for DNA sequencing; MNHN-IM-2019-13293, 13294 • 4 lv; Gulf de Girolata; 42°20.8' N, 8°35.8' E; 45–45 m depth; used for DNA sequencing; MNHN-IM-2019-17224, 17356, 17357, 17359 • 1 lv; between Capo Cavallo and Capu di a Mursetta; 42°29.3' N, 8°38.5' E; 90–91 m depth; used for DNA sequencing; MNHN-IM-2019-17968.

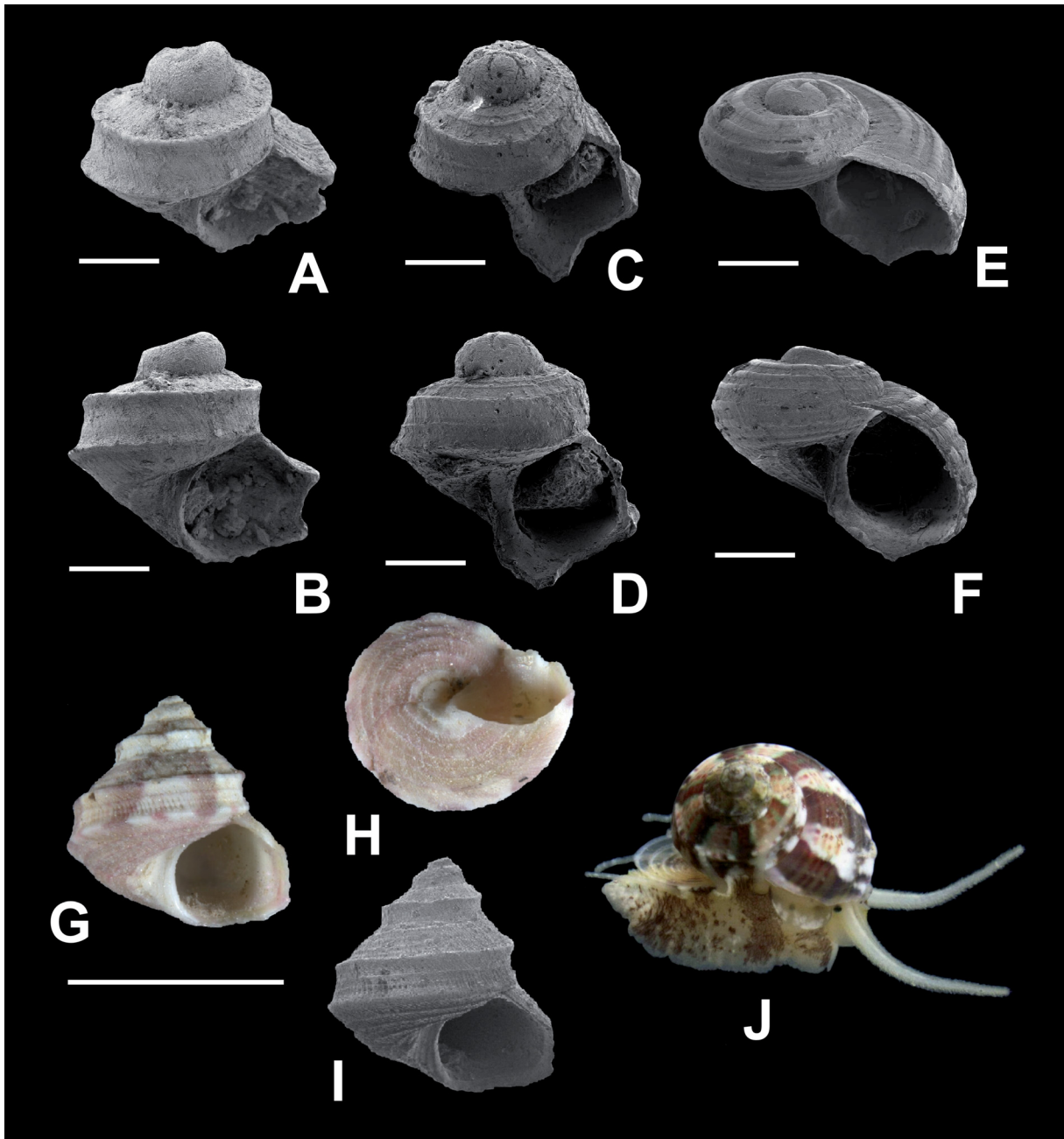


Fig. 9. A–F. Juvenile postmetamorphic shells of cantharidines. A–B. *Jujubinus tingitanus* (Pallary, 1902), CS-PM, Al Hoceima, Cala Iris, Morocco. C–D. *J. gravinae* (Dautzenberg, 1881), CS-PM, Gulf of Arzachena, Sardinia, Italy. E–F. *Steromphala racketsi* (Payraudeau, 1826), CS-PM, Giannutri Island, Italy. G–I. *J. tingitanus*, CS-PM, height 2.8 mm, Al Hoceima, Morocco. J. *Jujubinus tingitanus*, living specimen from Tarifa, Spain (photo courtesy of Serge Gofas). Scale bars: A–F = 0.1 mm; G–H = 2 mm.

GREAT BRITAIN • 5 dd; Aberdeen; labelled “*Trochus montacuti*”; MCZR-M-11778 • 11 dd; Shetlands; “*Shetland, Mc’Andrew*”; MCZR-M-E12/14.

ITALY • 43 dd; Capo D’Anzio, 3 miles off; 40 m depth; bioclastic sediment; CS-PM • 4 dd; Civitavecchia; 40 m depth; fishing boat; CS-PM • 2 dd; San Felice Circeo (LT); 40 m depth; dredging; LT • 2 dd; Ventotene Island; 50 m depth; fishing boat; CS-PM • 1 dd; Livorno; residuals of fishing boats; CS-PM • 1 dd; Capraia Is.; 100 m depth; residuals of fishing boat; CS-PM • 1 dd; Montalto di Castro; 57 m depth; CS-PM • 4 dd; Fiumicino; 160 m depth; residuals of fishing boats; CS-PM • 125 dd; Anzio; 50 m depth; CS-PM • 1 dd; Cape Circeo; 35 m depth; CS-PM • 2 dd; Capri Is.; MCZR-M-E12-11716 • 1 dd; Maratea; 80 m depth; residuals of fishing boats; CS-PM.

SARDINIA • 1 dd; Caprera Is., Punta Crucitta; 78 m depth; CS-PM • 3 dd; La Maddalena Island; 60 m depth; dredging; LT.

SICILY • 3 dd; Palermo, Gulf of Carini; 120 m depth; residuals of fishing boats; CS-PM • 16 dd; Pantelleria Is.; 42 m depth; MO.

SPAIN • 6 dd; Getares (Algeciras); 20 m depth; washing of algae; LT • 4 dd; Málaga; 90 m depth; trawled; CS-PM • 3 lv; Málaga; 90 m depth; trawled, used for DNA sequencing; BAU-2072.1 to BAU-2072.3 • 2 lv; Málaga Bay; 80–90 m depth; fishing nets, used for DNA sequencing; BAU-2073.1, BAU-2073.2 • 1 dd; Málaga Bay; 80–90 m depth; fishing nets; LT • 1 dd; Balears, Majorca Is.; residuals of fishing boats; CS-PM • 3 dd; Alboran Sea; 100–150 m depth; fishing nets; LT.

Description

SHELL. Shell of medium size for the genus, height 5.5–7.1 mm, width 4.2–5.1 mm, height/width ratio 1.30–1.38, conical, slightly shiny. Protoconch seemingly smooth of ca 1 whorl, 0.21–0.22 mm in width. Teleoconch of 4.5–6.5 slightly convex whorls. Sculpture of 5–6 closely set, slightly shouldered spiral cords of about the same strength, including the 2 peripheral ones forming the peripheral cord, and 7–8 regularly spaced, very evident, basal spiral cords. Suture well incised. Teleoconch surface covered by barely visible prosocline growth striae, irregularly set and by strong prosocline lamellae in spiral interspaces. Base convex, umbilicus closed also in juveniles, covered with a white callus. Aperture quadrangular, with the columellar callus thickened in the middle portion. Interior of the aperture whitish, nacreous.

COLOURATION. Colour of protoconch and initial teleoconch whorls whitish brownish; remaining whorls and base cream or hazelnut colour with axial wide lines brownish-reddish spotted and of different size.

SOFT PARTS. Unknown.

Distribution

The Mediterranean Sea (e.g., Nordsieck 1968; Ghisotti & Melone 1975; Terreni 1981; Curini-Galletti & Palazzi 1982; Poppe & Goto 1991; Barash & Danin 1992; Giannuzzi-Savelli *et al.* 1994; Brunet Navarro & Capdevila 2005; Scaperrotta *et al.* 2010; Gofas *et al.* 2011; Manousis 2012; Smriglio *et al.* 2019), and the northeastern Atlantic Ocean from Great Britain and Ireland to the Canary Islands (Jeffreys 1883; Wood 1828; Fretter & Graham 1962; Nordsieck 1968; Rolán 1983; Poppe & Goto 1991; Gofas *et al.* 2011; Smriglio *et al.* 2019), Madeira (Segers *et al.* 2009) and the Canary Islands (Hernández *et al.* 2011); living specimens at depths of 50–95 m.

Remarks

We postpone a decision on the generic classification of this species, pending a study with a wider taxonomic coverage, including more species that are morphologically similar (like e.g., *Jujubinus tumidulus* (Aradas, 1846), *Clelandella artilesi*, *C. azorica* Gofas, 2005, *C. dautzenbergi*, *C. madeirensis*, *C. myriamae* Gofas, 2005, *C. perforata* Gofas, 2005).

Jujubinus catenatus Ardovini, 2006
Species not assayed molecularly – Fig. 10A–C

Jujubinus catenatus Ardovini, 2006: 6–7.

Diagnosis

Shell of medium size for the genus, solid, elevated; sculpture of 4–5 very spaced spiral cords, raised and very granulated, broad interspaces with strong prosocline lamellae, peripheral cord evident.

Type material

Holotype

SICILY • dd; off Mazara del Vallo; 45–70 m depth; Museo Malacologico Piceno, Cupra Marittima.

Paratypes

SICILY • 1 dd; same data as for holotype; Museo Malacologico Piceno, Cupra Marittima (paratype 1) • 2 dd; same data as for holotype; collection Roberto Ardovini, Rome (paratypes 2–3).

Material examined

STRAIT OF SICILY • 3 dd; unprecised locality in the Strait of Sicily; ca 90 m depth; CS-PM.

