

A close look at *Erronea ovum* (GMELIN, 1791) with the description of a new subspecies (Gastropoda: Cypraeidae)

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4 Text-Figs, 2 Plates

Abstract

Erronea ovum erici n. ssp. is described from Kota Kinabalu, NW Sabah, Malaysia. The status of *E. ovum* and conchological relatives are revised. Based on shell- and genetic features, *E. chrysostoma* is lifted to species-rank, the differences and relationships between several species of *Erronea* are discussed.

Keywords

Cypraeidae, *Erronea ovum*, new subspecies, mtDNA, hybrids

Erronea ovum erici n. sp.

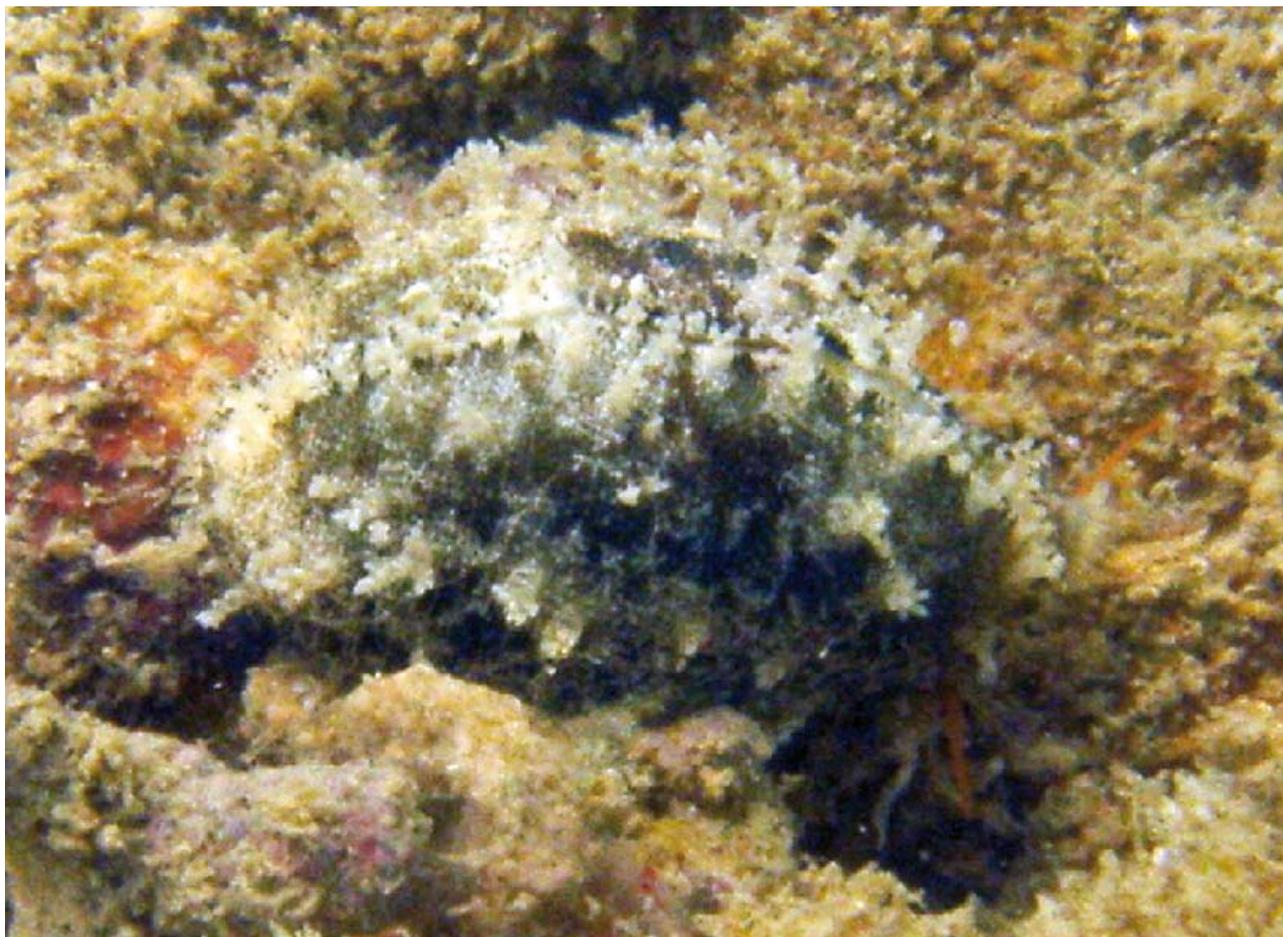
(Plate 2, 1st – 3rd row)

Material: 43 live collected specimens. Measurements en-listed: length, width, height (mm) labral teeth : columellar teeth (counted), depository.

