THE GENUS *CRIBRARULA* IN THE PACIFIC OCEAN

(corrected version, June 2010)

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Abstract: In this work shell characteristics of several groups of populations belonging to the genus *Cribrarula* in the Pacific Ocean are studied. The specific level of *Cribrarula cribraria* (Linnaeus, 1758) is taken for granted based on the malacological literature. The specific level of *Cribrarula catholicorum* Schilder & Schilder, 1938 and *Cribrarula cumingii* (Sowerby, 1832) is confirmed; both these taxa seem to be monotypic species.
Two subspecies are recognized in *C. cribraria*: *C. cribraria orientalis* Schilder & Schilder, 1940 of the Philippine Islands and *C. cribraria melwardi* Iredale, 1930 of North-East and East Australia. The subspecific level of the third possible subspecies—*C. cribraria gaspardi* Biraghi & Nicolay, 1993 from the Kwajalein area needs further confirmation.
Several populations of *C. cribraria* inhabiting a vast area of the Pacific Ocean from Indonesia and Japan in the West to Polynesia in the East are separated geographically. It turned out that these populations did not reach yet such a stage in their development that they can be separated as subspecies although their shell characteristics differ to a certain extent; hence they should be treated as *C. cribraria* in a broad sense.
There are several forms in populations of *C. cribraria* and *C. cumingii* in the Pacific Ocean, which confused students of cowries for a long time. Large shells of *cumingii* were described as a subspecies *C. cumingii cleopatra* Schilder & Schilder, 1938. Unusually wide shells of *cumingii* were described as *C. lefaiti* Martin & Poppe (1989). A conchological study shows that the two latter taxa are only forms of *C. cumingii*.
In an interesting form of *C. cribraria* the dark spots on the shell sides and base may be larger and darker than in typical shells of the species. This form from the Hawaiian Islands, Samoa, Fiji and other areas confused students of cowry in the past; such shells were described as a subspecies *C. fischeri astaryi* Schilder, 1971 and later as *C. taitae* Burgess, 1993. There seems to be no scientific evidence confirming the validity of the two latter taxa.
It is very probably that shells of *C. garciai* Lorenz & Raines, 2001 described as a species from Easter Island are in fact a form of *C. cumingii* but the final conclusion is difficult to draw currently due to scarcity of a conchological material.
Keywords: Mollusca, Gastropoda, Cypraeidae, *Cribrarula cribraria, cumingii, catholicorum*, intraspecific variation.

Shell characteristics of several groups of populations belonging to the genus *Cribrarula* in the Pacific Ocean are studied below. As in the previous works by the present author, the specific level of *Cribrarula cribraria* (Linnaeus, 1758) is taken for granted based on the malacological literature and its diagnostic characters are used for comparison with other taxa.

1. *Cribrarula cumingii* (Sowerby, 1832)

1.1. Descriptions of *Cribrarula cumingii* in works by students of cowries in the past.
The original description of *Cypraea cumingii* reads:

"77. Cypraea cumingii, *Gray*, Conch. Illustr., f. 5.
Shell oblong, ends produced, spire depressed; back pale fulvous, with round white spots, margins with round very dark, brown dots, outer margin thickened; base white, mouth long and narrow, teeth very small; length 0.6 breadth 0.3.
Cypraea Cumingii, Gray. Descr. Cat., p. 6, No. 41.
Obs. Two specimens were found by Mr. Cuming."

1. *C. cumingii*, Marquesas Islands

2. *C. cumingii*, Tahiti

Location of the holotype of the species seems to be unknown according to Schilder (1966).
The round white dorsal spots are characteristic of *Cribrarula cribraria* (Linnaeus, 1758). In *C. cumingii* known to us today the dorsal spots may be pale beige to tan—Figs. 1-2—and it is not clear why in the description "white spots" are mentioned.

Reeve (1846) mentioned *cumingii* as follows:
"Species 77. (Mus. Cuming.)
Cuming's Cowrey. Shell oblong-ovate, attenuately drawn out anteriorly, sides marginated, extremities produced and reflected, aperture flexuous, teeth fine, especially the inner; back fulvous straw-colour, sparingly ornamented with rather small white eyes tinged with pale brown, sides dotted with dark chestnut brow, base white.
Gray; Sowerby, Conch. Illus. Cat. Cypraeidae, no 77 f. 5 and 181.
Hab. Island of Rietea, Society Islands (found under coral on the reefs at low water.) Cuming.
This beautiful species may be distinguished from the *Cypraea cribraria* by its attenuated and elegant growth, by the clearness and delicacy of its colouring, and by the spots being smaller, fewer in number, and ringed with pale brown."
It should be mentioned that in *cumingii* of French Polynesia only the right side is distinctly margined.