Description (in parentheses data of the holotype)

SHELL. Shell conical, solid, of medium size for the genus, height 6.0–6.7 (6.3) mm, width 4.1–4.9 (4.9) mm. Protoconch seemingly smooth, of ca 1 whorl, ca 0.2 mm in width. Teleoconch of 6–7 very convex whorls. Sculpture of 4 strong, granulose spiral cords, interspaces almost as wide as cords with very strong prosocline lamellae, and a larger and evident peripheral cord. Suture barely visible. Base convex, with 7–8 regularly spaced basal cords, interspaces crossed by marked prosocline lamellae. Aperture quadrangular, with white columellar callus thickened in the central portion; interior of the aperture whitish, nacreous.

COLOURATION. Colour of protoconch milky white; teleoconch with first three whorls reddish or reddish pink, remaining whorls and base uniformly yellowish greenish with spiral cords reddish brown.

SOFT PARTS. Not known.

Distribution

Currently only known from the Strait of Sicily, Mediterranean Sea, empty shells at depths of 45–90 m.

Remarks

Jujubinus catenatus is clearly diagnosed from species with a similar strongly ‘granulose’ sculpture [like *Jujubinus montagui* (W. Wood, 1828), *J. tumidulus*, or *J. errinae*] by its ‘pear-shaped’ outline. From *J. montagui* it also differs in the less robust spiral cords sculptured by smaller and more spaced tubercles. From *J. tumidulus* it also differs in its larger size (6.0–6.7 mm vs 3–4.5 mm in *J. tumidulus*), and a less dense and weaker tubercles on the spirals.

Jujubinus errinae Smriglio, Mariottini & Giacobbe, 2016
Species not assayed molecularly – Fig. 10D–F

Jujubinus errinae Smriglio, Mariottini & Giacobbe, 2016: 59–66.

Diagnosis

Shell of medium size for the genus, slightly turruculate; sculpture 5 spiral cords, with incised interspaces; strong prosocline lamellae between spiral cords.

Type material

Holotype

SICILY • dd; Strait of Messina; stn POP95-DG04; 38°14'45" N, 15°37'36" E; 100 m depth; MZB-60155.

Paratypes

SICILY • 8 dd; same data as for holotype; Benthic Ecology Lab. Messina University (paratypes A–H) • 1 dd; Strait of Messina; stn POP95-DG001; 38°14'45" N, 15°37'28" E; 90–115 m depth; Benthic Ecology Lab. Messina University (paratype I) • 1 dd; same data as for preceding; CWR (paratype M) • 1 dd; Rada Paradiso, stn PIC02-St 2; 38°13'27" N, 15°36'02" E; 90–115 m depth; Benthic Ecology Lab. Messina University (paratype L) • 5 dd; off Borgo Chianalea (Messina); 38°15'36" N, 15°43'08" E; 40–50 m depth; CS-PM (paratypes N–R) • 3 dd; same data as for preceding; coll. Giuseppe Notaristefano, Messina (paratypes S–U) • 1 dd; same data as for preceding; coll. Rafael Mesa, Lanzarote (paratype V) • 1 dd; same data as for preceding; coll. Bruno Amati, Roma (paratype X) • 1 dd; same data as for preceding; coll. Ermanno Quaggiotto, Logare (paratype Y).

Description (in parentheses data of the holotype)

SHELL. Shell conical, of medium size for the genus, height 4.5–6.0 (4.9) mm, width 3.8–4.7 (4.0) mm, slightly shiny. Protoconch seemingly smooth, of ca 1 whorl, 0.26–0.29 (0.28) mm in width. Teleoconch of 4–4.5 (4.5) slightly convex whorls. Sculpture of 5 strongly granulate, closely set, abapical spiral cords of about the same strength, and a broader peripheral cord formed by 2 merged cordlets; peripheral cord rippled on first two whorls, almost smooth on remaining whorls. Suture incised. Teleoconch surface covered by barely visible prosocline growth striae, irregularly set. And very evident lamellae in the spiral interspaces. Base convex, with 6 regularly spaced, narrow basal spiral cords; umbilicus closed and covered with a white callus. Aperture quadrangular, with the columellar callus thickened in the middle portion; interior whitish nacreous.

COLOURATION. Colour of protoconch whitish, teleoconch spire and base pinkish-creamy, with red spiral cords interrupted by short white spots.

SOFT PARTS. Not known.

Distribution

Currently only known from the Strait of Messina and Ustica Is. (Giacobbe & Renda 2019). Empty shells at depths of 90–115 m, but the record from a bank off Ustica Is. (Giacobbe & Renda 2019) in a sample suggests an origin in a shallower kelp-related habitat.

Remarks

Jujubinus catenatus differs from *J. errinae* in the neatly convex whorls (yielding the typical ‘pearl-like’ outline), the more widely spaced and more granulate spiral cords, and the continuous reddish spiral lines vs the typical reddish spiral lines interrupted by short white spots of *J. errinae*.

Jujubinus montagui differs in its higher height/width ratio, the sculpture of less dense and larger tubercles, and the colouration lacking the interrupted red lines. *Jujubinus tumidulus* differs in its smaller size, the lower height/width ratio, the slightly weaker sculpture. None of the three species has the initial teleoconch whorls so markedly rippled as *J. errinae*, at variance with the remaining whorls.

Jujubinus karpathoensis F. Nordsieck, 1973
Species not assayed molecularly – Fig. 10G–I

Jujubinus karpathoensis F. Nordsieck, 1973: 6–7, 11–12, fig. 1.

Diagnosis

Shell of small size for the genus, solid; sculpture of 3–4 spaced spiral cords, raised, broad interspaces with dense prosocline growth lines; peripheral cord evident and rippled, high height/width ratio.

Type material

Holotype

GREECE • dd; Karpathos Is.; SMF 341874.

Paratypes

GREECE • unprecised number dd; Karpathos Is.; SMF.

Other material examined

GREECE • 3 dd; Petrochóri; 0.5 m depth; CS-PM.

Description (in parentheses data of the holotype)

SHELL. Shell of small size for the genus, conical, height 3.9–4.9 (5.0) mm, width 3.6–4.8 (4.0) mm, height/width ratio 1.0–1.25 (1.25), rather shiny. Protoconch smooth, of ca 1.0 whorls, ca 0.2 mm in width. Teleoconch of 4.5–5.0 slightly convex whorls. Sculpture of 3–5 flat abapical spiral cords of about the same strength, and a broad, evident and rippled peripheral cord formed by 4–5 cordlets. Suture incised. Teleoconch surface covered by barely visible, irregularly set prosocline growth striae. Base convex, with 6–7 regularly spaced, basal flat spiral cords; umbilicus closed also in juveniles, covered with a white callus. Aperture quadrangular, with the columellar callus thickened in the middle portion. Interior of the aperture whitish, yellowish or pinkish nacreous.

COLOURATION. Colour of protoconch and initial teleoconch whorls whitish; remaining whorls and base of cream or whitish background, with brownish-reddish-whitish flammules, of variable size on the basal flat spiral cords, peripheral cord with alternating whitish-yellowish and brownish-red spots.

SOFT PARTS. Unknown.

Distribution

Currently known only from the Aegean Sea, empty shells in shallow waters (0.5 m deep, our material).

Remarks

Jujubinus karpathoensis recalls *J. gravinae* with which it shares the general aspect, and in particular the evident and rippled peripheral cord; the two taxa are clearly related, and we cannot exclude that they are synonyms. It is not common in the Aegean Sea, yet specimens under this names are frequently found in the collections also from other Mediterranean areas. We assume that all records of *J. karpathoensis* from outside the Aegean Sea are misidentifications. Two other species have a similarly rippled peripheral cord,

namely *J. vexationis* and *J. errinae*; both exhibit the rippled cord only on the first 2–3 teleoconch whorls, while *J. karpathoensis* (like *J. gravinae*) on all teleoconch whorls.

Jujubinus tumidulus (Aradas, 1846)
Species not assayed molecularly – Fig. 10J–L

Trochus tumidulus Aradas, 1846: 164–165, pl. 1 fig. 2.

Trochus montagui (W. Wood, 1828) – sensu Monterosato 1872: 29.

Jujubinus vexationis Curini-Galletti, 1990 – sensu Hernández *et al.* 2011: fig. 15j–k.

Diagnosis

Shell cyrtoconoid, of small size for the genus, elevated, thick; sculpture of 4–5 spaced spiral cords, raised and granulose, broad interspaces with dense prosocline lamellae, peripheral cord poorly defined, high height/width ratio.

Type material

Not yet found. Probably the four syntypes (Aradas 1846: 165) are to be searched in the Aradas collection, which is stored partly in the Natural History Museum of Milan, and partly in the Museum of Zoology of Catania.

Other material examined

ITALY • 40 dd; Scilla; 42 m depth; CS-PM.

SICILY • 2 dd; Palermo; “*Jujubinus tumidulus* (Aradas) Palermo”, ex Bellini collection; MCZR • 123 dd; Palermo; “P”; MCZR-M-11713, MTS • 13 dd; San Vito Lo Capo; “S. vito”; MCZR-ME12/4, MTS • 11 dd; Linosa Is., Punta Calcarella; 36 m depth; CS-PM • 50 dd; Linosa Island, Sicchitella Due Ceppi; 28 m depth; CS-PM • 20 dd; Linosa Is.; 50–60 m depth; MO • 15 dd; Pantelleria Is., stn UR92#2; 36°49'24" N, 12°00'53" E; 53 m depth; MO • 3 dd; Marettimo Is.; 80 m depth; MO • 11 dd; Marettimo Is.; 45 m depth; CS-PM • 200+ dd; Lampedusa Is.; 70–80 m depth; residuals of trawlers; CS-PM • 3 dd; Lampedusa Is.; 92 m depth; MO.

UNPRECISED LOCALITY (probably Sicily) • 1 dd; “*Trochus tumidulus* Aradas Pliocen. Pleistocenico”; MCZR.

Description (holotype data not available)

SHELL. Shell solid, cyrtoconoid, of small size for the genus, height 3–4.5 mm, width 2.5–3.3 mm. Protoconch seemingly smooth, of ca 1 whorl, ca 0.2 mm in width. Teleoconch of 4.5–5 regularly convex whorls. Sculpture of 5–6 finely tuberculated spiral cords, interspaces twice as wide as the spirals, and 2 slightly smaller cords merged to form a non-prominent, broader peripheral cord. Suture incised. Teleoconch surface covered by fine prosocline growth lines, interspaces crossed by dense prosocline lamellae. Base convex, with 6–7 flat, granulose basal cords; umbilicus closed; covered by a whitish callus. Aperture quadrangular, with columella callus only barely thickened in the middle portion. Interior of the aperture whitish nacreous.