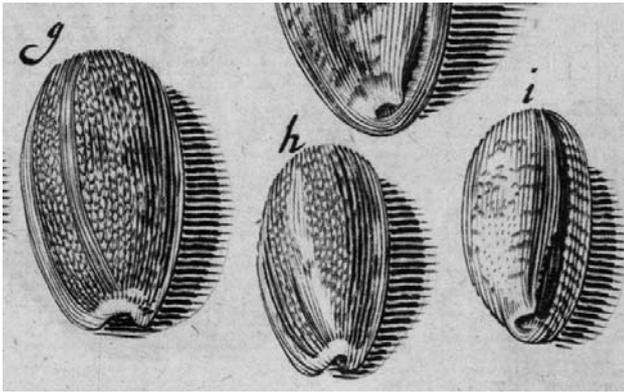
Holotype: 21,3 x 12,8 x 10,2 (15 : 16)
coll. MNHN 22864, Paris

Paratype 1: 19,5 x 11,6 x 9,4 (13 : 15)
coll. SMNS-ZI-0073529, Stuttgart

Paratype 2: 19,5 x 11,5 x 9,2 (13 : 13)
coll. ALLEN BENNETT



Text-Fig. 1: *Erronea ovum erici* n. ssp. Living animal. Photo JANA KRATZSCH.

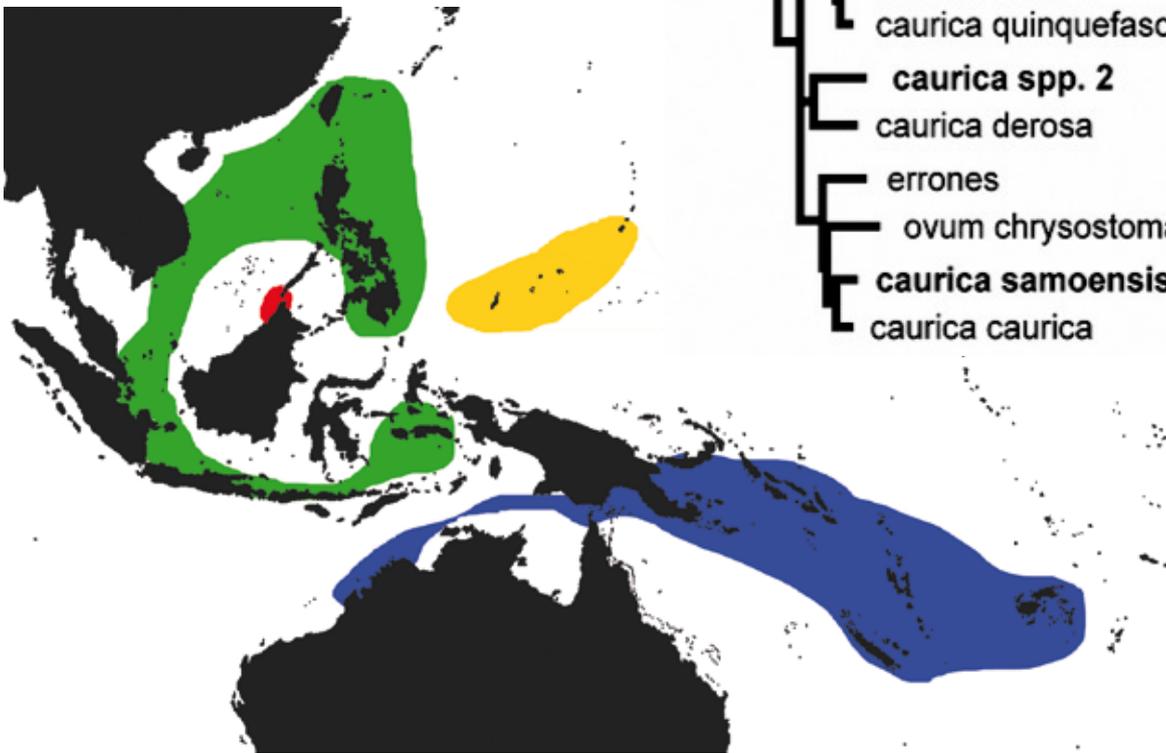
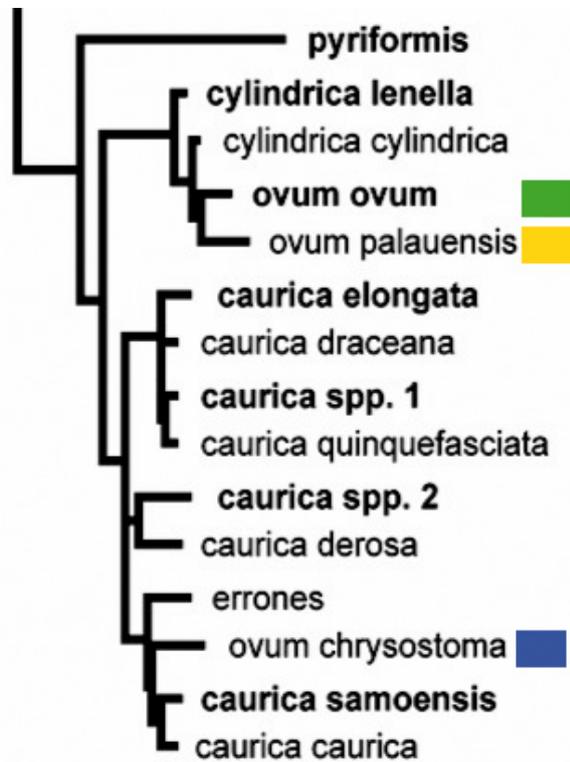


