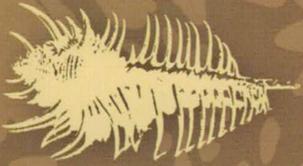


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CONCHYLIA

HUSMANNS
UNTERIRDISCH BRUNNENSCHNECKE

KORREKTE NAMEN **CYCLOTUS, LITHODOMUS**

FREAKS **PHALIUM BANDATUM**

ERSTE NACHWEISE **KAPVERDEN, SCHWARZES MEER**

NEUE ARTEN **MEDORA, MITRA, ARCHIVOLVA, EROSARIA**

The *Erosaria helvola* species-complex (Gastropoda: Cypraeidae)

by FELIX LORENZ, Buseck-Beuern

Figs 1-4, 1 Tab.

Zusammenfassung

Erosaria helvola und verwandte Taxa werden revidiert. Die Population von den Marquesas-Inseln wird als neue, eigenständige Art, *E. bellatrix* n. sp. beschrieben. Sie wurde früher *helvola callista* zugeordnet. Dieser Name basiert aber auf Exemplaren von Tahiti und die Einbeziehung der Population von den Marquesas war nicht korrekt. Die Unterschiede von *E. bellatrix* n. sp. gegenüber *E. helvola* basieren neben Gehäusemerkmalen auf DNA-Untersuchungen. Diesen Untersuchungen folgend wird *E. hawaiiensis* auf Artstatus erhoben, die klassischen Unterarten *callista* und *meridionalis* werden jeweils zu Variationen von *h. helvola* bzw. *h. argella* reduziert.

Keywords

Erosaria helvola, new species, Marquesas Islands, DNA-analysis

Abstract

Erosaria helvola and related taxa are revised. The population from the Marquesas Islands is described as valid species, *E. bellatrix* n. sp. It was formerly assigned to *helvola callista*. However, that name was based on shells from Tahiti and the concept of including the population from the Marquesas was incorrect. The differences of *E. bellatrix* n. sp. to *E. helvola* are based on conchological features and DNA-analysis. As consequence of this analysis, *E. hawaiiensis* is lifted to species-rank while the former subspecies *callista* and *meridionalis* are reduced to the level of mere variations of *h. helvola* and *h. helvola argella* respectively.

Introduction

Erosaria helvola LINNAEUS, 1758 is a widespread species of the intertidal and shallow subtidal in vast regions of the Indo-Pacific. Traditionally, it is split into several geographical subspecies. Recent mtDNA analysis (MEYER 2002) suggest that only three of these have a higher taxonomic rank. One of them is endemic to the Marquesas Islands and has not yet been named. This paper revises the taxa of the *helvola*-complex. The genetically and conchologically distinct population from the Marquesas Is. is described in the following.

Erosaria bellatrix n. sp. (Figs 2c-g)

Material: Thirty-seven specimens, personally collected by the author. Approximately forty further specimens were purchased from other collectors and dealers over a period of several years.

Holotype: 23.2 mm. Taiohae Bay, Nuku Hiva, at 25 m. Coll. MNHN 21966

Paratype 1: 22.9 mm. Motumeno, S. Nuku Hiva, at 30 m. Coll. LORENZ

Paratype 2: 21.3 mm. Taiohae Bay, Nuku Hiva. Coll. CHIAPPONI

Plus 70 further paratypes and 680 specimens of the *helvola*-complex from 242 different localities in coll. LORENZ.

Description: The holotype is solid, evenly pyriform, depressed. Both extremities slightly projecting. Margins calloused, rather angular along the periphery, distinctly pitted in the posterior and anterior third and on the extremities. The marginal callus has a crenulate outline labrally and towards the anterior extremity on columellar side. This crenulation results from the dentition reaching across the base onto the margins. Dorsum slightly humped towards the posterior. Base calloused, convex. Columellar teeth distinctly shortened centrally, coarser and longer towards both extremities. Posteriorly, two teeth extend across the base reaching the margin. Anteriorly, there are four teeth reaching across the base and the margin, becoming visible as spinose crenulations on dorsal view. These four teeth are extending into the shell at right angle to form the steep fossula. The labral teeth are equally strong throughout, extending across the lip onto the margins, a bit less distinctly so centrally. The anterior canal is bordered by an angular ridge on either side, visible dorsally as spiny processes. The aperture is notably wider anteriorly.