COLOURATION. Protoconch whitish. Colouration variable, teleoconch of whitish, yellowish or pinkish background, with irregularly arranged darker or lighter spots and blotches, sometimes with tubercles on the spirals darker, usually with alternating white and darker blotches on the peripheral cord. Completely dark or light monochrome specimens are also known. Base generally the same colour as the protoconch with spirals dotted of reddish or brownish.

SOFT PARTS. Not known.

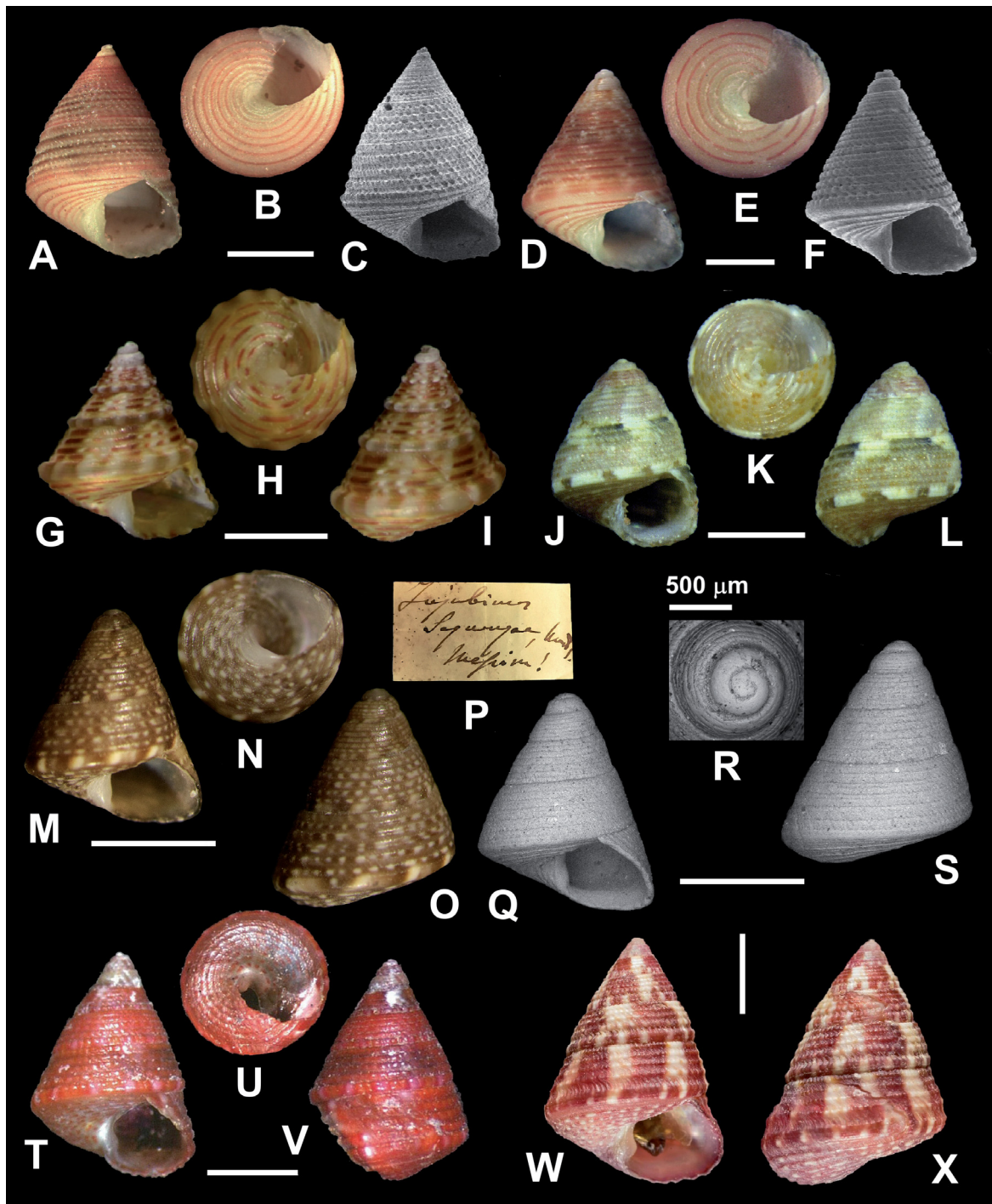


Fig. 10. A–C. *Jujubinus catenatus* Ardovini, 2006, CS-PM, height 5.2 (H) X 3.7 (W) mm, Strait of Sicily. D–F. *J. errinae* Smriglio, Mariottini & Giacobbe, 2016, holotype, MZB60155, 4.9 × 4.0 mm, (38°14'45" N, 15°37'36" E), Strait of Messina, Sicily, Italy, 100 m depth. G–I. *J. karpathoensis* F. Nordsieck, 1973, CS-PM, height 3.9 mm, Petrochori, Greece. J–L. *J. tumidulus* (Aradas, 1846), MO, Lampedusa Island, Sicily, Italy, 92 m depth. M–S. *J. seguenzae* Ghisotti & Melone, 1975, MCZR-M 11741, height 4.1 mm, Messina. T–V. *J. augustoi* Rolán & Gori, 2009, paratype, MNHS, height 4.7 mm, Miniero Reef (00°23'016" N, 6°46'228" E), São Tomé, 43 m depth (after Rolán & Gori 2009: figs 4–6). W–X. *J. fulgor* Gofas, 1991, holotype, MNHN-IM-2000-30359, height 6.5 mm, Praia do Cesar-Baie de Lucira (13°52' S, 12°30' E), Angola, 10 m depth. Scale bars = 2 mm.

Distribution

Described as a fossil from Gravitelli (Messina, Sicily, probably Pliocene) by Aradas (1846) and reported as Recent from the port of Messina, Lipari and Palermo (Sicily) by Curini-Galletti & Palazzi (1982), from the Gulf of Carini (Palermo) by Scaperrotta *et al.* (2009) and from Ganzirri, Messina by Scuderi *et al.* (2019), here recorded from Marettimo, Linosa and Lampedusa, empty shells at depths of 30–100 m.

Remarks

Although never recorded from outside the Mediterranean, a specimen from the Canary Islands figured under the name “*Jujubinus vexationis*” by Hernández *et al.* (2011: fig. 15j–k) is very similar to *J. tumidulus*. It is an easily recognizable species, resembling a small *J. montagui*, from which it differs in the more neatly cyrtocoid outline and the smaller size.

Jujubinus seguenzae Ghisotti & Melone, 1975
Species not assayed molecularly – Fig. 10M–S

Jujubinus seguenzae Ghisotti & Melone, 1975: 208.

Diagnosis

Shell of medium size for the genus, elevated, thick; sculpture of 5–6 spaced spiral cordlets, raised and scarcely sculptured, broad interspaces with weak prosocline lamellae, peripheral cord evident, high height/width ratio.

Type material

Syntypes

SICILY • unprecised number dd; Messina; Coen collection (n. 6527), Hebrew University of Jerusalem (Israel).

Other material examined

SICILY • 14 dd; Messina; MCZR-M-11471 • 114 dd; S. Reniero, Messina; MCZR-M-11471 • 2 dd; Messina; CS-PM.

Description (holotype data not available)

SHELL. Shell conic, solid, with medium size for the genus, height 3.5–5.4 mm, width 3.0–4.5 mm. Protoconch seemingly smooth, of ca 1 whorl, ca 0.2 mm in width. Teleoconch of 4.5–5.5 convex whorls. Sculpture of 5–6 spiral cords of almost equal size (sometimes formed by two merged cordlets), and a broader, not very prominent peripheral cord. Interspaces narrow, sculptured by weak prosocline lamellae. Suture not incised. Base flat or barely convex, with 5–6 flat basal spiral cords. Umbilicus closed also in juveniles, covered with a white callus. Aperture quadrangular, with the columellar callus thickened in the lower third.

COLOURATION. Interior of aperture whitish nacreous. Colour of the protoconch whitish. Teleoconch of greyish-brown background, with small whitish spots on spiral cords, iridescent in fresh specimens

SOFT PARTS. Epipodial tentacles greyish, with white knob-shaped sense organ at the base. Foot background creamy, with brown small dashes and large spots arranged in two main rows and one of smaller spots, alternated to white ones. Cephalic tentacles greyish, with thin dark little lines and small white dots. Eye stalks brownish dorsally, whitish ventrally, eyes black encircled by a creamy crown. Snout dark-brown, a whitish terminal band with a thin dark terminal stripe (Scuderi 2023).

Distribution

Currently only known from the eastern coasts of Sicily, in very shallow waters (Scuderi *et al.* 2019; Scuderi 2023).

Remarks

Jujubinus seguenzae is similar to *J. striatus* and *J. angustibasis* sp. nov. (with the latter is also found sympatrically) but is constantly smaller than both species but its size (3.5–5.4 mm vs 6.1–8.2 mm of *J. striatus* and 4.6–7.2 mm of *J. angustibasis*), and the microsculpture of prosocline lamellae is rather weak in *J. seguenzae* vs strong in *J. striatus* and *J. angustibasis*.

Jujubinus augustoi Rolán & Gori, 2009
Species not assayed molecularly – Fig. 10T–V

Jujubinus augustoi Rolán & Gori, 2009: 10–16.

Diagnosis

Shell of small size for the genus, elevated, thick; sculpture of 5–6 spaced spiral cords, raised and nodulose, with smaller interspaces and prosocline irregular striae; peripheral cord evident, high height/width ratio.

Type material

Holotype

SÃO TOMÉ • dd; Minerio Reef; 00°23'016" N, 6°46'228" E; 43 m depth; MNCN 15.05/47563.

Paratypes

SÃO TOMÉ • 1 dd; same data as for holotype; MNHN • 1 dd; same data as for holotype; MHNS • 1 dd; same data as for holotype; BMNH • 1 dd; same data as for holotype; collection Sandro Gori, Livorno.

Description (in parentheses data of the holotype)

SHELL. Shell conical, solid, of small size for the genus, height 4–4.9 (4.4) mm, width 3.0–3.4 (3.0) mm. Protoconch seemingly smooth, of ca 1 whorl, 0.15–0.20 mm in width. Teleoconch of 6–6.5 (6) flat and rapidly increasing whorls. Sculpture of 4 barely nodulose cords separated by smaller interspaces on first teleoconch whorl; 5–6 nodulose cords on following whorls, and a larger and prominent, nodulose, peripheral cord. Microsculpture of very prosocline irregular striae between the nodulose cords. Base convex, with 7–9 spiral cords with interspaces of similar size. Aperture broadly quadrangular, rounded anteriorly, with a columellar callus on the lower third. Interior of the aperture white, nacreous.

