The Higher Taxa of Cowries and their Allies

BY

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According to the International Rules of Zoological Nomenclature (July 1958) the family group of scientific names consists of the taxa superfamily, family, subfamily, and tribus (Article 35 a). They are named after and defined by a typical genus (Art. 35 b) by appending to the root of the generic name the syllables -idae and -inae for families and subfamilies obligatorily, but -oidea and -ini for superfamilies and tribus only by recommendation (Art. 29, 29 A). The first generic name chosen to represent the typical genus of a taxon of the family group automatically becomes the typical genus of any other taxon of the family group (Art. 36); this name need not be necessarily the oldest generic name belonging to the higher taxon (Art. 64). Later established taxa of the family group become synonyms of the taxa to which the genus belongs (Art. 23 d), but it seems advisable to cite them as synonyms of the lowermost distinguished taxa only. The author of names of the family group is the writer who first used a generic name to designate a higher taxon, even if the appended syllables do not agree with the official ones named above and therefore must be emended (Art. 36). The year of this first establishing a higher taxon is to be adopted for all other taxa of the family group based on the same typical genus (Art. 36).

The following list contains the generic names used as those of typical genera of taxa of the family group of the old, well known "genera" *Erato, Trivia, Pedicularia, Cypraea,* and *Ovula* (=*Amphiperas*); the taxa allied to *Lamellaria,* however, have been omitted.

In the first column the generic names have been arranged in chronological order according to the date of being used as typical genus of a taxon of the family group; the second column contains the names of the authors who used them in this sense, and the year of publication of the higher taxon; the third column indicates the exact original spelling of the higher taxon's name in their papers.
(see Table 1, next page)

In past times conchologists used to place the ribbed "*Trivia*" in the genus "*Cypraea*" on account of the aperture being denticulate on both lips, and the species of *Erato* have been placed among the Marginellidae, until anatomical research showed that *Trivia* and *Erato* are closely allied to each other, and that both exhibit affinity to Lamellariidae. Therefore the three last named groups have been united as superfamily Lamellariacea even in the Zoological Record (beginning with vol. 76 for 1939), while the superfamily Cypraeacea has been restricted to the mostly smooth "*Cypraea*" and "*Ovula*" (="*Amphiperas*"); *Pedicularia* has been placed into Lamellariacea (Zool. Record, vol. 84 for 1947).

However, I consider it to be more advisable to separate the Triviidae from the Lamellariidae on the rank of superfamily, as the latter show no distinct sipho, united jaws, a nautiloid (instead of a helicoid) echinospira larva, biological peculiarities, and the shell being covered by a periostracum (absent in all other allies), showing a sharply edged, never inflected outer lip also in the adult stage, and no traces of teeth along the wide aperture (Schilder, 1936, p. 106). Therefore I suggest that "cypraeologists" should restrict their studies to the superfamilies Triviacea and Cypraeacea and exclude the true Lamellariacea as I have done in the present paper.

I think that the ending -acea should be retained for superfamilies in malacology as it has been generally used since the publication of Thiele's handbook (1929), because the termination -oidea has not been proposed as obligatory, but only as a recommendation (Art. 29 A). Iredale (1935, p. 97), however, used the term "Cypraeoidea".

There are several rather isolated aberrant genera which possibly could deserve to be separated as higher taxa; but I consider it more advisable to place them provisionally into a well known allied taxon even if thereby it becomes difficult to find common characters to be used in the dichotomous key.

Thus the higher taxa of Triviacea and Cypraeacea may be arranged according to Table 2. This arrangement mostly agrees with the phylogenetical trees published in previous papers, especially in Schilder, 1936 and 1939. The predominantly Recent genera of Lamellariacea should be arranged according to Thiele (1929, pp. 262 - 267).