The base and the callousities above the margins are rich reddish-chestnut, the margins slightly paler. The tips and the canals are yellow-white, the extremities are thinly bordered with red dorsally. The dorsal ground colour is a peculiar pinkish grey, creamy orange in faded shells. The dorsum is sparsely but evenly ornamented with distinct, small chestnut spots. Each spot is encircled by an area where the ground colour is exposed, around which small white spots are arranged. These white spots never seem to trespass the

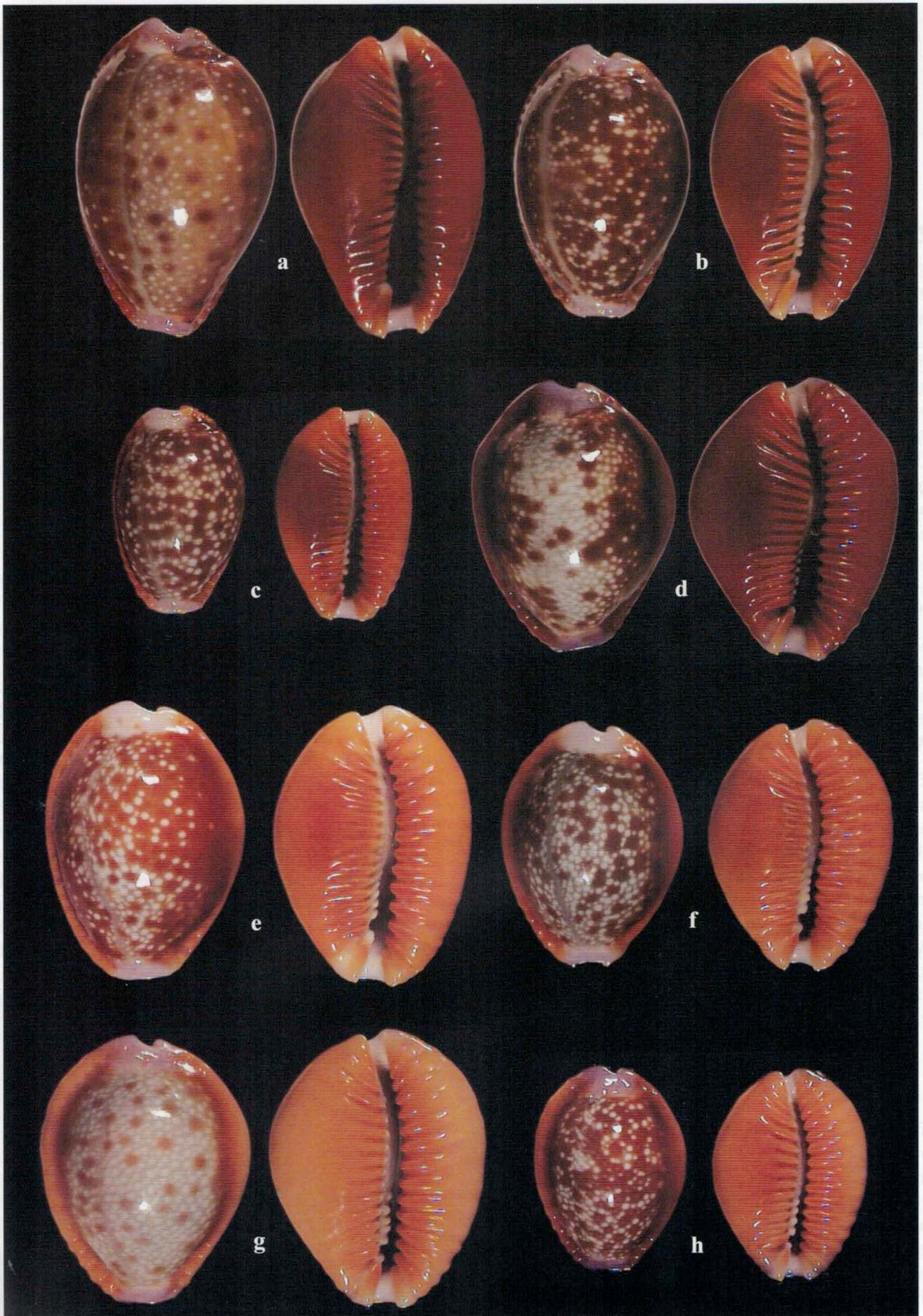


Fig. 1a-h: a) *Erosaria helvola argella* var. *meridionalis*: 29 mm. Transkei, South Africa; b) *Erosaria helvola argella*: 25 mm. SE Madagascar; c) *Erosaria helvola argella*: 19 mm. E Mauritius; d) *Erosaria helvola argella*: 25 mm. Tanzania; e) *Erosaria helvola helvola*: 25 mm. Broome, W Australia; f) *Erosaria helvola helvola*: 20 mm. Solomons; g) *Erosaria helvola helvola* var. *callista*: 24 mm. Tuamotu; h) *Erosaria helvola helvola* var. *callista*: 17 mm. Tahiti.



Fig. 2a-g: a) *Erosaria hawaiiensis*: 23 mm. Oahu, Hawaii; b) *Erosaria hawaiiensis*: 20 mm. Oahu, Hawaii; c) *Erosaria bellatrix* n. sp. (holotype): 23 mm. Nuku Hiva, Marquesas; d) *Erosaria bellatrix* n. sp. (paratype 1): 23 mm. Nuku Hiva, Marquesas; e) *Erosaria bellatrix* n. sp. 20 mm. Marquesas; f) *Erosaria bellatrix* n. sp. (paratype 2): 21 mm. Marquesas. Old, faded shell; g) *Erosaria bellatrix* n. sp. 18 mm. Marquesas. Old, faded shell.

exposed area around the darker spots. There is an indication of a dorsal line just above the labral callousity.

The paratypes show considerable variability in size and degree of marginal callousity. The general outline is always slightly pyriform, sometimes rhomboidal. The aperture is always widening anteriorly and rather wide in general. The length of the columellar dentition varies with the degree of callousity. Shells without callus-development have rather short teeth. Calloused shells have stronger, more distinctly extending teeth. The rich colour of the callousities fades rapidly to a pale