COLURATION. Colour of protoconch milky white; teleoconch red, with sparse white spots, larger on the peripheral cord; alternatig red and white segments on the spirals of the base.

SOFT PARTS. Not known.

Distribution

Only known from the type locality, Minerio Reef, São Tomé; empty shells at a depth of 43 m.

Remarks

Jujubinus augustoi is very similar to *J. pseudogravinae*, in their granulose spirals and the colouration dominated by red on the teleoconch, and the protoconch white. It differs in its smaller size, smaller protoconch, and more numerous spiral cords

Jujubinus augustoi is also similar to *J. exasperatus*, with which it was originally compared; it differs in the smaller size, the larger nodules on the spirals, the fewer spirals on the base. It differs from *J. gravinae* in its smaller size and smaller protoconch, and the less nodulose spiral cords with more regular and stronger prosocline lamellae in the interspaces (Rolán & Gori 2009).

Jujubinus fulgor Gofas, 1991
Species not assayed molecularly – Fig. 10W–X

Jujubinus fulgor Gofas, 1991: 21–24.

Diagnosis

Shell of medium size for the genus, elevated, thick; sculpture of 3–4 spaced spiral cordlets, raised and very granulated, broad interspaces with strong prosocline lamellae, peripheral cord evident, high height/width ratio.

Type material

Holotype

ANGOLA • dd; Baie de Lucira (Praia do Cesar); 13°52' S, 12°30' E; 10 m depth; MNHN-IM-2000-30359.

Paratypes

ANGOLA • 1 dd; same data as for holotype; MNHN • 8 dd; Baie de Santa Maria; MNHN • 1 dd; same locality as for preceding; MNCN • 1 dd; same locality as for preceding; Instituto de Investigação Científica Tropical, Lisbon.

Description (in parentheses data of the holotype)

SHELL. Shell conical, solid, of medium size for the genus, height 5.0–6.5 (6.5) mm, width 3.8–4.7 (4.7) mm, slightly shiny. Protoconch seemingly smooth, of ca 1 whorls, 0.28 mm in width. Teleoconch of 5.5–7 whorls, the first rather convex, the others slightly convex. Sculpture of 3 spiral cords on first whorl, four on the remaining ones, with interspaces twice as wide as the spiral cords, and a broader, weakly sculptured, peripheral cord, formed by 2–3 merged cordlets. Suture incised. Growth striae barely visible; interspaces sculptured by very strong, prosocline lamellae. Base flat (or barely concave), with 7 regularly spaced, basal spiral cords; umbilicus closed, covered with a whitish callus. Aperture quadrangular, with columellar callus in the lower third. Interior of aperture whitish nacreous.

COLOURATION. Colour of the protoconch whitish. Teleoconch colour of red background, with broad vertical whitish flame-like blotches, extending over the peripheral cord. Base reddish, with basal cords slightly darker, interrupted by small white blotches.

SOFT PARTS. Not known.

Distribution

Currently only known from Angola (Gofas 1991) with empty shells at a depth of 10 m.

Remarks

Jujubinus fulgor differs from *J. exasperatus* in the different sculpture of less strongly tuberculated spiral cords, with wider interspaces, the less evident peripheral cord, and the slightly more convex outline. *Jujubinus baudoni* is somehow similar, especially in the slightly convex outline and similar colouration, but is diagnosed by its stronger granulation of the spirals and the narrower interspaces.

***Jujubinus hernandezi* Rolán & Swinnen, 2009**
Species not assayed molecularly – Fig. 11A–B

Jujubinus hernandezi Rolán & Swinnen, 2009: 1–9.

Diagnosis

Shell of small size for the genus, elevated, thick; sculpture of 3–5 well spaced and raised spiral cords, broad interspaces with strong prosocline lamellae, peripheral cord evident, high height/width ratio.

Type material

Holotype

CANARY ISLANDS • dd; Punta del Lajial, El Hierro; MNCN 15.05/47568.

Paratypes

CANARY ISLANDS • 38 dd; same data as for holotype; MNHN • 1 dd; same data as for holotype; BMNH • 1 dd; same data as for holotype; MNHC • 2 dd; same data as for holotype; MHNS • 33 dd; same data as for holotype; FS • 1 dd; Santa Cruz de La Palma; coll. Ramón Gómez, La Palma • 2 dd; Tenerife, Puerto de la Cruz; coll. Ramón Gómez, La Palma • 20 dd; La Palma; coll. José María Hernández, Gáldar, Las Palmas • 10 dd; NW Gran Canaria; coll. José María Hernández, Gáldar, Las Palmas.

Description (in parentheses data of the holotype)

SHELL. Shell conical, solid, shiny, of small size for the genus, height 3.0–5.0 (3.0) mm; width 2.7–4.4 (2.6) mm. Protoconch seemingly smooth, of ca 1 whorl, ca 0.20 mm in width. Teleoconch of 3.5–5.5 convex and whorls. Sculpture of 3–4 raised and stepped non-granulose spiral cords, the uppermost frequently stronger and more prominent, and a broad and prominent peripheral cord. Interspaces narrower than spiral cords, sculptured by dense prosocline growth lines. Base convex, with 6–7 (7) regularly spaced basal spiral cords, flat, smooth. Umbilicus closed also in juveniles, covered with a white callus. Aperture quadrangular, with columellar callus weakly thickened on lower third only in adults.

COLOURATION. Interior of aperture whitish nacreous. Colour of the protoconch whitish; teleoconch with reddish, pink, brownish or greenish background, with white vertical blotches, often darker edges. Base with spirals of same colour as background, interrupted by white small blotches.

SOFT PARTS. Not known.

Distribution

Only known from the Canary Islands, with empty shells at a depth of 5–27 m.

Remarks

The sculpture of *J. hernandezi* is very peculiar, with its strong but smooth spiral cords (the uppermost frequently stronger and prominent), and a very prominent peripheral cord. This makes *J. hernandezi* easily diagnosable among the northeastern Atlantic species of the genus (Rolán & Swinnen 2009).

***Jujubinus mabelae* Rolán & Swinnen, 2009**
Species not assayed molecularly – Fig. 11C–D

Jujubinus mabelae Rolán & Swinnen, 2009: 3–5.

Diagnosis

Shell of small size for the genus, elevated, thick; sculpture of 4–5 well spaced and raised spiral cords, the uppermost broader, interspaces with small prosocline lamellae, peripheral cord evident, high height/width ratio.

Type material

Holotype

CANARY ISLANDS • dd; Tenerife, Fañabé; 5–27 m depth; MNCN 15.05/47569.

Paratypes

CANARY ISLANDS • 1 dd; same data as for holotype; MNHN • 1 dd; same data as for holotype; BMNH • 1 dd; same data as for holotype; MNHC • 75 dd; same data as for holotype; MHNS • 5 dd; same data as for holotype; FS • 2 dd; same data as for holotype; coll. Ramón Gómez, La Palma • 2 dd; same data as for holotype; coll. Roland de Prins, Brussels • 5 dd; same data as for holotype; coll. José María Hernández, Gáldar, Las Palmas • 4 dd; same data as for holotype; coll. Juan Horro, Vigo.

Description (in parentheses data of the holotype)

SHELL. Shell conical, solid, shiny, of small size for the genus, height 3.3–4.7 mm (4.7), width 2.4–3.4 (3.4) mm. Protoconch seemingly smooth, of ca 1.5 whorls, ca 0.30 mm in width. Teleoconch of 5.5–6.5 convex whorls. Sculpture of 5–7 (6) flat abapical cords, the uppermost broader, and a broader and slightly prominent peripheral cord. Suture not incised. Interspaces narrower than spiral cords, sculptured by dense prosocline growth lines. Base convex, with 6–7 (6) spiral cords; umbilicus closed also in juveniles, covered with a white callus. Aperture quadrangular, with the columellar callus weakly thickened on lower third, only in adults. Interior of the aperture whitish nacreous.

COLOURATION. Colour of protoconch white. Teleoconch of cream or reddish background, with irregular axial prosocline white stripes lined adaperturally with brown, producing white/brown blotches on the peripheral cord; basal cords with similar white blotches lined of brown, over the creamy or reddish background.

SOFT PARTS. Not known.

Distribution

Only known from the type locality, Tenerife, Canary Islands, with empty shells at depths of 5–27 m.

Remarks

The almost smooth spiral cords, the broader but not prominent uppermost cord, along with the typical colouration with white vertical stripes/blotches lined adaperturally of brown (similarly replicated on the base with white and brown blotches on the spirals), makes *J. mabelae* rather easily identifiable. The absence of strong prosocline lamellae in the interspaces and of tubercles on the spirals easily separates *J. mabelae* from most species with convex whorls (see under *J. poppei* for diagnostic characters).

Jujubinus poppei Curini-Galletti, 1985
Species not assayed molecularly – Fig. 11E–G

Jujubinus poppei Curini-Galletti, 1985: 133–139.

Diagnosis

Shell of small size for the genus, cyrtoconoid; sculpture of 4 flat and smooth spiral cordlets, raised and not granulated, narrow interspaces with very fine prosocline lamellae, peripheral cord evident, high height/width ratio.

Type material

Holotype

CANARY ISLANDS • 1 dd; Lanzarote Is., harbour of Arrecife; 28°57' N, 13°32' W; USNM 784712.

Paratypes

CANARY ISLANDS • 1 dd; same data as for holotype; USNM 784713 (paratype I) • 2 dd; same data as for holotype; RBINS 387-26439 (paratypes A and H).

Other paratypes in the collections G.T. Poppe (Mactan) and M. Curini-Galletti (Sassari).

Other material examined

CANARY ISLANDS • 4 dd; Lanzarote Is., Arrecife; 2 m depth; MO.

Description (in parentheses data of the holotype)

SHELL. Shell cyrtoconoid, solid, shiny, of small size for the genus, height 2.7–4.8 (3.4) mm, width 2.9–4.1 (2.9) mm. Protoconch seemingly smooth, of ca 1.5 whorls, ca 0.2 mm in width. Teleoconch with 4–5.5 (5) very convex whorls. Sculpture of 6–7 (7) spiral cords of about the same strength, and a broader and slightly prominent peripheral cord. Suture incised. Interspaces narrower than spirals; microsculpture of very fine, markedly prosocline lamellae. Base slightly convex, with 6 basal cords slightly smaller than interspaces; umbilicus closed and covered by a whitish callus, but umbilical chink barely visible in juveniles. Aperture quadrangular, with columellar callus barely thickened on lower third. Interior of aperture whitish-greyish nacreous.

COLOURATION. Protoconch whitish. Teleoconch background colour brown on spire and base, sometimes with darker spirals and peripheral cord, and irregular white spots and blotches.