Sowerby (1870:35) wrote:
"There is nothing to distinguish the variety named *compta* from *Cumingii*,—the branch from the center of the dorsal scar being accidental or simply varietal."
Two shells are pictured on Plate 31 of the latter work: in figs. 349-350 a large shell named *cumingii*, and in fig. 351 a small shell with the distorted dorsal line from Rieatea, Society Islands.

Melvill (1888:49-50) noted about *cumingii*:
"*C. cumingii* (Gray) is more distinct, a very graceful attenuated pyriform shape, resembling *C. macandrei* (Sowb.), and *C. beckii* (Gaskoin), in a greater degree than the other species" and added: "*C. compta* (Pease) is but a variety of *Cumingii* from Kingsmill group (A. Garrett) and Phoenix Island (Harper Pease), a single example in each case. The dorsal sinus is branched, hinting at some malformation in the mantle, the result, however, being a beautiful little shell, now in the National Collection. "*Cf.* Sowb., T. C., pl. xxxi., f. 351.".

The following passage from the work is remarkable:
"The *cribrariae* more nearly run into each other than do most of the sections of this genus, and though *cribraria, esontropia, cribellum, Gaskoinii* are typically distinct, I should never be surprised at all being eventually united."

In the Prodrome the Schilders gave the following conchological information about *C. cumingii*:
" in the three Eastern species [*catholicorum, cumingii*, and *gaskoini*] the dorsal line always is well defined though narrow, and bordered by two deeper coloured lines; the dorsal lacunae are also encircled with deeper brown in these Eastern species only, in which the teeth are more numerous than in the Western ones."

"Among the Pacific species *cumingii* is characterized by the extremely fine and numerous teeth and the broad concave fossula; its extremities are produced and the outer lip is rather declivous in front (where it is carinate externally) and behind, but flattened in its central third, where the labial teeth become short; the lateral spots are larger and blackish, and the dorsal lacunae often more distant than in *gaskoini* and in *catholicorum*."

"There are two striking varieties in size: the typical *cumingii* (11.54.40.34) varying from 9 to 16 mm, and rare giants, which we propose to call *cleopatra* (22.52.28.32), varying from 20 to 30 mm; we have never seen intermediate shells. Moreover *cleopatra* differs by the labial teeth, which are relatively coarser and less numerous than the columellar ones, by the outer lip less declivous in front, the labial teeth produced more equally, the body whorl less inflate, the extremities less produced, the dorsal lacunae smaller and more numerous, and lateral spots more numerous; it seems to live together with *cumingii* in Eastern Polynesia, but it has not yet been found in the Western half of the area inhabited by *cumingii*, so that we doubt whether *cleopatra* is an ecological variety only or a distinct species comparable to *Cribraria subteres*: therefore we

treat it provisionally as a geographical race, still overlapped geographically by *cumingii* which is evidently the younger race being morphologically extreme.
cleopatra nov.-Society Is. to Henderson I.
cumingii-(=compta Pease 1860)-Tahiti to Gilbert I., Henderson I., and Samoa."

1.2. Students of cowries after the Schilders
Burgess (1970, 1985) considered *cumingii* a monotypic species ('cleopatra' being a form) and restricted its range of distribution to an area Cook Islands-Javris Island-Marquesas Islands-Tuamotu Archipelago.

Gill (1984) published the interesting statistical data regarding 209 *C. cumingii* shells, which seems to be not studied until now (it will be discussed below).

Martin (1989) followed the Schilders in considering *C. cumingii cleopatra* to be a subspecies having shells above 20 mm and mentioned that *C. astaryi* Schilder 1971 (not a subspecies *fischeri astaryi*) and *C. gaskoini fischeri* (Vayssiere 1910) are possible present in French Polynesia.

Martin & Poppe (1989) described a new species *C. lefaiti* from the Marquesas Islands. The taxonomic identity of this taxon is discussed below separately.

Salvat & Rives (1990) pictured the following species of *Cribrarula* from Tahiti: *astaryi, cribraria, cumingii, gaskoini.*

Richard & Hunon (1991) considered that the following taxa of the genus *Cribrarula* are living in French Polynesia: *C. cribraria* (Linnaeus, 1758), *C. gaskoini fischeri*, *C. astaryi* (with a form 'lefaiti') and *C. cumingii.*

Lorenz & Hubert (1993) accepted as a whole a range of distribution of *cumingii* given in the Prodrome. They distinguished two subspecies: *C. cumingii cumingii* and treated 'cleopatra' as its form, and *C. cumingii astaryi* with 'lefaiti' as its form. *C. fischeri astaryi* and other derivates of this name are discussed in Heiman (2010b).