red-brown, the dorsal ground colour becomes yellow-brown, usually with a pink tint, sometimes even pale creamy-orange. The extremities are plain white in older shells. The remarkable character of the dorsal spotting - sparse, with an area around the darker spots into which the white spots do not reach - is very constant, the density of the white spotting is variable.

The living animal has a thin, transparent mantle with small white and red specks. The papillae are dendritic and very long, so that the crawling animal appears to be twice the size of the shell. The foot is grey with white and red specks.

Etymology: Bellatrix is the second brightest star in the constellation of Orion, and it is a zenith star of the Marquesas Islands. The clarity of the sky at night gives an amazing view at the stars, now rarely encountered anywhere on our polluted planet. The dorsal pattern of *E. bellatrix* n. sp. reminds me of the view I enjoyed while staying in the Marquesas Islands in 2009.

Distribution and Habitat: *Erosaria bellatrix* n. sp. is endemic to the Marquesas Islands. Confirmed records are available from Nuku Hiva, Hiva Oa, Fatu Hiva and Ua Pou. At Taiohae Bay and all along the south of Nuku Hiva, I observed living specimens at depths ranging from 5 m to 35 m. At night, animals can be observed crawling on rocks and the sandy areas nearby, during daytime they hide under rocks, often in pairs.

Discussion: *Erosaria helvola* has been subdivided in seven geographical subspecies by SCHILDER & SCHILDER 1952:

helvola helvola LINNAEUS, 1758

helvola citrinicolor IREDALE, 1935

helvola callista SHAW, 1909

helvola hawaiiensis MELVILL, 1888

helvola mascarena MELVILL, 1888

helvola argella MELVILL, 1888

helvola meridionalis SCHILDER & SCHILDER, 1938

The geographical range of the species was well known at SCHILDER & SCHILDER's times but judging from their account of localities studied in the DAUTZENBERG-collection, they never studied specimens from the Marquesas Islands. LORENZ & HUBERT (1993) retained five subspecies based mainly on the same conchological features noted by the SCHILDERS.