Text-Fig. 2a: Type illustrations cited by GMELIN; from Museum Gottwaldianum. Identity unrecognizable.



Text-Fig. 2b: Type illustrations cited by GMELIN; from MARTINI. The basal aspect clearly shows the species today called *E. ovum ovum*.

Text-Fig. 3: Cladogram of *Erronea ovum* and allied species, based on mtDNA analysis, after MEYER 2004.



Text-Fig. 4: Distribution map of *Erronea ovum ovum* (green), *E. o. palauensis* (yellow), *E. o. erici* (red) and *E. chrysostoma* (blue).

Paratype 3: 22,7 x 13,2 x 10,7 (15 : 16)

coll. ANDREY KOSTIN

Paratype 4: 19,6 x 11,5 x 9 (15 : 16)

coll. ERIC FRITZ

Paratype 5: 16,6 x 9,8 x 7,9 (15 : 15)

coll. MARCO CHIAPPONI

Paratype 6: 20,6 x 12,1 x 9,5 (14 : 14)

coll. HNC 74742, Cismar

Paratype 7: 19,4 x 10,9 x 8,7 (14 : 15)

coll. RANDALL J. BRIDGES

Paratype 8: 21,7 x 12,8 x 10,4 (15 : 16)

coll. ELFRIEDE KESSLER

Paratype 9: 19,1 x 11,2 x 8,9 (14 : 15)

coll. MARCO CHIAPPONI

Paratype 10: 18,5 x 10,8 x 8,9 (15 : 14)

coll. RANDALL J. BRIDGES

Plus 33 further paratypes in the author's collections.

Description

Shell: Oval to slightly pyriform, solid, slightly depressed. Extremities blunt, slightly indented posteriorly. Aperture narrow, hardly widening anteriorly, gently curved left posteriorly. Margins rounded, heavily calloused on either side. Base thickly calloused. Teeth on columellar side deeply incised, dense and slightly extending towards the base. Anterior columellar teeth slightly thickened. A weakly denticulate columellar peristome blends into the steep fossula consisting of four pronounced denticles, which are prolongations of the anterior columellar teeth. Middle and posterior part of the peristome not connected with the teeth. Terminal ridge calloused and slit. Labral teeth strong and densely set, extending onto the labrum midways, but restricted to aperture towards the anterior and posterior canal.