In Lorenz & Hubert (2000) the authors' approach is the same and they added 'compta' (Pease, 1860) as a form of *C. cumingii cumingii.*

A study of more than 100 shells of *C. cumingii* is reported in Lorenz (2000) and a conclusion is drawn that two subspecies of this species can be separated based on the shell size: *C. cumingii cumingii* from an area Tahiti-Huahine and *C. cumingii compta* (Pease, 1860), which is distinguished by smaller shells.
In Lorenz (2002:261) three subspecies are mentioned:
C. cumingii cumingii from Tahiti (large shells >20 mm "from quiet lagoons"); 'cleopatra' is a form;
C. cumingii astaryi from Marquesas Islands, 'lefaiti' is its larger form;
C. cumingii compta (Pease, 1860) from Tuamotu Archipelago (small shells).

1.3. Diagnostic shell characters of *C. cumingii* can be seen in Figs. 1-2 and in a Table 1 below.
Several diagnostic characters: the dorsal line, the dorsal lacunae bordered by darker rings, and the large dark spots on the sides and on the base can be found in other Pacific taxa of the genus *Cribrarula* too, but the fine and numerous teeth are unique to *C. cumingii*; this shell character seems to be the main diagnostic character of the species. All shells of a species (including shells of its subspecies) should share the main diagnostic character of the species ("species first" rule). It worth to compare the conchological information regarding several taxa, which were related to *C. cumingii* as mentioned above, keeping in mind the FCA approach as discussed in Heiman (2010a).

Table 1
Diagnostic characters of *C. cumingii* according to the malacological literature

shell characters	Sowerby (1832, 1870)	diagnostic characters added by the subsequent students of cowries (see notes)
shell shape	oblong	the shell shape can be considered elliptical
extremities	produced	
spire	depressed	
dorsum	pale fulvous	
dorsal line		well defined though narrow, and bordered by two deeper coloured lines (2)
dorsal lacunae	round white	**round beige or tan**, ringed with pale brown (1) (2) **often more distant than in *gaskoini* and in *catholicorum*** (2)
sides	right thickened	
	lateral spots	**larger and blackish** (2)
	round very dark brown spots	
base	white	
aperture	long and narrow	
teeth	very small	**extremely fine and numerous** (2)
length, mm	15.24	
width, mm	7.62	
outer lip		rather declivous in front (where it is carinate externally) and behind, but flattened in its central third where the labial teeth become short (2)
V-S formula	two subspecies (2)	typical *cumingii* (11.54.**40.34**) (2) *cleopatra* (22.52.**28.32**) (2)

Notes.
1. This diagnostic character is first mentioned in Reeve (1846).
2. These diagnostic characters are given in the Prodrome.
3. The main diagnostic characters of a specific level are written in bold letters.

1.4. Comparing shell characters of *C. cumingii* and several closely related taxa
It should be mentioned that a subspecies *C. cumingii cleopatra* was described in the Prodrome "provisionally as a geographical race, still overlapped geographically by *cumingii*…" The Schilders apparently hoped to confirm the subspecific level of this taxon in the future but this did not happen. Finally, in Schilder & Schilder (1971) 'cleopatra' is listed as a synonym of *cumingii* (together with 'compta').
In other words, in 1971 *C. cumingii* was treated as a monotypic species and this approach should be accepted until the scientific evidence confirms the existence of a group of populations of the species, which conforms to the criteria of subspecies.

C. lefaiti Martin & Poppe (1989)—was described as a new species from the Marquesas Islands. Its description reads:

"*Cribrarula lefaiti* n. sp.
The shell has all the characteristics of the genus *Cribrarula*. It can be distinguished particularly by the large black marginal blotches and by the solid, heavy ventral part, pure porcellaneous white. This is naturally in comparison with the other species of the genus. Its unique feature is the denticles of the fossula, which point strongly towards the inside of the shell."

The authors did not picture the latter feature of 'lefaiti' shells and this character remains unclear.

3-4. *C. lefaiti*; after Martin & Poppe (1989).

"*C. lefaiti* is distinguished from *C. astaryi* and from *C. cumingii* by its much more globose shape, the black marginal blotches which go up towards the dorsum and by the more callous ventral part. *C. lefaiti* can be distinguished from *C. gaskoini* by the darker dorsal colour, the larger, less numerous and darker dorsal blotches and by the presence of circles around the blotches."