They recognized *mascarena* and *citrinicolor* as variations of *argella* and *helvola* respectively, as no reproducible conchological differences could be found, despite of fairly comprehensive material from the W Pacific and the Indian Ocean at hand. LORENZ & HUBERT illustrated four specimens from the Marquesas, and a single one from the Tuamotus and called these '*callista*'. No specimen from Tahiti was illustrated, and if I remember well, we both did not have any specimens from Tahiti in our collections at the time of writing the book (1987-1992). The Marquesan shells are convincingly different from *helvola* and the Tuamotu specimen, but on a closer look at SHAW's concept of that name, it becomes obvious that typical *callista* were not illustrated in the "Guide" as that name was based on shells from Tahiti, not the Marquesas Islands: "*Cypraea helvola* var. *callista*. Shell of an oval form, sides hardly thickened; teeth on columella the same as in the typical form, while on the anterior end of the outer lip at least six are produced over the base and margin, and disappear between the pitting of the latter; the last four on the posterior end of the outer lip being likewise produced, but not so strongly accentuated as the former. The base and teeth are of a palish golden brown, lighter towards the margins; both extremities are of a pure shining white, the posterior one having a white blotch extending from the spire almost to the outer margin. The dorsal surface is of a very pale brown, profusely sprinkled with small, deep brown spots intermingled with minute ones of a pure white. The pittings and areas above them on each side of the shell being of a beautiful purplish tint. Long. 29, diam. 18 mm. Hab. Tahiti. I have only seen two specimens of this variety; that here described in my possession, the other, slightly smaller and from the same locality, now in the collection of M. DAUTZENBERG."

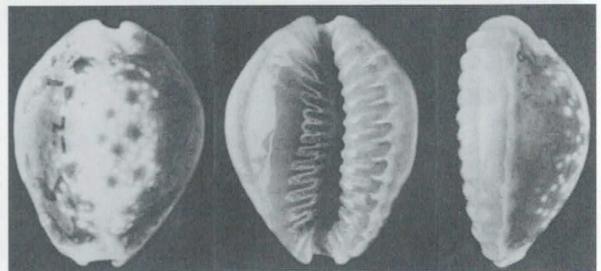


Fig. 3: Paratype of *E. helvola callista*, after SCHILDER & SCHILDER, 1952

The smaller paratype is depicted in SCHILDER & SCHILDER 1952. It is an oval and depressed shell typical for populations from Tahiti (see Fig. 3). SHAW's description does not mention any of the characteristics of the Marquesan population here described as *E. bellatrix* n. sp. and it is clear that ALEX HUBERT and myself interpreted the name *callista* incorrectly in "A Guide to Worldwide Cowries".

This was first pointed out to me by attentive shell-collectors, who demonstrated that shells from Tahiti and the Tuamotus were completely different conchologically to the population from the Marquesas (L. GABRIELLI, H. MORRISON, M. BEALS)

	<i>helvola argella</i>	<i>h. argella</i> var. <i>meridionalis</i>	<i>helvola helvola</i>	<i>h. helvola</i> var. <i>callista</i>	<i>bellatrix</i>	<i>hawaiiensis</i>
distribution	Aden, East Africa, Madagascar, Mascarenes	Southeast Africa to Cape Province, South Africa	Central Indian Ocean to W. Pacific, Australia, Melanesia	Micronesia, Polynesia	Marquesas Is.	Hawaii
size, shape and callosities	medium size, pyriform to rhomboid, mostly calloused, slightly inflated	always large, pyriform inflated, hardly calloused	small to medium size, oval, mostly calloused, rather depressed	small, oval, mostly calloused, depressed	small to medium size, pyriform, mostly calloused, depressed	small to medium size, oval to rhomboidal, calloused, rather inflated
margins	high, rather angular, mostly smooth	low, angular, smooth	high, rounded, faintly crenulated	high, rounded, faintly crenulated	low, angular, distinctly crenulated	low, angular, smooth
labral teeth	mostly long, reaching margin at extremities	short	long, reaching margin at extremities	long, reaching margin at extremities	very long, often reaching across margin throughout	very short, rarely reaching margin
columellar teeth anteriorly	2-3 are longer, crossing base	1-2 are longer, crossing base	not much longer, rarely crossing base	not much longer, rarely crossing base	3-5 longer, often reaching across base and margin	rather short, rarely reaching onto base
aperture in front	slightly wider	wider	mostly narrow	narrow	distinctly wider	narrow
tips and canals (in fresh shells)	rich purple	rich purple	pink to purple	pale purple	yellow-white, framed with reddish above	pink to purple

Tab. 1

and finally Dr. CHRISTOPHER MEYER (pers. comm. 2002) who stated that only *helvola*, *hawaiiensis* and the unnamed Marquesan population are separable based on DNA-differences (MEYER 2004).