In Table 2 the extinct taxa have been marked with a dagger (†); synonyms have been added by foot notes. Many synonyms established chiefly by the writer himself

Table 1

Typical Genus	Author of higher Taxon	Name of higher Taxon
Cypraea	Gray, 1824	Cypraeideae
Ovula	Fleming, 1828	Ovuladae
Amphiperas	Adams & Adams, 1854	Amphiperasidae
Pedicularia	Adams & Adams, 1854	Pediculariidae
Trivia	Troschel, 1863	Triviacea
Lamellaria	Troschel, 1863	Lamellariidae
Porcellana	Roberts, 1870	Porcellanidae
Eocypraea	Schilder, 1924	Eocypraeinae
Erosaria	Schilder, 1924	Erosariinae
Erato	Schilder, 1927	Eratoinae
Cypraedia	Schilder, 1927	Cypraediinae
Cypraeovula	Schilder, 1927	Cypraeovulidae
Simnia	Schilder, 1927	Archicypraeinae
Archicypraea	Schilder, 1927	Simniini
Gisortia	Schilder, 1927	Gisortiinae
Bernaya	Schilder, 1927	Bernayini
Cypraeorbis	Schilder, 1927	Cypraeorbini
Erronea	Schilder, 1927	Erroneini
Jenneria	Thiele, 1929	Jenneriinae
Amphiperas	Winckworth, 1929	Amphiperatidae
Cypraeacites	Schilder, 1930	Cypraeacitinae
Volva	Schilder, 1932 a	Volvini
Luria	Schilder, 1932 b	Luriini
Pustularia	Schilder, 1932 b	Pustulariini
Naria	Schilder, 1932 b	Nariinae
Zonaria	Schilder, 1932 b	Zonariini
Umbilia	Schilder, 1932 b	Umbiliini
Cyproglobina	Schilder, 1932 b	Cyproglobinini
Sulcocypraea	Schilder, 1932 b	Sulcocypraeini
Zoila	Iredale, 1935	Zoilinae
Staphylaea	Iredale, 1935	Staphylaeinae
Austrocypraea	Iredale, 1935	Austrocypraeinae
Eratotrivia	Schilder, 1936	Eratotriviini
Pusula	Schilder, 1936	Pusulini
Conocypraea	Schilder, 1936	Conocypraeini
Mandolina	Schilder, 1936	Mandolinini
Talparia	Schilder, 1936	Talpariini
Johnstrupia	Schilder, 1939	Johnstrupiini
Triviella	Schilder, 1939	Triviellini
Pseudocypraea	Steadman & Cotton, 1943	"Subfamily *Pseudocypraea*"
Adusta	Steadman & Cotton, 1946	Adustinae
Mauritia	Steadman & Cotton, 1946	Mauritiinae

were based on the erroneous assumption that the oldest generic name must be used for the designation of the higher taxon (see Art. 64).

(see Table 2, page 33)

It is rather difficult to construct a dichotomous key to the taxa of this family group, as they represent members of the phylogenetic tree gradually passing each into the other and terminal branches often showing parallel devel-

Table 2

Superfamily	Family	Subfamily	Tribus (Infrafamily)
Triviacea	Triviidae[1]	Eratoinae	† Johnstrupiini
Triviacea	Triviidae	Eratoinae	Eratoini
Triviacea	Triviidae	Eratoinae	† Eratotriviini
Triviacea	Triviidae	Triviinae	Triviellini
Triviacea	Triviidae	Triviinae	Triviini
Triviacea	Triviidae	Triviinae	Pusulini
Triviacea	Pediculariidae		
Cypraeacea	Cypraeidae[2]	Bernayinae[3]	† Archicypraeini[4]
Cypraeacea	Cypraeidae	Bernayinae	Bernayini[5]
Cypraeacea	Cypraeidae	Bernayinae	† Gisortiini
Cypraeacea	Cypraeidae	Cypraeinae	Cypraeini[6]
Cypraeacea	Cypraeidae	Cypraeinae	Luriini
Cypraeacea	Cypraeidae	Erroneinae[7]	Zonariini
Cypraeacea	Cypraeidae	Erroneinae	Cypraeovulini[8]
Cypraeacea	Cypraeidae	Erroneinae	Erroneini[9]
Cypraeacea	Cypraeidae	Erosariinae[10]	Pustulariini[11]
Cypraeacea	Cypraeidae	Erosariinae	Erosariini[12]
Cypraeacea	Ovulidae[13]	Eocypraeinae[14]	Eocypraeini[15]
Cypraeacea	Ovulidae	Eocypraeinae	Jenneriini[16]
Cypraeacea	Ovulidae	Eocypraeinae	† Cypraediini
Cypraeacea	Ovulidae	Ovulinae[17]	Ovulini[18]
Cypraeacea	Ovulidae	Ovulinae	Simniini[19]