Summarizing: it is expected that *C. lefaiti* can be distinguished from other taxa of the genus by:

1.→ the large black marginal blotches,
2.→ the solid, heavy ventral part,
3.→ much more globose shape,
4.→ the darker dorsal colour,
5.→ the presence of circles around the blotches,
6.→ the denticles of the fossula, which point strongly towards the inside of the shell.

Five of the above six diagnostic characters can be found in both *C. gaskoini* and *C. cumingii* too. A question regarding peculiarities of the fossula needs clarification. Until this is done, *C. lefaiti* should be treated as a form of *C. cumingii* (form dilated) and a synonym of the latter.

In Lorenz & Hubert (1993) *C. cumingii astaryi* is mentioned as a subspecies from Marquesas Islands.

The taxonomic identity of *C. fischeri astaryi* is discussed in Heiman (2010b) where a conclusion is drawn that *astaryi* is a sporadic unusual form of *C. cribraria*, which differs by the presence of the larger then usual dark marginal spots, and should be treated as a synonym of the latter until new conchological information will be available to confirm the contrary option.
It should be mentioned again that all shells (in all subspecies) share the main diagnostic characters of the same species. *C. cumingii asta*ryi does not conform to this criterion because it does not share the main diagnostic characters of *C. cumingii*.

In Lorenz (2000) an attempt is made to revise the nomenclatural history of *C. cumingii* assuming that the holotype of *C. cumingii* is not the shell mentioned in the original description—15.24 mm x 7.62 mm—(which was apparently lost according to Schilder (1966)) but the substantially larger shell (27.8 mm) pictured in Sowerby (1870) as mentioned above in section 1.
This is strange and, in my opinion, does not make sense due to the following reasons:
a. The small shell 15.24 mm is clearly mentioned in Sowerby (1832).
b. Reeve (1846) and Sowerby (1870) treated 'compta' as a synonym of *cumingii*.
c. Melvill (1888) mentioned *cumingii* as "a beautiful little shell" and even compared it with *Erosaria macandrewi* and *Erosaria beckii* (typically small shells).
d. Schilder (1966) mentioned that the holotype of *cumingii* is unknown, apparently lost.

Besides, comparing the shell length of about 100 shells of *cumingii*, Lorenz (2000) concluded that the statistical distribution is clearly shows two picks, which allows treating several populations of the species as subspecies.

But a conclusion may be different if one uses the data published earlier in Gill (1984), where 209 shells were studied. Below the data of the latter work and those given in Lorenz (2000) are compared in Fig. 5, next page, where the numbers of *cumingii* shells having different size from 10 mm to 27 mm up are written in the base of each column (bold letters).