Ground colour of callousities yellow-cream, dental interstices richer yellow. Dorsum somewhat darker green, with a darker transverse central zone bordered by two paler transverse bands. Dorsum densely speckled with brown, a distinct central blotch of darker brown on top of the darker transverse mid-dorsal band.

The paratypes show little variability in the density and darkness of the central dorsal blotch, which is present in all specimens examined. The contrast of the dorsal banding varies slightly, so does the degree of marginal callousity. In some shells a darker staining of the dental interstices is hardly perceptible.

Animal: Mantle thick, covered with numerous dendritic papillae. Mantle surface covered with tiny grey warts. Foot and mantle yellow-cream, covered with irregular darker patches of variable size. Mantle edges ornamented with darker brown stripes. Tentacles red. See Text-Fig. 1.

Habitat and distribution: The type material was collected by the first author and his companion JANA KRATZSCH in shallow water just below the low-tide level in a habitat consisting of algae-overgrown slabs of rock and dead coral. The animals perfectly camouflaged their shells on this substrate. *Erronea ovum erici* n. ssp. was encountered only in a narrow channel between Gaya Is. and Sapi Is. (Locus typicus, 6°00'41"N 116°00'29"E), offshore Kota Kinabalu, Sabah, Malaysia. Conchologically similar shells were collected by commercial shell-divers at Balabac Island in the south of Palawan, Philippines.

Etymology: We are naming this beautiful little cowry in honour of our dear friend ERIC FRITZ of Taylorsville, North Carolina, USA, a passionate collector of cowries and many other natural history objects.

Discussion: *Erronea ovum* (GMELIN, 1791) was described on the basis of figures in Museum Gottwaldianum (1782): *testa oblonga tenui olivacea: maculis ferrugineis spartis, subtus alba*. "Shell narrow elongate, olive coloured, with scattered darker markings, base white". The illustrations do not depict the species called *ovum* today. In fact, the illustrations show shells with a distinct dorsal line and whitish spots on a darker background (Text-Fig. 2a). However, GMELIN is also citing figures in MARTINI (1769): *testa angusta, detrita fasciis supra 3 caeruleiscentibus, denticuloum in labiis interstitiis subfuscis*. "Shell narrow, three eroded bands on bluish, interstices of teeth darker". The illustration of the basal aspect is clear and evidently shows what is today called *Erronea ovum ovum* (Text-Fig. 2b).

It is widespread in the western Pacific, with three geographic subspecies according to SCHILDER & SCHILDER (1938, 1952):

Erronea ovum ovum (GMELIN, 1791) (Pl. 1, 1st and 2nd row, Pl. 2, 3rd row) from Sumatera, the Moluccas, Java, the Philippines and supposedly northwestern Australia. They characterized the nominate subspecies as being less calloused basally, with rather close, labrally produced teeth, discrete dorsal specks, an often distinct dorsal blotch, a pale fulvous base and pale yellow dental interstices.

Erronea ovum palauensis (F. A. SCHILDER & M. SCHILDER, 1938) (Pl. 1, 3rd row) from Western Micronesia has a more calloused base, more distant teeth that are rather produced labrally, confluent dorsal specks on a rich olivaceous ground-colour. The central blotch is obsolete, the base white, the dental interstices pale yellow.

Erronea ovum chrysostoma (F. A. SCHILDER, 1927) (Pl. 1, 4th row) supposedly from Queensland and Melanesia has a more calloused base, a more recurved posterior extremity, less close and less produced teeth, discrete dorsal specks but never a central blotch. The base is white, with rich orange dental interstices.

CATE (1966) discussed *E. ovum* as a widespread species that is commonly confused with *Erronea erronea* (LINNAEUS, 1758). He agrees to separating *chrysostoma* as an eastern

subspecies, mentioning that such shells are also found in the Moluccas.

BURGESS (1970) mentioned the name *palauensis* and a colourful variation from New Guinea (= *chrysostoma*). He comprehensively illustrated several morphological extremes of the species, but the new subspecies described herein is not among them.

LORENZ & HUBERT (1993, 2000) recognized only *E. ovum ovum* and *E. ovum chrysostoma* and considered *palauensis* a variation of the nominate subspecies.

