

***CRIBRARULA GASKOINI* (REEVE, 1846), AN INTERESTING FORM,
WHICH CAN PERHAPS BE TREATED AS A SUBSPECIES
OF *C. CRIBRARIA* (LINNAEUS, 1758)**

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Abstract: In this conchological study a total of 30 shell characters of *Cribrarula cribraria* (Linnaeus, 1758) and *Cribrarula gaskoini* (Reeve, 1846) are compared. It turned out that all compared shell character of *C. gaskoini* can be found also in shells of *C. cribraria*. Diagnostic characters of a specific level i.e. those, which are present in all specimens of *C. gaskoini* and absent in *C. cribraria*, are not found.

Based on this fact, *C. gaskoini* should be treated as a form of *C. cribraria* or as a subspecies of the latter. This approach can be supported by the following reasons: 1) *C. gaskoini* shares the main diagnostic shell characters of *C. cribraria*. 2) It is separated geographically from all the others populations of *C. cribraria*. 3) Certain shell characters seem to be more often found in *C. gaskoini* than in *C. cribraria*: the humped shell profile, the bigger number of the small dark spots on the shell sides, the dark rings around the dorsal lacunae, and the very narrow dorsal line bordered by narrow darker lines.

But shell characteristics allowing treating *gaskoini* as a subspecies of *cribraria* are unknown: it is unknown whether the majority of shells from the Hawaiian Islands share the prominent conchological characters mentioned above, which are rarely found in *C. cribraria*. That a gap in our knowledge can be filled by a conchological statistical study of large batches of authentic local shells; then *gaskoini* should perhaps be treated as a subspecies of *C. cribraria*.

Key words: Mollusca, Gastropoda, Cypraeidae, *Cribrarula cribraria*, *Cribrarula gaskoini*, taxonomy, nomenclature, intraspecific variation.

Cribrarula gaskoini (Reeve, 1846) is a well known taxon, which is considered to be endemic to the Hawaiian Islands although this opinion seems to be never checked by any malacological method including a statistical conchological study.

Two shells (“one in the British Museum and one in the collection of Mr. Gaskoin”) are used in the original description, which reads:

“Gaskoin’s cowrey. Shell somewhat shortly ovate, rather solid, sides thickened, margined, teeth rather strong; back yellowish straw-colour, sparingly ornamented with rather small white eyes, encircled with pale brown rings, sides dotted with chestnut, base white.”



1-2. *C. gaskoini*, the Hawaiian Islands, 23.5 mm. In this specimen the main diagnostic shell characters given by Reeve are visible but they are not always present in other shells of the taxon



3-4. *C. gaskoini*, the Hawaiian Islands, 23.5 mm. In this specimen the main diagnostic shell characters given by Reeve are visible but they are not always present in other shells of the taxon.

The diagnostic characters given in the original description (the first three lines) and in the consequent works by the Schilders can be seen in Table 1.

Table 1

diagnostic shell characters	notes
dorsal lacunae (“eyes”) encircled with brown rings Figs. 1-2.	not in all shells rings are visible
sides spotted with chestnut Figs. 3-4.	not in all shells spots are numerous
base white	
acuminate though much shorter [than in <i>cumingii</i>] extremities	extremities slightly acuminate
the outer lip declivous at the extremities	slightly near the anterior extremity
the labial teeth equally produced	
dorsal line is bordered by narrow darker brown lines	not in all shells this is visible
the fossula consists of two rows of teeth rather approaching each other and so becomes much narrower than the declivous columellar sulcus	the fossula seems to be the same, compare Figs. 40-41 below

The conchological practice shows that most of the diagnostic characters given in Table 1 are present in shells of *C. gaskoini*, but not in **all** its shells, or they are not always can be easily recognized. Much depends also on lights and the angle of view when shells are photographed or examined.

Diagnostic characters should be present in all shells if one considers their specific level.

Certain diagnostic characters mentioned above can be seen in Figs. 5-16 below (all from the Hawaiian Islands).



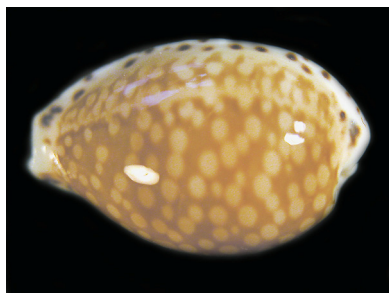
5-7. 20 mm



8-10. 22.5 mm



11-13. 17.1 mm



14-16. 19.1 mm

Several shell characters of *C. gaskoini* were studied statistically in Thorsson (1978, 1982). It was shown that the shell size varies from 8 mm to 24 mm; small dark spots on the labral margin are mostly arranged in rows a number of which may be 1 to 6—see Figs. 17-19.