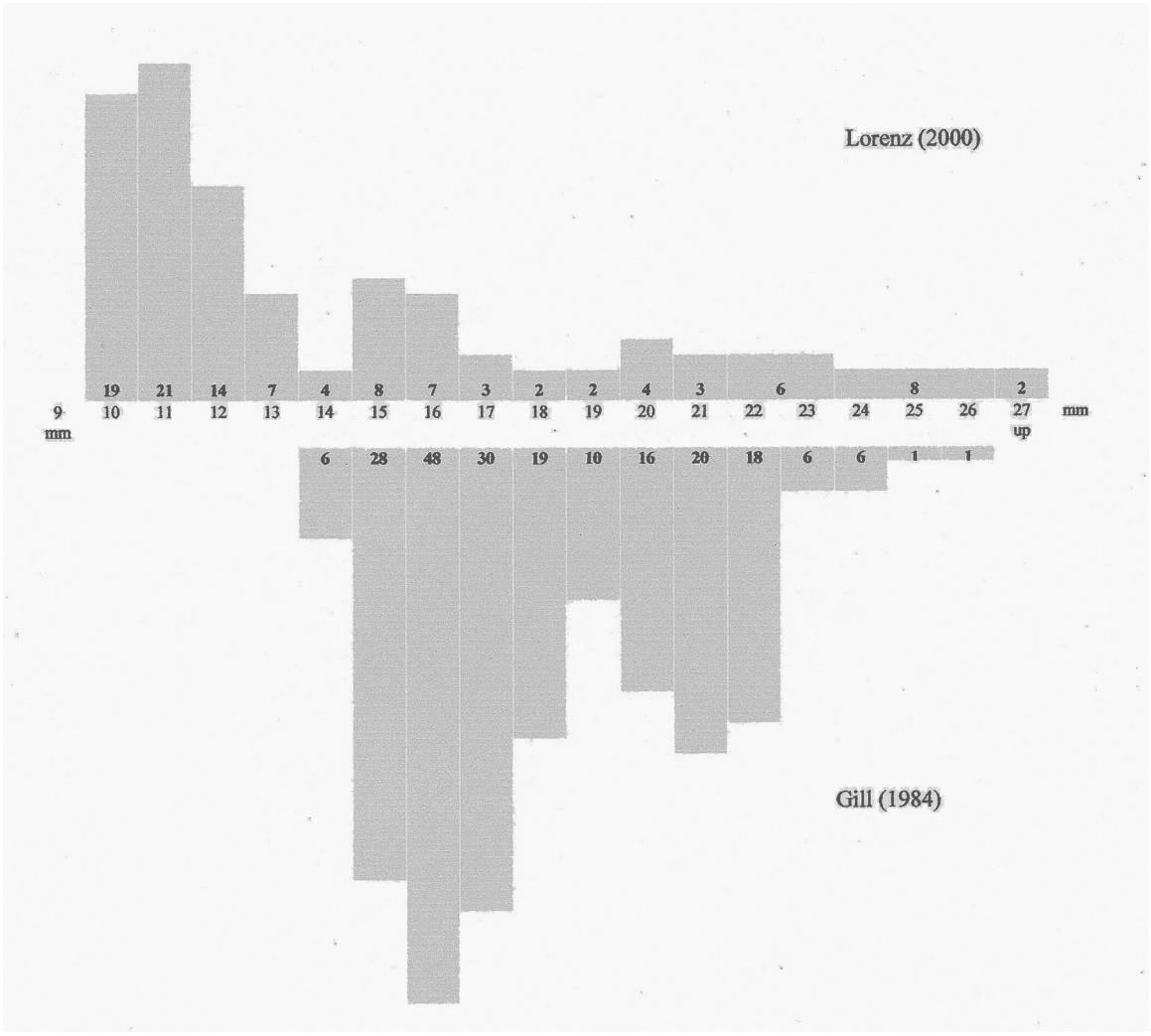
The data published in the two works are apparently based on information obtained from different collectors and dealers; the shells were collected at different islands, in different depth of water, and in different time, in other words this conchological material regarding *cumingii* from Polynesia is not homogeneous. Besides, collector and dealers prefer usually to have larger shells. Fig. 5 shows that the shell size of *C. cumingii* varies considerably and any accidental data, even data obtained by examining substantial batches of shells, may lead to confusion; the data of Gill (1984) and Lorenz (2000) are not in harmony.

One should remember also, that hurricanes may devastate for a certain time the cowry fauna in different areas of the Pacific Ocean and, according to a phenomenon named 'founders effect,' a new generation in the same area after hurricanes may differ from the old one. Variability of the species and the shell size in particular may be substantial; this is a very complicated issue.

There are many examples in the malacological practice when unusual shells of cowry species widely distributed in the Indo-Pacific region were described as new species. Just a few examples:
Lyncina leviathan Schilder & Schilder, 1938 from the Pacific Ocean and *Lyncina titan* Schilder & Schilder, 1962 from East African coasts in the Indian Ocean were first treated as valid species; later they were treated as subspecies of *Lyncina carneola* (Linnaeus, 1758), and finally as an unusually large form of *L. carneola.*

Unusually large shells are sporadically found in populations of *Lyncina lynx* (Linnaeus, 1758), *Erronea caurica* (Linnaeus, 1758), and other species. Such shells may be temporarily locally common and found in substantial numbers but they are only a form.

Taking all this into consideration, changes in the nomenclature of *C. cumingii* suggested in Lorenz (2000) cannot be accepted.



5. Statistical distribution of the shell size of *C. cumingii* given in two different works

Radulae of the taxa belonging to the discussed group are similar and cannot be used as an additional means for separating between them. In Bradner & Kay (1996) the radulae of the following taxa are given:

C. astaryi
C. catholicorum
C. cribellum
C. cribraria
C. cumingii
C. esontropia
C. fallax
C. gaskoini

The authors of the Atlas considered that that the radulae of all these taxa have the '*cicercula*' pattern and are very similar.

1.4. Comparing shell characters
Shell characters of the taxa belonging to the genus *Cribrarula* in the Pacific Ocean are compared in Table 2 (next page).