Synonyms:

[1] Eratoidae
[2] Porcellanidae
[3] Cypraeorbinae, Zoilinae
[4] Mandolinini
[5] Cypraeorbini, Zoilini
[6] Talpariini, Mauritiini
[7] Cypraeovulinae
[8] Umbiliini
[9] Adustini
[10] Cypraeacitinae, Nariinae
[11] Cypraeacitini, Austrocypraeini, Conocypraeini
[12] Nariini, Staphylaeini
[13] Amphiperasidae, Amphiperatidae
[14] Jenneriinae, Sulcocypraeinae
[15] Sulcocypraeini, Pseudocypraeini
[16] Cyproglobinini
[17] Amphiperatinae
[18] Amphiperatini
[19] Volvini

opment of characters. Therefore there are many species and even genera which do not fit the most outstanding characters of a higher taxon, although the sum of all other characters points to close relationship to this taxon. Nevertheless, the taxa of the family groups belonging to the superfamilies Triviacea and Cypraeacea roughly may be distinguished as follows (see also Schilder, 1936 and 1939):

DICHOTOMOUS KEY

(R = radula; S = shell)

1 Osphradium semilunar, pedal ganglia short, echinospira well developed Triviacea 2
– Osphradium trifid, pedal ganglia long, echinospira wanting Cypracacea 8
2 Vagile, sipho distinct, R: laterals dagger-like, S: outer lip denticulate Triviidae 3
– Sessile, sipho obsolete, R: laterals trifid, S: cuplike ..... Pediculariidae
3 Sipho separated by a rim, S: anterior margin of the fossula free Eratoinae 4
– Sipho not separated if extended, S: fossula connected with the dorsal wall in front Triviinae .. 6
4 S: dorsum smooth or granulate, fossula smooth or reduced 5
– S: dorsum and fossula transversely ribbed ..... † Eratotriviini
5 S: fossula reduced, anterior columellar teeth coarse, transverse ..... † Johnstrupiini