MEYER (2004) published cladograms of his comprehensive mtDNA analysis (Text-Fig. 3). These reveal unexpected relationships between the three *ovum*-like taxa and the conchologically close *Erronea erronea* (LINNAEUS, 1758), *Erronea cylindrica* (LINNAEUS, 1758) and *Erronea caurica* (LINNAEUS, 1758). The interpretation of this data shows that *Erronea caurica*, *E. erronea* and *E. chrysostoma* arose from a common ancestor, whereas *E. ovum ovum* and *E. o. palauensis* are more closely related to *Erronea cylindrica*. This is one of the few instances in which the genetic data does not correspond with the relationships received by comparing conchological features.

Our study largely agrees with the data provided by previous authors. *E. ovum ovum* is characterized mainly by its more slender, mostly less calloused shell in which the dorsal blotch tends to be indistinct in most populations, while in those that have a blotch, it is dissolved and rather mottled. The dental interstices vary considerably in colour, from being untinted to pale yellow, but never saturate orange as in *E. chrysostoma*.

E. ovum palauensis (Pl. 1, 4th row) is usually more calloused, the dorsal blotch is absent or very indistinct and speckled. The features of colouration of the callousities, however, does not at all apply. Several populations of *E. ovum ovum* are saturate brown all over, others greenish, with nearly white callousities. The same is true for *E. chrysostoma*. Classic specimens are deep brown basally and along the margins, often with a paler frame separating the marginal callousities from the dorsum. In no specimen of *E. chrysostoma* there

was a discernible dorsal blotch. In all three taxa, the degree of transverse dorsal banding is highly variable individually. The main features distinguishing *E. chrysostoma* from related taxa, apart from the absence of a dorsal blotch, are the deep orange staining of the dental interstices and the more humped, pyriform shell, which is found only in *E. o. palauensis* to a certain degree. The data of MEYER's genetic analysis suggests that *E. chrysostoma* is not a subspecies of *E. ovum* at all and should therefore be regarded as valid.

Erronea ovum erici n. ssp. differs from *E. ovum ovum* in the following aspects: The dorsal blotch is always present, more condensed and conspicuous. The callousities are stronger developed than in typical *E. ovum ovum*, in which occasional calloused specimens are usually more pyriform rather than oval and depressed. *E. ovum erici* has more produced, densely set and longer midway columellar teeth, which are widely spaced, narrower and mostly shorter in *E. ovum ovum*. The same set of features safely separate *E. o. erici* from *E. o. palauensis* and *E. chrysostoma*. In *E. o. erici*, the anterior columellar teeth are thicker and more densely set, whereas in the other taxa they are less thickened and more widely spaced. *E. ovum erici* has a well developed denticulate columellar peristome. This structure may be found, usually less developed, in *E. ovum ovum*, but not in *E. o. palauensis* or *E. chrysostoma*. Finally, the staining of the dental interstices is very weak in *E. o. erici*, comparable to *E. o. palauensis*, in which the darker staining between the teeth is barely noticeable as well. In a series of shells from different localities, *E. ovum erici* stands out by its small size and calloused, blunt

Geographically, *E. o. erici* inhabits a poorly investigated area in the south of Palawan and the north of Sabah, Malaysia (Fig. 4). Numerous new species of gastropods have recently been discovered: *Conus guidopoppei* RAYBAUDI, 2006, *Conus leobottonii* LORENZ, 2006, *Mitra lorenzi* POPPE & TAGARO, 2006, many other Mitroidea and others, all of which are obviously endemic to that small region which may be recognized as a zoogeographic sub-province with elements of the Java- and the Sulu-Province (after SCHILDER & SCHILDER 1938), but with a high amount of local endemisms.

Plate 1 (see Page 6)

- 1st row: *E. ovum ovum*. Left: 33 mm. Samar, Philippines. Right: 33 mm. Bohol, Philippines. Dark form.
 2nd row: *E. ovum ovum*. Left: 32 mm. Cebu, Philippines, exceptionally dark blotched shell. Right: 31 mm. Kangean Is., Java Sea.
 3rd row: *E. ovum palauensis*, 25 and 20 mm, Palau Is.
 4th row: *E. chrysostoma*, both 28 mm. Solomons.