It follows from the table:
a) The shell shape may be elliptical or oval in all compared taxa; subcylindrical shells seem to be unknown in *C. cumingii*.
b) The shell profile may be convex to humped.
c) The shell extremities are not spotted in all compared taxa and may be mostly acuminated (*cumingii*) or blunt (*catholicorum*).

d) The spire and the shell sides are the same in all shells.
e) Dark spots (small or larger) can be found in shells of all taxa in different proportion.
f) The shell base is white or whitish in all shells; it may be convex or rather flat.
g) Labial and columellar teeth are rather similar in shells of all taxa except *cumingii*.
h) The dorsal pattern and the dorsal line are vary considerably in *C. cribraria*; in *cumingii* and *catholicorum* these two characters are rather constant.

Table 2
Shell characters, which are found in taxa of the genus *Cribrarula*

shell characters ↓		*cribraria s.s.*	*cr. comma*	*cr. esontropia*	*cr. orientalis*	*cr. gaskoini*	*catholicorum*	*cumingii*
shape	elliptical	V	V	V	V	V	V	V
	oval	v	v	v	v	v		V
	subcylindrical	v		v	v			
	dilated	v	v	v	v	v		v
profile	convex	V	V		V	V		v
	quasi-flat	v		v			v	
	humped even if low	v			v	v		**V**
extremities	acuminated	v			v	v		V
	rostrated	v			v			
	blunt	v			v		**V**	
	not spotted	V	V	V	V	V	V	V
spire	depressed	V	V	V	V	V	V	V
sides	right margined	V	V	V	V	V	V	V
	left rounded	V	V	V	V	V	V	V
	both sides not margined	V	V	V	V	V	V	V
	not blotched	V	V	V	V	V	V	V
right side spots	small, dark	v		V		V	V	V
	large, dark	v				V		V
left side spots	small dark	v		v		V?		V?
	large, dark	v				V		V
base	convex	V			V	V		V
	rather flat	v		v	V			?
	white	V	V	V	V	V	V	V
	blotch absent	V	V	V	V	V	V	V
aperture	narrow	v			v			V
	rather wide	v			v	v		V
labial teeth	normalized (average)		20	17	18	21	21	**40**
columellar teeth	normalized		19	16	16	20	20	**34**
dorsal pattern	white lacunae	V	V	V	V	V	V	
	beige lacunae							**V**
	lacunae ringed	v			v	v		**V**
	blotch absent	V	V	V	V	V	V	V
	bands absent	V	V	V	V	V	V	V
dorsal line	wide, hardly visible, confused	v	V	v	v	V	V	
	sometimes absent	v	V	v	v	V	V	
	narrow, clear	v	V			V?	V	**V**
	bordered with darker lines	v				v	V	**V**