It follows also from Thorsson's study—Fig 20—that small shells of *C. gaskoini* are more frequently found and a statistical distribution of the shell length deviates of the so called law of normal distribution.

These data are mostly confirmed in Dayle (1991) by a statistical study of large batches of *C. gaskoini* shells.

This fact can perhaps be explained by the special environmental situation around the Hawaiian Islands, which are subject to hurricanes when coastal populations of marine molluscs may be temporarily devastated; new populations may differ from the previous ones by several peculiarities including the shell size and other shell characters; all that may change the statistics when shells taken with long intervals of time are studied together.

Other diagnostic characters: the dorsal pattern of whitish round 'eyes', brownish dorsal color, sides spotted with chestnut, white base—may be visible in other *Cribrarula* species, as will be seen below.

A question whether the diagnostic shell characters mentioned above present in **all** shells of *C. gaskoini* and absent in shells of the related *Cribrarula cribraria* (Linnaeus, 1758) can be supplemented by another question: Perhaps the description of *C. gaskoini* is not adequate, perhaps Reeve missed certain diagnostic characters of a specific level, which can be used for separating *C. gaskoini* from *C. cribraria* and can be added to the description of *C. gaskoini*? *C. cribraria* is widely distributed in the Indo-Pacific region; in the West it is known as a subspecies *C. cribraria comma* (Perry, 1811); in an area Mauritius-Reunion Islands it can be treated as a subspecies *C. cribraria esontropia* (Duclos, 1833); in an area of the Western Pacific Ocean it is

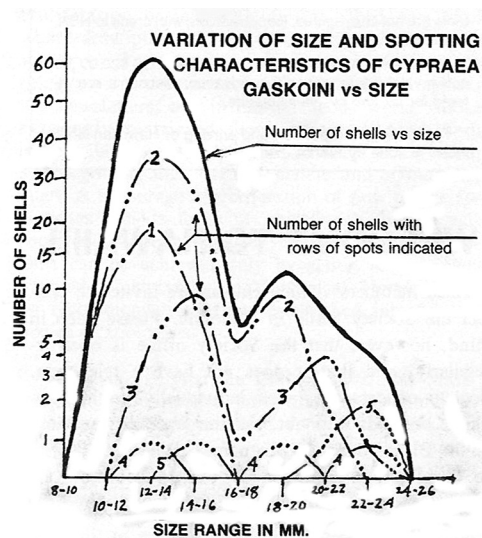
treated as *C. cribraria orientalis* Schilder & Schilder (1940). Intermediate zones between these subspecies and other populations of the species are treated as *C. cribraria* in a broad sense according to Heiman (2007).

C. gaskoini and *C. fischeri* (Vayssiere, 1910) are linked in their nomenclatural history after the Schilders treated 'fischeri' a subspecies *C. gaskoini fischeri* (Vayssiere, 1910), which can be diagnosed by the lesser shell size. It is shown in Heiman (2009) that 'fischeri' is a synonym of *C. cribraria* and this taxon is not discussed here.

To answer the both questions mentioned above, one has to compare shell characters of these taxa; this is done below.



17-18. *C. gaskoini* with five-six rows of marginal spots. After W. Thorsson (2001, #396-07 & #396-08)



19. *C. gaskoini* with five to six rows of marginal spots. After Thorsson (2001, # 396-09)

20. Number of shell of different size and number of shells with rows of lateral spots indicated. After Thorsson (1982)

Comparing shell characters of *C. gaskoini* and *C. cribraria*.

Shell characters of *C. gaskoini* and *C. cribraria* are compared in Table 2 and illustrated in pictures Figs. 21-41.

Notes to Table 2:

- 1). Shell characters mentioned in the original description of *C. gaskoini* are designated by the sign '1'.
- 2) Shell characters added in the Prodrome are designated by the sign '2'.
- 3) The presence of a character in the examined shells is designated by the sign 'V'
- 4). 'ni' means the absence of information.
- 5). Sometimes only the right side is spotted.
- 6) Formula for different subspecies of *C. cribraria* reads according to the Prodrome:
cribraria comma 19.61.19.16
cribraria esontropia 26.61.17.16
cribraria. orientalis 22.57.20.19 (until 1940 this taxon was named *cribraria melwardi*)
- 7) The Schilders mentioned that the fossula in *C. gaskoini* is "much narrower than the declivous columellar sulcus".
- 8) Pictures Figs. 21-41 are of *C. cribraria* if not mentionrd differently.

The results

As can be seen in Table 2 all the compared shell characters of *C. gaskoini* are present also in *C. cribraria*.