On examining a much larger amount of eastern Polynesian shells than was available back in 1993, it becomes obvious that MEYER's diagnosis is reflected perfectly by shell characteristics: the isolate *hawaiiensis* and *bellatrix* n. sp. both deserve a higher systematic rank than the W Indian Ocean subspecies *h. argella*. The "true" *callista* from Tahiti and the Tuamotus, on the other hand, is barely separable from calloused *helvola helvola* from the western Pacific. At the same time, the South African *meridionalis* appears to be a large ecological variation of *argella*, but not geographically defined: conchologically inseparable large shells are occasionally found among typical *h. argella*, e.g. in the south of Madagascar. Therefore, only *helvola helvola* from the central Indian Ocean and the Pacific and *h. argella* from the western Indian Ocean are retained on the level of a subspecies, as the populations show reasonably consistent differences in colouration and shape, in connection with their distributions.

The shell of *helvola helvola* varies greatly in shape, size and general colouration. Specimens from the central Indian Ocean tend to be darker, sometimes resembling *h. argella*. Further east, e.g. in the western Pacific, shells are less rhomboid or pyriform but oval, the callosities paler yellowish brown rather than red, the extremities paler pink. In the eastern limit of the distribution, shells are smaller, more calloused, oval and still paler, the tips of variable colour, but usually contrasting the base more strikingly than in western shells. The dentition varies considerably in all localities, but generally, the columellar teeth do not cross the base to a notable extent in eastern shells. In *E. hawaiiensis*, the teeth are shorter than in *E. helvola*, and the colouration differs by having a grey to cream tint instead of yellow-brown as in *helvola*.

E. bellatrix n. sp. differs from both, *helvola* and *hawaiiensis*, by the long and mostly more produced teeth, especially in calloused shells. The general colour has a unique chestnut tint in fresh shells, which rapidly fades to a peculiar pellucid pinkish red. The extremities and canals are very pale yellow-white also in fresh shells, whereas only in old and faded *helvola* and *hawaiiensis* they may be of that colour, thus lacking the red border observed also in older shells of *E. bellatrix* n. sp.. Interestingly, the shells of *E. bellatrix* n. sp. fade more rapidly and more dramatically than any *E. helvola*. Also *E. hawaiiensis* tends to fade in a remarkable way, and at unusual speed, a circumstance already noted by BURGESS 1985. The most remarkable and unique feature of *E. bellatrix* n. sp. is not so obvious at first sight, and it is found only in specimens without blurred pattern due to an injury of the mantle: the frame of exposed ground colour encircling the distinct darker spotting. In all other taxa of the *helvola*-complex, the white spots may touch the darker spots and often overlay them.

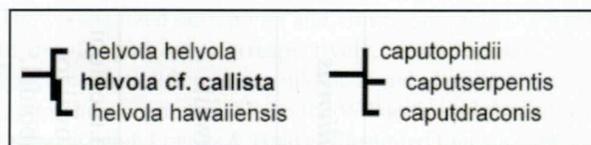


Fig. 4: left: cladograms of the *helvola*-complex and *Monetaria caputserpentis* and its allies, based on the comparison of the 16S and CO1 regions of mtDNA, after MEYER 2004. The taxon here called "cf. *callista*" is described as *E. bellatrix* n. sp. in this paper.

The table of differences given in the "Guide" is obsolete as the characteristics given for '*callista*' mainly apply to Marquesan shells. Table 1 gives an updated account of the most important features of the members of the *helvola*-complex. The species-status given to *hawaiiensis* and *bellatrix* n. sp. herein is based on the observation that apart from the genetic differences (see Fig. 4), the shell-characteristics are very constant and confined to the geographically isolate Hawaiian and Marquesan Islands. This evaluation is consistent with that of another Cypraeid sister-species-complex: *Monetaria caputserpentis* LINNAEUS, 1758, *caputdraconis* MELVILL, 1888 (Easter Is.), *caputophidii* SCHILDER, 1927 (Hawaii). The Marquesas Islands are home to a large amount of endemic cowry-species and -subspecies; those that have been analysed by MEYER reveal marked genetic isolation from the neighbouring Atolls of Tuamotu and Tahiti.

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