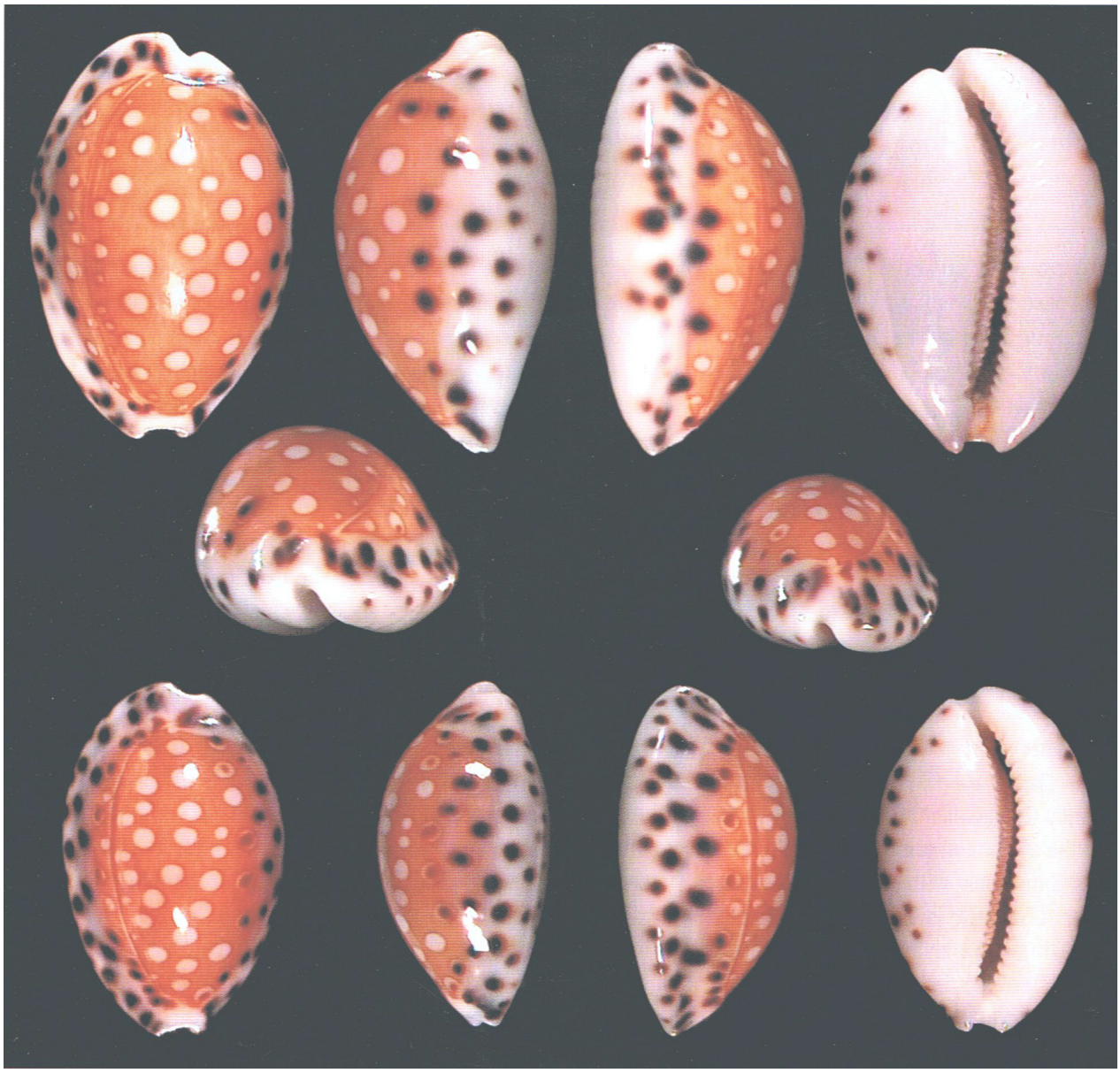
Notes:
1. Designations: V-supposedly found in all specimens; v-sporadically found; V?-needs confirmation.
2. Diagnostic characters of a specific level are written in bold letters and given in the shaded blocks.
3. Data regarding the normalized teeth count are cited from the Prodrome.

2. The taxonomic identity of the compared populations
2.1 According to Table 2 *C. cumingii* differs from *C. cribraria* by the following shell characters:
A. More numerous teeth.
B. The light beige instead of white dorsal lacunae ringed by darker color.
C. The narrow dorsal line bordered by the narrow darker lines.
D. The rather humped dorsal profile. Shells of *cumingii* are not relatively high but the highest point of the dorsum is more close to the posterior extremity than to the anterior one.
In other words, *C. cumingii* is a valid monotypic species.
C. cumingii inhabits areas of the French Polynesia, Cook Islands, and perhaps the Easter Island.

2.2. *C. catholicorum* Schilder & Schilder (1938a) differs from all the other taxa by the blunt shell extremities and low convex profile; inhabits and area from the New Britain the New Hebrides; mostly known from the Solomon Islands. The main diagnostic shell characters of this species are: the sparse small dark spots on the shell sides and the narrow dorsal line—Fig. 6.
These characters seem to be present in all shells of the taxon.

6. *Cribrarula catholicorum*; Solomon Islands.

3. Populations of the subspecific level belonging to the genus *Cribrarula* of the Pacific Ocean
Based on the data of the current study and those published in Heiman (2009a, 2009b) the following taxa of the subspecific level belonging to the genus *Cribrarula* inhabit the Pacific Ocean:
3.1. *C. cribraria* s.l. (in a broad sense) inhabits the Western Pacific Ocean: Japan, Indonesia, Papua New Guinea, North-East Australia, East Australia, New Caledonia, and the French Polynesia. Shell characters of this taxon are discussed in Heiman (2009a).
3.2. *C. cribraria orientalis* Schilder & Schilder, 1940 inhabits the Philippines and near-by areas.
3.3. *C. garciai* Lorenz & Raines, 2000 described from the Easter Island shares the main diagnostic characters of *C. cumingii*: the dorsal lacunae, the dorsal line, and the numerous teeth. It differs by the wider callused shell (which can be interpreted as form dilated known in many species of cowries) and the larger dorsal spots on the shell sides, which are visible also on the lower part of the dorsum. Specimens of this taxon are rare and it is still not clear whether the latter shell characters of *garsiai* are present in all its shells or in a part of them. This taxon is so close to *C. cumingii*—Fig. 7, next page—that it even be treated as a subspecies, but such a decision should be based on a study of more shells.
3.4. *C. cribraria gaskoini* inhabits the waters bordering the Hawaiian Islands; its subspecific level needs confirmation according to Heiman (2009b).
3.5. There is a group of cowry populations of the genus *Cribrarula* the shell of which are similar to those of *C. cribraria* but differ by one or two peculiarities, analogous to the case of *C. gaskoini*. These populations are known from the Hawaiian Islands, from Samoa, Fiji and other areas