The numerous small dark brown spots of different size on the shell sides are prominent shell character of *C. gaskoini*. Such small spots may be present also in shells of several populations of *C. cribraria*, for example *C. cribraria esontropia* (Duclos, 1833) from an area Mauritius-Reunion but in *gaskoini* their number may be substantially larger and their color more vivid.

Summary and conclusions

The following are the facts:

- 1) All shell characters of *C. gaskoini* can be found in *C. cribraria* hence *C. gaskoini* is not separable from *C. cribraria* at a specific level.
- 2) Shells of *C. gaskoini* share the main diagnostic characters of *C. cribraria*.
- 3) Several shell characters of *C. gaskoini* —the numerous small spots on the shell sides, the narrow dorsal line, the dark rings around the dorsal lacunae, and dark lines bordering the dorsal line—may be sometimes prominent in shells of *gaskoini* more than in *cribraria*.
- 4) Populations of *C. gaskoini* are geographically separated from other populations of *C. cribraria* so perhaps it can be treated as a subspecies of *C. cribraria*.
- 5) At least one shell characteristic is absent in order to treat *gaskoini* as a subspecies of *cribraria*: it is unknown whether the majority of shells from the Hawaiian Islands share the prominent conchological characters mentioned above. That a gap in our knowledge can be filled by a conchological statistical study of large batches of authentic local shells; then *gaskoini* should perhaps be treated as a subspecies of *C. cribraria*.

Table 2.

Comparing shell characters of *C. cribraria* and *C. gaskoini*.

taxa →		<i>cribraria</i>	<i>gaskoini</i>	notes	
shell characters ↓					
shape	elliptical	Figs. 8, 10, 25	V	V	
	elongate-oval	Figs. 5-7, 22	V	V	
	oval	Figs. 17-18, 21, 26	V	V	1
profile	convex	Figs. 19, 23	V	V	
	humped	Figs. 2, 12, 24	V	V	
sides	spotted	Figs. 1-4, 29	V	V	1, 5
	left round, thickened, rarely slightly edge	Figs. 2, 6, 28	V	V	
	right thickened, margined (edged)	Figs. 1, 17, 27	V	V	1
	right may be adorned with small spots	Figs. 1, 4, 16, 19, 30	V	V	
spire	depressed	Figs. 31, 32	V	V	
dorsum	yellowish straw-colour		V	V	1
	fulvous or ochraceous (as previous)		V	V	
	light brown to dark brown		V	V	
	sparingly ornamented with rather small white eyes	Figs. 1, 4, 33	V	V	1
	lacunae of different size, round, may be crowded	Figs. 8, 14, 34	V	V	
	lacunae encircled with brown rings	Figs. 1-2, 35	V	V	1
	with lacunae tinged beige to tan		V	V	
dorsal line	definite, narrow	Figs. 1, 5, 8, 11, 36	V	V	
	narrow, may be bordered by deeper colored lines	Figs. 1, 37	V	V	
lateral spots	numerous chestnut to dark brown	Figs. 1-4, 6, 19, 29-30	V	V	
	few small present on the base	Figs. 7, 10, 13, 28	V	V	
	absent		V	-	
base	white	Figs. 3, 7, 18, 38	V	V	1
	convex	Figs. 2, 6, 9, 39	V	V	
aperture	wide enough so the fossula can be visible	Figs. 3, 16	V	V	
teeth	labial may be equally produced to about ½ lip		V	V	1
	columellar fine, several teeth more strong anteriorly		V	V	
fossula	broad, denticulate or ribbed	Figs. 40-41	V	V	2, 7
extremities	slightly produced		V	V	
formula	for <i>gaskoini</i> 20.62.21.20; similar to that of <i>C. cribraria</i>		V	V	2, 6



21. Oval shape, Philippines



22. Elongate-oval, Philippines



23. Convex profile, Reunion



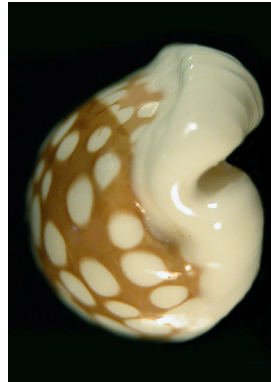
24. Humped profile, Japan



25. Elliptical shape, Philippines



26. Oval shape, Australia



27. Margined right side



28. Round left side



29. Spotted right side



30. Spotted base



31. *C. gaskoini*



32. *C. cribraria*



33. *C. cribraria*, Australia



34. *C. cribraria*, Mozambique



35. Encircled lacunae



36. Narrow dorsal line



37. Bordered dors. line



38. White base



39. Convex base

40. Fossula of *C. gaskoini*, 22.5 mm41. Fossula of *C. cribraria*, Japan, 28 mm

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