SOFT PARTS. Not known.

Distribution

Arrecife, Lanzarote, Canary Islands, with empty shells at a depth of 2 m.

Remarks

The small size, the almost smooth spiral cords, and the neatly cyrtoconoid outline make *J. poppei* easily distinguished from almost all other species of *Jujubinus*. It is similar to the nominal taxon *Jujubinus guanchus* (which is here recognised as a synonym of *J. ruscurianus*), described from the same area: *J. poppei* differs in its more neatly cyrtoconoid outline, and the weaker but more numerous spiral cords (6–7 vs 3–4 in *J. guanchus* and 5–6 in *J. ruscurianus*). *Jujubinus tingitanus* has a similarly *Gibbula*-like outline, but is easily diagnosed by its lower height/width ratio, and the strongly keeled shell with two major strong spiral cords.

Jujubinus rubioi Rolán & Templado, 2001
Species not assayed molecularly – Fig. 11H–J

Jujubinus rubioi Rolán & Templado, 2001: 52–54.

Diagnosis

Shell of medium size for the genus, elevated, thick; sculpture of 6–7 granulate spiral cords, interspaces with evident prosocline lamellae, rippled peripheral cord evident, high height/width ratio.

Type material

Holotype

CAPE VERDE • dd; Mordeira Bay, Sal Island; MNCN 15.05/44459.

Paratypes

CAPE VERDE • 1 dd; same data as for holotype; MNCN 15.05/44459 • 2 dd; same data as for holotype; MNHN • 2 dd; same data as for holotype; AMNH • 19 dd; same data as for holotype; coll. Emilio Rolán, Vigo.

Other material examined

CAPE VERDE • 1 dd; Maio Island; CS-PM.

Description (in parentheses data of the holotype)

SHELL. Shell conical, solid, of medium size for the genus, height 4.5–6.0 (4.9) mm, width 3.4–4.8 (3.9) mm, shiny. Protoconch seemingly smooth, of ca 1 whorl, ca 0.30 mm in width. Teleoconch of 5–6 (6) convex whorls. Sculpture with 4–6 (6) narrow, finely granulose whorls, interspaces narrower than the spirals, and a prominent and rippled peripheral cord formed by 2–3 merged cordlets. Suture not incised. Growth lines barely visible, interspace of spirals crossed by thick, prosocline lamellae. Base convex, with 6 irregular spiral cords alternate with smaller cordlets; umbilicus closed, covered with a white callus. Aperture quadrangular, with the columellar callus slightly thickened in the lower third. Interior of aperture whitish nacreous.

COLOURATION. Colour of the protoconch whitish. Teleoconch with variable colouration, background colour cream to light green, with scattered white spots and greenish-brown or light olive-green flammules, and red blotches on the peripheral cord; base with the same colour pattern with the basal cords colourful of alternating reddish-brownish and whitish.

SOFT PARTS. Not known.

Distribution

Sal and Maio Islands, Cape Verde Archipelago, with empty shells at a depth of ca 10 m.

Remarks

Jujubinus rubioi is rather similar to *J. gravinae*, especially for the rippled peripheral cord, but differs in its scabrous sculpture of prosocline lamellae. *Jujubinus vexationis* is also similar but its peripheral cord is evidently rippled only in the first 2–3 whorls.

Jujubinus silbogomerus Smriglio, Mariottini & Swinnen, 2019
Species not assayed molecularly – Fig. 11K–M

Jujubinus silbogomerus Smriglio, Mariottini & Swinnen, 2019: 359–364.

Diagnosis

Small and little conical shell, with sculpture of incised spiral lines and strong prosocline lamellae between and over spiral cords, micropustules within interspaces

Type material

Holotype

CANARY ISLANDS • dd; La Gomera Is., San Sebastian, off Playa de la Cueva; 28°06' N, 17°06' W; 18 m depth; RBINS, MT.3820/I.G.34082.



Fig. 11. **A.** *Jujubinus hernandezi* Rolán & Swinnen, 2009, holotype, MNCN 15.05/47568, height 3.0 mm, Punta del Lajial, El Hierro, Canary Islands (after Rolán & Swinnen 2009: fig. 1). **B.** *J. hernandezi*, paratype, coll. Juan Horro, Punta del Lajial, El Hierro, Canary Islands (after Rolán & Swinnen 2009: fig. 6). **C–D.** *J. mabelae* Rolán & Swinnen, 2009, holotype, MNCN 15.05/47569, height 4.7 mm, Fanabé, Tenerife, Canary Islands, 5–27 m depth (Rolán & Swinnen 2009: figs 24–25). **E–G.** *J. poppei* Curini-Galletti, 1985, paratype, coll. Curini-Galletti, height 3.0 mm, harbour of Arrecife (28°57' N, 13°32' W), Lanzarote, Canary Islands, 3–5 m depth. **H–J.** *J. rubioi* Rolán & Templado, 2001, holotype, MNCN 15.05/44459, height 4.9 mm, Mordeira Bay, Sal Island, Cape Verde Archipelago (after Rolán & Templado 2001: figs 22–24). **K–M.** *J. silbogomerus* Smriglio, Mariottini & Swinnen, 2019, holotype, RBINS MT.3820/I.G.34082, height 2.8 mm, La Gomera Island, Canary Islands, 18 m depth. **N–P.** *J. rafaelmesai* Rolán & Swinnen, 2013, holotype, RBINS, IG. 32400 MT. 2821, height 8.5 mm, Punta Jandía, south of Fuerteventura, Canary Islands, 600 m depth (after Rolán & Swinnen 2013: figs 11–13). Scale bars = 2 mm.

Paratypes

CANARY ISLANDS • 1 dd; same data as for holotype; MNHN-IM-2014-7994 (paratype A) • 7 dd; same data as for holotype; CS-PM (paratypes B, M–S) • 10 dd; same data as for holotype; FS (paratypes C–L).

Material examined

CANARY ISLANDS • 3 dd juvs; same data as for holotype; FS.

Description (in parentheses data of the holotype)

SHELL. Shell conical, of small size for the genus, height 2.8–3.0 (2.8) mm, width 2.5–2.8 (2.8) mm, slightly shiny. Protoconch seemingly smooth, of about 1.5 whorls, ca 0.25 mm in width. Teleoconch of 4.5 slightly convex whorls, stepped shoulder on first two whorls. Sculpture of 6 regularly spaced abapical spiral cords, of about the same strength, and a strong basal cord (more pronounced on first whorls). Suture incised. Surface of the teleoconch completely covered by strong prosocline lamellae, regularly spaced, with dense micropustules in the interspaces. Base convex, with 6–7 (7) basal spiral cords, umbilicus closed and covered with a white callus. Aperture quadrangular, with the columellar callus slightly thickened in the middle portion. Interior of the aperture whitish nacreous.

COLOURATION. Colour of protoconch whitish. Teleoconch yellowish-creamy, with brownish quadrangular spots on spire and base, brown blotches on basal cord.

SOFT PARTS. Not known.

Distribution

Currently only known from La Gomera Is., Canary Islands, empty shells in 18 m depth.

Remarks

Jujubinus silbogomerus is similar to *J. poppei*, from which differs in the strong prosocline lamellae (very fine in *J. poppei*) and the micropustules in the interspaces. *Jujubinus montagui* and *J. tumidulus* share a microsculpture of strong lamellae, but they lack the micropustules in the interspaces, and *J. montagui* is larger in size (height 5.5–7.1 mm vs 2.8–3.0 mm in *J. silbogomerus*).

Jujubinus rafaelmesai Rolán & Swinnen, 2013
Species not assayed molecularly – Fig. 11N–P

Jujubinus rafaelmesai Rolán & Swinnen, 2013: 172–177.

Jujubinus sp. – Hernández *et al.* 2011: 67, fig. 16b–c.

Diagnosis

Shell of medium size for the genus, elevated, thick; sculpture of 6–8, very flat spiral cordlets, separated by incised lines, and crossed by prosocline growth lines; peripheral cord not evident, prosocline lamellae between cords absent, high height/width ratio.

Type material

Holotype

CANARY ISLANDS • dd; Fuerteventura, Punta Jandía; 600 m depth; RBINS IG. 32400 MT. 2821.

Paratypes

CANARY ISLANDS • 1 dd; same data as for holotype; MNCN • 1 dd; same data as for holotype; coll. Roland de Prins, Brussels • 2 dd; same data as for holotype; FS • 1 dd; same data as for holotype; coll. Rafael Mesa, Lanzarote.

Description (in parentheses data of the holotype)

SHELL. Shell conical, solid, shiny, of medium size for the genus, height 6.0–8.5 (8.5) mm, width 4.8–6.2 (6.2) mm. Protoconch seemingly smooth, of ca 1 whorl, ca 0.2 mm in width. Teleoconch of 4.5–5.5 (5) flat or barely convex whorls. Sculpture of 9–10 narrow, not exactly equal in size, abapical spiral whorls, finely granulose in the first whorls, and a broad and not evident peripheral cord. Suture incised. Teleoconch surface covered by evident, dense, very prosocline growth lines. Base convex, with 10–12 irregular, flat spiral cords; umbilicus closed, covered with a white callus. Aperture quadrangular, with the columellar callus thickened in the middle portion. Interior of the aperture whitish-pinkish nacreous.

COLOURATION. Colour of the protoconch white. Teleoconch of pink-reddish background, with scattered white spots and irregularly arranged whitish stripes of variable breadth; base with the same colour pattern.

SOFT PARTS. Not known.

Distribution

Only known from the type locality, Fuerteventura, Canary Islands, with empty shells at a depth of 600 m (but see Remarks).

Remarks

The known specimens of *J. rafaelmesai* (all empty shells) have been collected at a very high depth (600 m) compared with all the other species of the genus, and in our opinion, an origin of the shells from shallower habitats is very probable. The general habitus recalls that of the species in the *J. curinii* complex from which it differs in its larger size and the chromatic pattern: a relationship with this complex is worthy an investigation. Similarly, along with the peculiar chromatic pattern, the large size separates *J. rafaelmesai* from the other Canarian species devoid of evident tubercles or lamellae (6–8.5 mm vs 4.7 mm in *J. mabelae*, 3.5 mm in *J. poppei*, and 3.4 mm in *J. guanchus* (Curini-Galletti 1985)).

Jujubinus alboranensis Smriglio, Mariottini & Oliverio, 2015
Species not assayed molecularly – Fig. 12A–C

Jujubinus alboranensis Smriglio, Mariottini & Oliverio, 2015: 151–157.

Diagnosis

Shell of medium size for the genus, light, slightly turriculate; sculpture of only incised spiral lines, prosocline lamellae between cords absent.