7. Shells of *C. garciai* (after Lorenz & Raines, 2001)

In these populations dark spots on the shell sides and base are larger than in *cribraria*, and the dorsal line is not exactly clear and narrow. These shell characters confused students of cowry in the past and are the main reason why several taxa were described as species: *C. fischeri, C. fischeri astaryi*, and *C. taitae*.

Conchologically these taxa do not conform to the criteria of species and should be treated as synonyms of *C. cribraria* although they apparently represent a form (form "A"), which is not found in other populations of *C. cribraria.* In the future the taxonomic identity of populations in which form A is present can be established as follows:

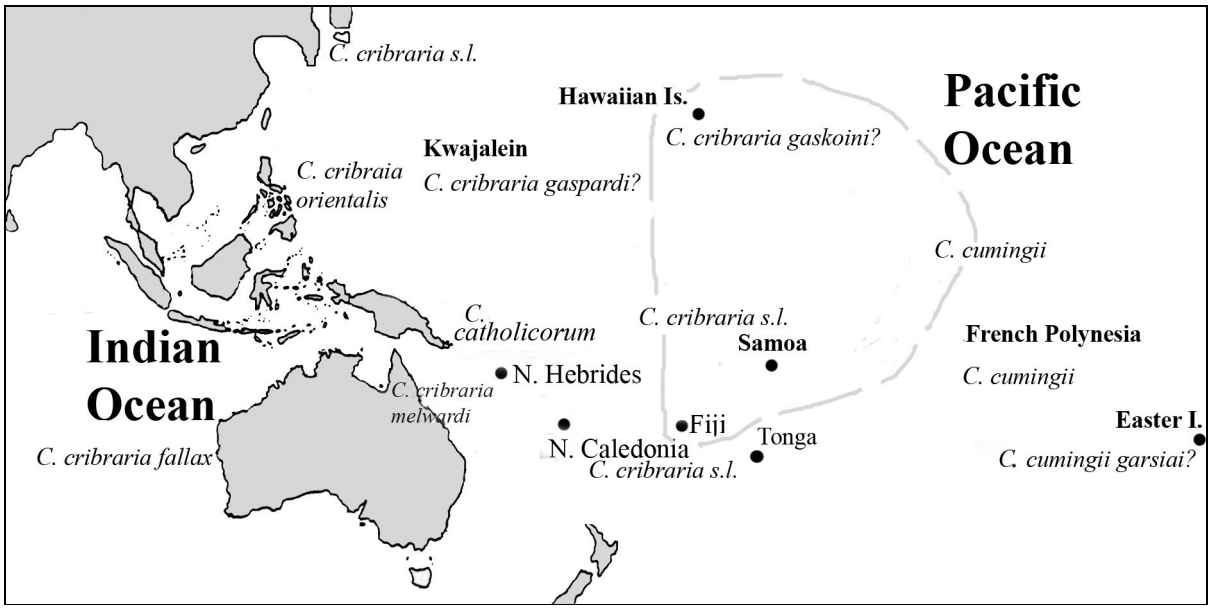
a. Shells of *C. cribraria* in a broad sense and shells of form A can be found in different numbers in certain areas of the Pacific Ocean treated in Fig. 8 below as an intermediate zone between French Polynesia and the Western Pacific Ocean.

b. If it will be proven by a conchological study that the majority of shells of *C. cribraria* in that area share the peculiarities of the form A these populations should be treated as a subspecies of *C. cribraria.* For example, shells of *C. gaskoini* from the Hawaiian Islands do not currently conform to the criteria of species or subspecies. A study of substantially large batches of shells from the Hawaiian Islands may show that the majority of shells there have a shell character, which is mostly not found in *C. cribraria.* In this case the subspecific level of *gaskoini* will be based on the scientific evidence.

4. Conclusion

A conclusion based on the malacological literature and the study of representative batches of shells belonging to different taxa of the genus *Cribrarula* in the Pacific Ocean is:

C. catholicorum, C. cribraria and *C. cumingii* can be distinguished as valid species



8. The genus *Cribrarula* in the Pacific Ocean (a simplified, schematic map)

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