(Explanation see Page 5)



(Explanation see Page 8)

The exact range of *E. ovum ovum* remains uncertain. It has been reported from Singapore (GRIFFITHS, 1957), from Okinawa (CATE, 1970), Vietnam (THACH, pers. comm. 2009) and many places in the Philippines (CATE, 1966). On numerous expeditions through Indonesia and Malaysia on board the *MV Empress* between 2001 and 2006, *E. ovum ovum* was found only in the Kangean Islands (Java Sea), Bali and the Moluccas (Indonesia), but not anywhere along the western and northern coast of Sulawesi, the south and the west of Borneo or the Spratly Islands.

E. ovum palauensis was reported from Palau and Guam (CATE 1969). A record from the Marshall Islands (BURGESS, 1985, citing a report from SCOTT JOHNSON) was probably based on a mis-localized shell, as the species was never found there again (JOHNSON, pers. comm. 2010).

E. chrysostoma appears to be the most widespread of the taxa discussed herein. The distribution stretches from northwestern Australia (CATE, 1968), the Torres Strait in northern Australia, New Caledonia (RAYBAUDI, 1989) to Fiji (STEADMAN & COTTON, 1943, who described this local population as *Erronea bartletti* - a name universally regarded as a synonym of *E. chrysostoma*). The center of population seems to be the east of Papua New Guinea and the Solomons. It was not found in New Ireland so far, despite intense collecting (D. AMON, pers. comm. 2009) and despite several reports in literature, it does not seem to occur along the Queensland coast (D. THORN, pers. comm. 2010).

Concluding, we wish to hint at the conchological similarity of *E. ovum* and its subspecies to *E. erronea* (Pl. 2, 4th row). Apart from the main feature, the lack of staining of the dental interstices in *E. erronea*, in that species the last two anterior columellar teeth are strongly produced contrasting with the much finer posterior columellar teeth. The anterior part of the aperture is distinctly widening in *E. erronea*, whereas

in *E. ovum* the anterior part of the aperture is far less conspicuously widened. These differences become obvious on direct comparison of shells with similar size and callousity, but a safe distinction of *E. erronea* and *E. ovum* based on single shells can still be difficult if any of the features described above are not clearly formed for whichever reason. This is true especially for specimens of *E. erronea* from Western Australia. According to the genetic analysis done by MEYER (2004), *E. ovum* and *E. erronea* have developed independently, from different ancestors. Both inhabit the same habitat of algae-overgrown rocks and dead coral in very shallow water habitats; their conchological similarity is the result of convergence rather than relationship.

Incidentally, *E. chrysostoma* appears to be the closest relative of *E. erronea*, but at the same time it is the most easily distinguishable taxon among those species and subspecies generally assigned to the *E. erronea*-species-complex based on conchological features. The relationship of *E. erronea* to *E. caurica* as suggested by the cladogram is supported by the common occurrence of hybrids between these species, mainly known from India and New Caledonia. Hybrids between *E. ovum* and *E. erronea* are unknown to us, and no interbreeding between *E. ovum* and any other species of the genus seems to occur.

Acknowledgements

We wish to thank the following people for their kind cooperation: Jana Kratzsch, for continued support. She collected many of the type shells and photographed the living animal of *E. ovum erici*. HANS-JÖRG NIEDERHÖFER and KLAUS GROH for careful editing and advice. And also: DIETMAR AMON, DOUG THORN, SCOTT JOHNSON, ANITA ESCHNER, VIRGINIE HÉROS.

Plate 2 (see page 7)

Erronea ovum erici n. ssp.

1st row left: holotype, 21 mm coll. MNHN. Right: paratype 5, 17 mm.

2nd row left: paratype 7, 19 mm coll. HNC. Right: paratype 9, coll. CHIAPPONI.

3rd row left: *E. ovum erici*, 23 mm, Balabac Island, Palawan.

E. ovum ovum

3rd row left 23 mm, exceptionally calloused look-alike specimen from Samar. Note the structural differences in the dentition, especially on columellar side, and the formation of the columellar peristome, the less condensed blotch and the less blunt extremities in *E. ovum ovum*.

Erronea erronea

4th row: Left: 21 mm, Broome, NW Australia. Specimens from this area are confusingly similar to *E. ovum*. The abruptly widening anterior end of the aperture and the pronounced last anterior teeth is still obvious though. Right: *E. erronea*, 20 mm, New Caledonia. In most populations of *E. erronea* the different formation of the anterior is more defined.

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