Type material

Holotype

ALBORAN SEA • dd; Alborán Island; 35°56'43.99" N, 3°02'03.73" W; MNHN-IM-2000-30131.

Paratypes

ALBORAN SEA • 1 dd; same data as for holotype; MNHN-IM-2000-30132 (paratype 1) • 2 dd; same data as for holotype; MZB-60153 (paratype 2), MZB-60154 (paratype 3) • 2 dd; same data as for holotype; MCZR00225A (paratype 4), MCZR00225B (paratype 5) • 2 dd; same data as for holotype; MNCN 15.05/60160 (paratypes 6–7) • 13 dd; same data as for holotype; CS-PM (paratypes 8–20) • 102 dd; same data as for holotype; MO (paratypes 21–122).

Other material examined

ALBORAN SEA • 8 dd; same data as for holotype; CS-PM.

Description (in parentheses data of the holotype)

SHELL. Shell conical, slightly turriculate, of medium size for the genus, height 6.5–8.9 (6.8) mm, width 5.0–6.0 (5.3) mm, light. Protoconch seemingly smooth, of ca 1.1 whorl, 0.37–0.40 (0.39) mm in width. Teleoconch of 4.5–5.5 (4.5) slightly convex whorls. Sculpture of 8–10 (9) flat, weak and closely set abapical spiral cords of about the same strength, and a weak peripheral cord, slightly shouldered, formed by 2–3 (3) merged cordlets. Suture incised. Teleoconch surface covered by barely visible prosocline growth striae, irregularly set. Base convex, with 7–8 (8) regularly spaced, basal spiral cords, large and flat; umbilicus closed also in juveniles, covered with a white callus. Aperture quadrangular, with the columellar callus thickened in the middle portion. Interior of the aperture whitish, nacreous.

COLOURATION. Colour of protoconch and early teleoconch whorls bright red; remaining whorls and base with alternating brownish-reddish and yellowish-orange spiral stripes (of different size in the holotype), with the upper part of the brownish-reddish stripes dotted with red.

SOFT PARTS. Unknown.

Distribution

Known only from the type locality, Alborán Island, with empty shells at depths of 30–37 m.

Remarks

Jujubinus alboranensis is a member of the *J. curini* complex, and differs from most of the Atlantic and Mediterranean *Jujubinus* species by lacking the typical prosocline lamellae in the spiral furrows between cords, see under *J. curinii*, *J. eleonora*, *J. browningleeae* Smriglio, Mariottini & Swinnen, 2018, *J. roseus*, and *J. trilloi* for diagnostic differences.

Jujubinus browningleeae Smriglio, Mariottini & Swinnen, 2018
Species not assayed molecularly – Fig. 12D–F

Jujubinus browningleeae Smriglio, Mariottini & Swinnen, 2018: 325–332.

Diagnosis

Shell of medium size for the genus, slightly turriculate; sculpture of flat spiral cords delimited by narrow incised spiral lines, prosocline lamellae between cords absent.

Type material

Holotype

PORTUGAL • dd; Goringe Ridge, 130 miles off Cape St Vincent; RBINS: I.G.33787/MT.3687.

Paratype

PORTUGAL • 1 dd; same data as for holotype; FS.

Description of the holotype

SHELL. Shell conical, slightly turriculate, of medium size for the genus, height 5.2 mm, width 3.8 mm. Protoconch seemingly smooth, of ca 1 whorls, 0.27 mm in width. Teleoconch of 5.5 slightly convex whorls. Sculpture consisting of 6 flat, regularly spaced, spiral cords, slightly shouldered, delimited by incised spiral lines, and a broader and evident basal cord. Suture well incised. Teleoconch surface entirely covered by evident prosocline growth striae. Base convex, with 7 basal spiral cords, of unequal size, large and flat; umbilicus closed and covered with a whitish callus. Aperture quadrangular, with the columellar callus thickened in the middle portion. Interior of the aperture whitish, nacreous.

COLOURATION. Colour of protoconch and earliest teleoconch whorls reddish, remaining whorls and base uniformly dark-brown with axial wavy and narrow yellow stripes.

SOFT PARTS. Not known.

Distribution

Only known from the bank of the Gorringe Ridge, with empty shells at a depth of 30 m.

Remarks

Jujubinus browningleeae is the first species of the *Jujubinus curinii* complex discovered in the Atlantic Ocean, all other species being exclusively Mediterranean. *Jujubinus browningleeae* differs from *J. curinii* in its almost non-stepper whorls, the fewer spiral cords, the broader peripheral cord, and the darker colouration.

From *J. alboranensis* and *J. trilloi* it differs in the fewer spiral cords, the broader peripheral cord, and the darker colouration. From *J. eleonora* it differs in the weaker spiral sculpture with narrower interspaces, and the darker colouration.

Jujubinus curinii Bogi & Campani, 2006
Species not assayed molecularly – Fig. 12G–I

Jujubinus curinii Bogi & Campani, 2006: 99–101.

Diagnosis

Shell of small size for the genus, solid, with stepped spire; sculpture of only incised spiral lines, prosocline lamellae between cords absent.

Type material

Holotype

ITALY • dd; Strait of Messina, Scilla; 38°15'36" N, 15°43'08" E; 42 m depth; Museo di Storia Naturale, Livorno (Malacology, V-730).

Paratypes

ITALY • 1 dd; same data as for holotype; MZB-45234 (unnumbered paratype) • 1 dd; same data as for holotype; coll. Cesare Bogi, Livorno (paratype A) • 1 dd; same data as for holotype; coll. Enzo Campani, Livorno (paratype B) • 2 dd; same data as for holotype; coll. Francesco Ciriaco, Livorno (unnumbered paratypes).

Other material examined

ITALY • 200 dd; same data as for holotype; CS-PM.

Description (in parentheses data of the holotype)

SHELL. Solid shell of small size for the genus, height 3.9–4.6 (4.0) mm, width 2.9–3.0 (3.1) mm, conical, solid. Protoconch seemingly smooth of ca 1.1 whorls, ca 0.3 mm in width. Teleoconch of 5–6 (6) flat or barely convex whorls. Sculpture of 10 flat, weak, smooth spiral cords, merged into 5 pairs separated by incised spiral lines, and a peripheral pair of slightly broader cords. Suture incised, with one non-protruding sutural cingulate. Teleoconch with shiny surface covered by barely visible prosocline growth striae, irregularly set. Base convex, with 9–10 flat, broad, spaced spiral cords, umbilicus closed also

in juveniles, covered with a white callus. Aperture quadrangular, with the columellar callus slightly thickened in the central portion. Interior of the aperture whitish, nacreous.

COLOURATION. Colour of protoconch and early teleoconch of shiny reddish-brown background, remaining whorls brownish (occasionally greenish), with small white blotches and spots.

SOFT PARTS. Not known.

Distribution

Only known from the Strait of Messina, with empty shells at a depth of 42 m.

Remarks

Jujubinus curinii was the first of this group of ‘smooth’ species described for the Mediterranean Sea (Bogi & Campani 2006), all lacking the typical prosocline lamellae in the spiral furrows between cords. It differs from *J. alboranensis* in its smaller size (3.9–4.6 mm vs 6.5–8.9 mm in *J. alboranensis*), and the different colouration (shiny reddish-brown with whitish blotches and spots vs yellowish-orange narrow spirals with alternating bright red dots and spots in *J. alboranensis*). *Jujubinus curinii* is apparently endemic to the Strait of Messina, *J. alboranensis* to the Alboran Sea.

Jujubinus eleonora Smriglio, Di Giulio & Mariottini, 2014
Species not assayed molecularly – Fig. 12J–L

Jujubinus eleonora Smriglio, Di Giulio & Mariottini, 2014: 583–590.

Diagnosis

Shell of medium size for the genus, stout; flat spiral cords, strong spiral sculpture; basal cord evident; prosocline lamellae between cords absent.

Type material

Holotype

STRAIT OF SICILY • dd; Skerki Bank; 37°45'00" N, 10°50'00" E; 37 m depth; MNHN-IM-2000-25883.

Paratypes

STRAIT OF SICILY • 1 dd; same data as for holotype; MZB-49668 (paratype 1) • 1 dd; same data as for holotype; MCZR 00227 (paratype 2) • 37 dd; same data as for holotype; CS-PM (paratypes 3–39) • 20 dd; same data as for holotype; EDS (paratypes 40–59) • 10 dd; same data as for holotype; MO (paratypes 60–69) • 10 dd; same data as for holotype; IN (paratypes 70–79) • 40 dd; same data as for holotype; PT (paratypes 80–119) • 2 dd; same data as for holotype; BA (paratypes 120–121).

Other material examined

STRAIT OF SICILY • 25 dd; same data as for holotype; MO • 606 dd; same data as for holotype; IN.

Description (in parentheses data of the holotype)

SHELL. Shell conical, of medium size for the genus, height 5.5–6 mm (5.7), width 4–4.5 (4.7) mm, rather solid. Protoconch seemingly smooth, of ca 1.1 whorls, 0.24–0.25 mm in width. Teleoconch of 4.5–5.5 slightly convex whorls. Sculpture of 6–7 strong abapical spiral cords of about the same strength, slightly shouldered, and a pronounced basal cord, rounded, formed by 2 cordlets separated by a furrow, the lower twice as wide as the upper one. Suture barely visible. Teleoconch surface covered by faint prosocline growth striae, in some specimens more evident and irregular. Base convex, with 4–5 flat spiral cords,

regularly spaced, crossed by numerous growth striae; umbilicus closed also in juveniles, covered with a white callus. Aperture quadrangular, with a columellar callus thickened in the middle portion. Interior of the aperture whitish nacreous.

COLOURATION. Colour of protoconch and early teleoconch whorls bright red, remaining whorls and base light green-brownish with 3 regularly spaced, thick yellowish-orange spiral lines covering a portion of the spiral cords, and 4–5 lines on the base.

SOFT PARTS. Not known.

Distribution

Only known from the Skerki Bank, Strait of Sicily, with empty shells at a depth of 37 m.

Remarks

The stronger spiral sculpture and the peculiar chromatic pattern (with bright orange spiral lines) are diagnostic with the other species of the *Jujubinus curini* complex. Juveniles can also be easily diagnosed: *Jujubinus curinii* has weaker spiral sculpture, is lighter in colouration and lacks the orange spiral lines; *J. alboranensis* has also a weaker spiral sculpture, has a bright red protoconch and early teleoconch whorls, but has always small white blotches on the peripheral cord.

Jujubinus roseus Smriglio, Mariottini & Oliverio, 2026
Species not assayed molecularly – Fig. 12M–O

Jujubinus roseus Smriglio, Mariottini & Oliverio, 2026: 71–79, figs 1–5, 11.