– S: fossula well developed, smooth (rarely denticulate within) ..... Eratoini
6 S: aperture wide, outer lip narrow, terminal teeth projecting ..... Triviellini
– S: aperture narrow, central, outer lip broader, terminal teeth hardly separable 7
7 S: dorsum smooth between the ribs .... Triviini
– S: dorsum finely granulate between the ribs Pusulini
8 Osphradium central, large, R: laterals with coarse cusps, S: spire never involute Cypraeidae 9
– Osphradium displaced to the front, small, R: laterals flabellate, S: spire involute so that the cast shows a hole behind Ovulidae 18
9 R: median without basal lamella, S: margins never pitted, anterior columellar teeth short, dorsum mostly freckled with brown, with several bands 10
– R: median mostly with a basal lamella, S: margins mostly pitted, anterior columellar teeth transversely extended, dorsum with white spots, with one band only Erosariinae 17
10 S: spire mostly projecting, shell medium size to large, barely margined 11
– S: spire mostly umbilicate, shell small to medium size, outer lip margined Erroneinae 15
11 S: fossula smooth, never denticulate within, spire mostly broad Bernayinae 12
– S: fossula transversely ribbed or denticulate within, spire less broad Cypraeinae 14
12 S: medium size to large, without appendices, teeth and fossula distinct 13
– S: large to gigantic, with large appendices, teeth and fossula obsolete, spire extremely broad ..... † Gisortiini
13 S: elongate, fossula rather reduced to absent ..... † Archicypraeini
– S: globular, fossula broadly concave .. Bernayini
14 R: laterals large, median smaller, S: with four bands ..... Cypraeini
– R: laterals reduced, median very large, S: trizonate ..... Luriini
15 S: spire slightly projecting, fossula broad Zonariini
– S: spire mostly umbilicate, fossula narrow to obsolete 16
16 S: fossula reduced to obsolete .... Cypraeovulini
– S: fossula distinct though narrow, bituberculate ..... Erroneini
17 S: fossula rather broad but inner denticles obsolete, pittings obsolete ..... Pustulariini
– S: fossula narrow, but inner denticles mostly coarse, pittings mostly distinct ..... Erosariini
18 R: laterals narrow, with few flabella; S: columellar teeth distinct Eocypraeinae 19
– R: laterals triangular with many flabella, S: columellar teeth absent Ovulinae 21
19 S: fossula broad, smooth 20
– S: fossula reduced, shell covered with fine spiral ribs ..... Cypraediini
20 S: pyriform, dorsum smooth, rarely with fine ribs ..... Eocypraeini
– S: ovate to elongate, dorsum often ribbed or pustulate ..... Jenneriini
21 S: pyriform, labial teeth and terminal ridge distinct ..... Ovulini
– S: fusiform, labial teeth and terminal ridge obsolete ..... Simniini

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The Range of *Trivia myrae* Campbell

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(1 Map)

A new member of Triviidae, *Trivia myrae,* was described by Campbell (1961), who referred it to the subgenus *Pusula.* The type locality is the channel between Loreto, Baja California and Carmen Island, which lies between 5 and 10 miles offshore in the Gulf of California. The holotype and two paratypes were trawled in this locality, while seven additional specimens were trawled off Monserrate Island, Gulf of California, and two specimens were dredged off Punta Final, Baja California. It was further stated that extensive dredging at the mainland locations of Puerto Peñasco, Guaymas, Mazatlán, Salina Cruz, and El Salvador failed to produce additional specimens. The conclusion was accordingly reached that this species appeared to be limited to the eastern (*i. e.* Gulf of California) shore of Baja California.

Trivia myrae does not appear in a checklist of mollusks for Puertecitos (DuShane, 1962). This locality is on the eastern shore of Baja California, about 45 miles north of Punta Final. It is noteworthy that the collectors who contributed information used in the compilation of this checklist include the author of the species.

Emerson & Old (1963) then reported finding three specimens off Coronados Island and one specimen off Puerto Escondido, and although the latter was stated to represent an extension of the range southward, Puerto Escondido is in fact *north* of Monserrate Island.

I wish to report a further range extension on the basis of two shells from Puerto Peñasco (*leg.* Nora Donohue). These were discovered in a large lot of beach *Trivia,* which consisted in the main of *T. solandri* (Sowerby) and *T. californiana* (Gray), collected in April, 1964. The two *T. myrae* in the lot were identified by F. A. Schilder, who referred to them (*in litt.*) as subspecific of *T. fusca* Sowerby. There are, therefore, some taxonomic problems to be settled here, because *T. fusca* and *T. myrae* are, at present, assigned to different subgenera, viz., *Cleotrivia* Iredale and *Pusula* Jousseaume, respectively. The diagnostic difference between *Cleotrivia* and *Pusula* is, according to Keen (1958), that in the former the rib ends in the dorsal furrow interrupting the ribs are not beaded, while in the latter the rib ends are beaded. The original description of *T. myrae* (Campbell, 1961) states "as the ribs enter the dorsal sulcus, the color is lighter, giving the impression of very slight beading." The status of these two subgenera, it would seem, deserves further study.

In any case, the range extension of *T. myrae* to the mainland coast of the Gulf of California suggests that

[1] Contribution No. 286.