Diagnosis

Shell of medium size for the genus, slightly turriculate; sculpture of flat spiral cords; prosocline lamellae between cords absent.

Type material

Holotype

SPAIN • Iv; off Alborán Island, Fauna Ibérica IV stn 315B; 35°58.00' N, 02°58.46' W; 37 m depth; Jul. 1996; infralittoral bottom; Fauna Ibérica IV leg.; MNCN 15.05/35835H.

Paratypes

SPAIN • 5 Iv, 5 dd (including seven juveniles); same data as for holotype; MNCN 15.05/35835P.

Description

SHELL. Shell of medium size for the genus, height 5.5–8.9 mm, width 4.3–6.3 mm, conical, light. Protoconch of 0.85 whorls, 0.27 mm in width, sculptured by two spiral threads. Teleoconch of 4.5–6.5 slightly convex whorls with stepped shoulder. Sculpture of 6–10 flat, closely set abapical spiral cords of about the same strength, broader than interspaces, and a peripheral cord, not prominent, slightly shouldered and ratchet, formed by 2–3 merged cordlets. Suture incised. Teleoconch surface covered by faint prosocline growth striae. Base convex, with 13–14 (13) regularly spaced, basal broad and flat spiral cordlets of variable size; umbilicus closed also in juveniles, covered with a whitish-pinkish callus. Aperture quadrangular, with columellar callus thickened in lower third. Interior of the aperture whitish-pinkish nacreous.

COLOURATION. Colour of protoconch and initial teleoconch whorls bright intense pink; remaining whorls and base pale pink, with brownish-reddish flexuous axial lines of different size and arrangement.

SOFT PARTS (based on Peñas *et al.* 2006: fig. 424, as *Jujubinus* sp.). Epipodial tentacles light purple-reddish. Foot reddish, sole creamy yellowish. Cephalic tentacles purple-reddish, with a dorsal purple stripe. Eye stalks reddish, eyes black encircled by creamy-yellow. Snout reddish with a creamy terminal band. Cephalic lappets whitish.

Distribution

Currently known only from Alborán Island, with living specimens at depths of 10–34 m.

Remarks

This is the last described species in the *J. curinii* complex, currently under description elsewhere (Smriglio *et al.* 2026). It has been collected sympatrically with *J. alboranensis*, from which it differs in the more numerous, flat spiral cords (13–14 vs 6 in *J. alboranensis*) and the consistently different pink colouration. From *J. trilloi* it differs in its larger shell (8 mm vs rarely up to 6.5 mm in *J. trilloi*), the fewer, flat spiral cordlets (12–13 vs 6–8 in *J. trilloi*) and the different colouration.

Jujubinus trilloi Smriglio, Di Giulio & Mariottini, 2014
Species not assayed molecularly – Fig. 12P–R

Jujubinus trilloi Smriglio, Di Giulio & Mariottini, 2014: 583–590.

Diagnosis

Shell of medium size for the genus, slightly turriculate; sculpture of only incised spiral lines, prosocline lamellae between cords absent.

Type material

Holotype

STRAIT OF SICILY • dd; Talbot Bank; 37°30'00" N, 11°40'00" E; 25 m depth; MNHN-IM-2010-25882.

Paratypes

STRAIT OF SICILY • 1 dd; same data as for holotype; MZB-49669 (paratype 1) • 1 dd; same data as for holotype; MCZR 00226 (paratype 2) • 52 dd; same data as for holotype; CS-PM (paratypes 3–54) • 5 dd; same data as for holotype; MO (paratypes 55–59) • 30 dd; same data as for holotype; PT (paratypes 60–89).

Description (in parentheses data of the holotype)

SHELL. Shell conical, slightly turriculate, of medium size for the genus, height 5–6.5 (5.4) mm, width 4–4.5 (4.6) mm, solid. Protoconch seemingly smooth, of ca 1 whorl, 0.24–0.25 (0.25) mm in diameter. Teleoconch of 4.5–5.5 (4.5) flat or slightly convex whorls. Sculpture of 6–8 (8) regularly spaced, fine, incised spiral lines. Basal cord rounded, formed by 2 cordlets separated by a fine furrow, the upper one as wide as one third to one quarter the lower one. Suture distinct. Teleoconch surface covered by faint prosocline growth striae. Base convex, with 9–11 (11) concentric fine incised spiral lines, irregularly spaced and crossed by numerous growth striae. Umbilicus closed also in juveniles covered with a white callus. Aperture quadrangular with a columellar callus thickened in the middle portion. Interior of the aperture whitish, iridescent.

COLOURATION. Colour of protoconch and early teleoconch whorls bright red, remaining whorls and base greenish-brownish, with axial opisthocline brown-reddish narrow lines. Three to five (4) narrow yellowish-orange spiral lines on the spire, 4–6 (4) on the base

SOFT PARTS. Not known.

Distribution

Only known from the Talbot Bank, Strait of Sicily, with empty shells at a depth of 25 m.

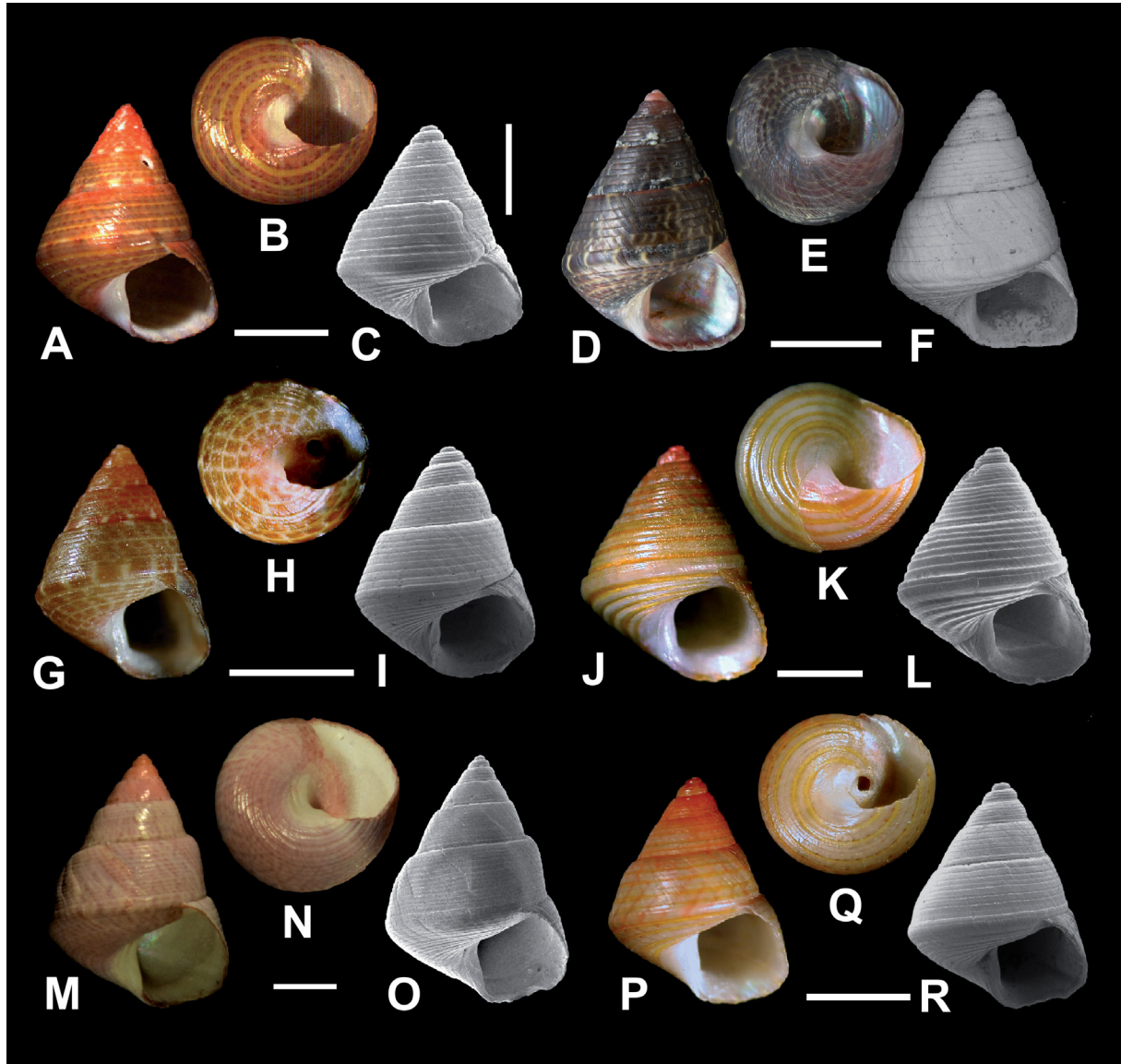


Fig. 12. A–B. *Jujubinus alboranensis* Smriglio, Mariottini & Oliverio, 2015, holotype, height 6.8 mm, Alborán Island (35°56'43.99" N, 3°02'03.73" W), Alborán Sea, 30–37 m depth, MNHN IM-2000-30131. C. *J. alboranensis*, paratype 6, MNCN 15.05/60160, height 5.2 mm, Alborán Island (35°56'43.99" N, 3°02'03.73" W), Alborán Sea, 30–37 m depth. D–F. *J. browningleeae* Smriglio, Mariottini & Swinnen, 2018, holotype, RBINS I.G.33787/MT.3687, height 5.2 mm, The Gorringe Seamount Bank, 130 miles off Cape St Vincent, Portugal. G–I. *J. curinii* Bogi & Campani, 2006, CS-PM, height 5.3 mm, Scilla, Strait of Messina, 42 m depth. J–L. *J. eleonora*e Smriglio, Di Giulio & Mariottini, 2014. holotype, MNHN 25883, height 5.7 mm, Skerki Bank (37°45' N, 10°50' E), Strait of Sicily, 37 m depth. M–O. *Jujubinus roseus* Smriglio, Mariottini & Oliverio 2026, holotype, MNCN 15.05/35835H, height 8.2 mm, Alborán Island, Alborán Sea, 10–34 m depth. P–R. *J. trilloi* Smriglio, Di Giulio & Mariottini, 2014, holotype, MNHN 25882, height 5.4 mm, Talbot Bank (37°30' N, 11°40' E), Strait of Sicily, 25 m depth. Scale bars = 2 mm.

Remarks

Jujubinus trilloi differs from *J. curinii* in the less stepped whorls, and the colouration with bright red protoconch and early teleoconch whorls, the remaining whorls and base greenish-brownish, with narrow axial opisthocline brown-reddish lines, and the yellowish-orange spiral lines on spire and base (vs shiny reddish-brown protoconch and early teleoconch whorls, with sparse whitish spots in *J. curinii*). *Jujubinus alboranensis* differs in its slightly less convex whorls, and the white blotches on the peripheral cord.

Jujubinus eleonora differs in its stronger sculpture, and in the spiral orange lines that are similar but thicker than in *J. trilloi*.

Discussion

These results once again (as in Williams *et al.* 2010 and Uribe *et al.* 2017), supported the exclusion from *Jujubinus* s. str. of morphologically similar species from the Indo-West Pacific (like *J. suarezensis*, *J. gilberti*, *J. geographicus* and the various *Cantharidus* spp.). This in turn provides a strong indication that *Jujubinus* is currently restricted to the East Atlantic and the Mediterranean. In the European area, its history is well tracked in the fossil record, back to the Oligocene (Giannuzzi-Savelli & Reina 1987; Lozouet 1999; Landau *et al.* 2003, 2017; Brunetti & Della Bella 2005; Harzhauser *et al.* 2014; Ceulemans *et al.* 2016; Smriglio *et al.* 2017; Harzhauser 2021). This is congruent with molecular dating (Uribe *et al.* 2017) that suggested an Oligocene origin of *Jujubinus*. We agree with Harzhauser (2021) that older records (Cossmann 1918; Moore 1964; Glibert, 1973; Gitton *et al.* 1986; Hickman & McLean 1990; Pacaud *et al.* 2000; Caze *et al.* 2012) probably represent other lineages, morphologically convergent with *Jujubinus* s. str., as is also the case in the Recent fauna of Indo-West Pacific ‘*Jujubinus*-like’ cantharidines. For *Trochus montagui*, traditionally ascribed to *Jujubinus*, we did not find unequivocal evidence of its belonging in this clade, but rather we found some indication of a closer relationship with *Clelandella miliaris* than with the *Jujubinus* clade. Morphologically, a putative transfer of *Trochus montagui* from *Jujubinus* to *Clelandella* would not be too surprising. Recently, some species have been described in *Clelandella* (Fig. 3) that show some similarity with *Trochus montagui*; in particular, *Clelandella artilesi* and *C. madeirensis*, but to some extent also *C. dautzenbergi* (Gofas 2005; Vilvens *et al.* 2011). A final assessment of this issue, as well as the complete scopes of the genera *Jujubinus* and *Clelandella*, is postponed to a future study including taxa missing in this research, such as *J. tumidulus* which may prove closely related to *Trochus montagui*, or the series of ‘smooth’ species (*J. alboranensis*, *J. browningleeae*, *J. curinii*, *J. eleonora*, *Jujubinus* sp., *J. trilloi*: Fig. 12) mostly recently described, based only on shell morphology, which may or not represent a distinct lineage. Given the lack of strong statistical support to the relevant nodes/branches, a larger genetic sampling (including also nuclear loci) will be necessary.

After this revision, we consider as valid in the East Atlantic fauna 40 species of the genus *Jujubinus* s. str., of which 22 have been assayed genetically, and seven are herein described as new (Table 2; Supp. file 1). This is an increase of 24% with respect to the accepted diversity before this study.

We did not identify clear phylogenetic patterns for the distribution of morphological or distributional characters (Fig. 2): only the presence of a black stripe on the snout seems to be plesiomorphic in *Jujubinus*. Size displays a weak pattern, in the sense that large-sized species prevalently have a wide range, whereas all the small-sized species have restricted ranges. There seems to be no phylogenetic pattern for the distribution of the geographic ranges. Six species have rather wide ranges, including both the eastern Atlantic and the Mediterranean: *Jujubinus vulgaris*, *J. exasperatus*, *J. gofasi* sp. nov., *J. striatus*, *J. angustibasis* sp. nov., and *J. montagui*. At least six species have ranges limited to one of the Macaronesian archipelagos: *Jujubinus pseudogravinae* (Azores), *J. vexationis* (Madeira), *J. mabelae*, *J. poppei*, *J. hernandezi*, and *J. swinnyi* sp. nov. (Canary Islands). *Jujubinus augustoi* and *J. browningleeae* occur in West Africa. The remaining species are distributed only in the Mediterranean

Table 2 (continued on next page). Valid species of the genus *Jujubinus* Monterosato, 1884, as recognised after this revision in the East Atlantic fauna with their distribution (in bold taxa for which samples have been genetically assayed in this work; the others are accepted based on morphological features only): Az = Azores; Ca = Canary Islands; CV = Cape Verde Islands; EM = East Mediterranean; Ma = Madeira; NEA = northern East Atlantic; WA = West Africa; WM = West Mediterranean; # = restricted range.

Species	Distribution							
	EM	WM	WA	CV	Ca	Ma	Az	NEA
<i>Jujubinus alboranensis</i> Smriglio, Mariottini & Oliverio, 2015		#						
<i>Jujubinus angustibasis</i> Mariottini, Oliverio & Smriglio sp. nov.	+	+						
<i>Jujubinus augustoi</i> Rolán & Gori, 2009			#					
<i>Jujubinus baudoni</i> (Monterosato, 1891)		#						
<i>Jujubinus browningleeae</i> Smriglio, Mariottini & Swinnen, 2018								#
<i>Jujubinus catenatus</i> Ardovini, 2006		#						
<i>Jujubinus curinii</i> Bogi & Campani, 2006		#						
<i>Jujubinus daniensis</i> Mariottini, Oliverio & Smriglio sp. nov.		#						
<i>Jujubinus dispar</i> Curini-Galletti, 1982		#						
<i>Jujubinus elenchoides</i> (Issel, 1878)	#							
<i>Jujubinus eleonora</i> Smriglio, Di Giulio & Mariottini, 2014		#						
<i>Jujubinus errinae</i> Smriglio, Mariottini & Giacobbe, 2016		#						
<i>Jujubinus exasperatus</i> (Pennant, 1777)	+	+	+		+			+
<i>Jujubinus fraterculus</i> (Monterosato, 1880)	#							
<i>Jujubinus fulgor</i> Gofas, 1991								#
<i>Jujubinus gofasi</i> Mariottini, Oliverio & Smriglio sp. nov.		+						+
<i>Jujubinus gravinae</i> (Dautzenberg, 1881)	+	+						
<i>Jujubinus hernandezii</i> Rolán & Swinnen, 2009						#		
<i>Jujubinus inopinatus</i> Mariottini, Oliverio & Smriglio sp. nov.		+						
<i>Jujubinus karpathoensis</i> F. Nordsieck, 1973	#							
<i>Jujubinus kyrnos</i> Mariottini, Oliverio & Smriglio sp. nov.		+						
<i>Jujubinus mabelae</i> Rolán & Swinnen, 2009						#		
<i>Jujubinus poppei</i> Curini-Galletti, 1985						#		
<i>Jujubinus pseudogravinae</i> Nordsieck, 1973								#
<i>Jujubinus rafaelmesai</i> Rolán & Swinnen, 2013						#		
<i>Jujubinus roseus</i> Smriglio, Mariottini & Oliverio, 2026		#						
<i>Jujubinus rubioi</i> Rolán & Templado, 2001					#			
<i>Jujubinus ruscurianus</i> (Weinkauff, 1868)		+						
<i>Jujubinus seguenzae</i> Ghisotti & Melone, 1975	#							
<i>Jujubinus silbogomerus</i> Smriglio, Mariottini & Swinnen, 2019						#		
<i>Jujubinus smaragdinus</i> (Monterosato, 1880)		+						
<i>Jujubinus striatus</i> (Linnaeus, 1758)	+	+	+	+	+	+	+	+
<i>Jujubinus superum</i> Mariottini, Oliverio & Smriglio sp. nov.	+							

Table 2 (continued). Valid species of the genus *Jujubinus* Monterosato, 1884, as recognised after this revision in the East Atlantic fauna with their distribution (in bold taxa for which samples have been genetically assayed in this work; the others are accepted based on morphological features only): Az = Azores; Ca = Canary Islands; CV = Cape Verde Islands; EM = East Mediterranean; Ma = Madeira; NEA = northern East Atlantic; WA = West Africa; WM = West Mediterranean; # = restricted range.

Species	Distribution							
	EM	WM	WA	CV	Ca	Ma	Az	NEA
<i>Jujubinus swinneni</i> Mariottini, Oliverio & Smriglio sp. nov.								+
<i>Jujubinus tingitanus</i> (Pallary, 1902)		#						
<i>Jujubinus trilloi</i> Smriglio, Di Giulio & Mariottini, 2014		#						
<i>Jujubinus tumidulus</i> (Aradas, 1846)		+						
<i>Jujubinus vexationis</i> Curini-Galletti, 1990							#	
<i>Jujubinus vulgaris</i> (Risso, 1826)	+	+						+
<i>'Jujubinus' montagui</i> (Wood, 1828)	+	+						+

Sea. The ranges of *J. gravinae*, *J. depictus* and *J. sartorii* span almost the entire Mediterranean. Some species are limited to the western realm: *Jujubinus ruscurianus*, *J. tingitanus*, and *J. dispar*; others to the eastern: *Jujubinus elenchoides*, *J. fraterculus*, and *J. smaragdinus*. Some species have very restricted ranges: *Jujubinus superum* sp. nov. is currently known from a narrow area of the Adriatic; *Jujubinus dianiensis* sp. nov. is seemingly restricted to the northern Tyrrhenian Sea; *Jujubinus kyrnos* sp. nov. is known only from southern Spain and Corsica; *Jujubinus seguenzae* is known only from eastern Sicily, and *J. inopinatus* sp. nov. is known only by one specimen from Sicily and one from the Bay of Naples. One nominal taxon showed an unexpected relationship: *Jujubinus delpreteanus* was long supposed to be a valid species, exclusive of Sicilian coastal lakes (Pantano Piccolo and Ganzirri), and at risk of extinction, but then we have discovered morphologically identical specimens in the Monterosato collection, labelled as from “Toulon, France” (possibly also collected in a lagoon environment); however, the Sicilian coastal lake population has proven to be a lagoon morphotype of the marine *J. smaragdinus*.

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Supplementary material

Supp. file 1. Samples used for the molecular systematics analyses, with their voucher ID catalogue numbers, locality data, the GenBank accession numbers for the sequences, references, the preliminary morphological identification (PSH), the final species hypotheses (FSH) and the corresponding final name. <https://doi.org/10.5852/ejt.2026.1044.3223.14281>

Supp. file 2. Additional figures. Figs S1, S1A–S1C: collapsed and uncollapsed BI *cox1* trees. Figs S2–S74: morphological variation within each assayed species. <https://doi.org/10.5852/ejt.2026.1044.3223.14283>