

***Lioconcha kovalisi*, a new species from the Red Sea, situated within the *Lioconcha ornata* (Dillwyn, 1817) complex (Bivalvia: Veneridae)**

Roland DE PRINS

Royal Belgian Institute of Natural Science, Vautierstraat 29, 1000 Brussels, Belgium
roland.deprins@skynet.be

Keywords: BIVALVIA, VENERIDAE, *Lioconcha*, new species, Red Sea, Israel, Eilat.

Abstract: A new venerid species within the genus *Lioconcha* Mörch, 1853 is described from the coastal waters of Eilat, Israel, Red Sea and compared with *Lioconcha ornata* (Dillwyn, 1817), *Lioconcha sulcatina* (Lamarck, 1818) and *Lioconcha philippinarum* (Hanley, 1844).

Introduction: Within the Veneridae, the identification of the genus *Lioconcha* is very difficult due to the extreme variation in the external colour pattern and the lack of a well-developed pallial sinus, which is an important diagnostic characteristic in Veneridae. Species belonging to the genus *Pitar* (*s.l.*) are sometimes similar in colour pattern, but possess a clear pallial sinus.

A new revision of the genus *Lioconcha* is much needed, as the most recent review on the genus by Lamprell & Healy (2002) is dated. For the time being, van der Meij, Moolenbeek & Dekker (2008), created two groups based on common shell characteristics such as shape and thickness of the shell: the so-called “castrensis group” with the species *Lioconcha castrensis* (Linnaeus, 1758), *L. macaulayi* Lamprell & Healy, 2002, *L. arabaya* van der Meij, Moolenbeek & Dekker, 2010 and *L. rumphii* van der Meij, Moolenbeek & Dekker, 2010 and the “ornata group” with smaller and less solid shells, at present including at least *L. ornata* (Dillwyn, 1817), *L. tigrina* (Lamarck, 1818), *L. fastigiata* (Sowerby II, 1851), *L. annettae* Lamprell & Whitehead, 1990, *L. berthaulti* Lamprell & Healy 2002, and *L. lamprelli* Moolenbeek, Dekker & van der Meij, 2008, leaving behind a series of species not included in either of these groups. Habe (1951) created the subgenus *Sulcilioconcha* with *L. philippinarum* as the type species.

Abbreviations and definitions

KBIN: Koninklijk Belgisch Instituut voor Natuurwetenschappen, Brussels, Belgium

MHNG: Muséum d'Histoire Naturelle Genève, Switzerland

CGV: collection Gilbert Verbinnen, Vosselaar, Belgium

CHD: collection Henk Dekker, Winkel, The Netherlands

CMK: collection Moti Kovalis, Gan-Yavne, Israel

CRDP: collection Roland De Prins, Mechelen, Belgium

lv: left valve

pv: paired valves

rv: right valve

Systematics:

Class BIVALVIA

Superfamily **Veneroidea** Rafinesque, 1815

Family **Veneridae** Rafinesque, 1815

Subfamily Pitariinae Stewart, 1930

Genus *Lioconcha* Mörch, 1853. Type species: *Venus castrensis* Linnaeus, 1758 (by subsequent designation of Stoliczka, 1870)

Diagnosis of the genus: Medium-sized shells with right and left valve of equal size and shape (equivalve). No gap when closed. Umbones subcentral, low and prosogyrate. Hinge with 3 cardinal teeth and strong anterior laterals in each valve. External ligament supported by a nymphal ridge in each valve. Pallial sinus very shallow, almost absent. Internal margins smooth.

Lioconcha kovalisi sp. nov.

Circe sulcatina; Reeve, 1863, plate IX fig. 40b.

Pitar hebraea; (Lamarck, 1818) Sharabati, 1984, plate 47 fig. 9b.

Lioconcha sulcatina; Oliver, 1992, plate 40 fig. 3, a-b.

Lioconcha sp.; Rusmore-Vilaume, 2008, p. 276.

Lioconcha (Lioconcha) sp 3; Hubert, 2010, p. 388.

Type material: **Holotype** KBIN IG 32327, MT 2787, Red Sea, Israel, Eilat, North Beach, sand, 0-15m. **Paratype 1:** CRDP reg.nr. 24317; **Paratype 2:** CMK; **Paratype 3:** CRDP reg.nr. 24677; **Paratypes 4:** CMK; **Paratype 5:** CRDP reg.nr. 24678; **Paratypes 6:** CMK; **Paratype 7:** CHD. Reg nr. 30342; **Paratype 8:** CGV.

All paratypes from type locality, except for paratype 7 from Red Sea, Egypt, Sinai, Gulf of Aqaba, Sharm el Moya, 1997 and paratype 8 from Red Sea, Egypt, Dahab, Gulf of Aqaba.

Description: Shell equivalve, solid and inflated. Outline subovate-trigonal, somewhat longer than high. Anteroventral and posteroventral margin rounded. Sculpture at first sight smooth; consisting only of fine dense concentric growth striae which become more prominent anteriorly and posteriorly as discrete concentric ridges. Growth pauses rare, only seen in a few larger specimens (Plate 1, Fig. 4a). Lunule elongate heart-shaped, bordered from the remainder of the shell by a fine groove. Coloration of the lunule is divided into two areas: a distinct dark chestnut brown area directly under the umbones and a lighter brown area on the lower part, a coloration which is repeated on the escutcheon. External colour white, with small chestnut brown, chevron-like, tent shaped markings, concentrically arranged and getting denser, usually starting from the middle (rarely from the top) towards the ventral margin. Simultaneously they get more compressed (Plate 1, Fig. 1e). A very distinctive feature is the total absence or weak expression of the overall pattern around the lunule. The internal colour of the shell is canary yellow to pale orange with a darker band starting below the anterior adductor scar, along the pallial line and including the posterior adductor scar. This coloration always continues beyond the pallial line, but never reaches the outline of the shell. As a result, there is a white band the peripheral areas. In adult specimens, the white band is also clearly present at the exterior of the shell, especially ventrally (Plate 1, Fig. 1c). The ligament is deeply sunken. Pallial sinus very weak (Plate 1, Fig. 4b). On the lv, there are 3 cardinal non-bifid teeth. The central cardinal tooth is more robust. There is one anterior lateral tooth. The posterior tooth is fused with the nymph. The hinge of the rv has got two anterior lateral teeth and three cardinal teeth, with the posterior cardinal tooth lightly bifid. Shape, colour and overall pattern are very constant.

Animal unknown.

Dimensions:

	length	height	width
holotype	28.2 mm	24.2 mm	18.2 mm
paratype 1	26.2 mm	22.9 mm	17.0 mm
paratype 2	24.4 mm	21.3 mm	16.0 mm
paratype 3	28.6 mm	25.0 mm	18.8 mm
paratype 4	30.0 mm	26.2 mm	20.0 mm
paratype 5	22.0 mm	18.9 mm	14.3 mm
paratype 6	19.0 mm	16.8 mm	12.2 mm

Table 1: Dimensions of *Lioconcha kovalisi* sp. nov.

Length = greatest distance between the anterior and posterior extremities.

Height = greatest distance between the umbo and ventral margin.

Width = greatest distance between the external surface of the paired valves.

Ratio length/height	1.13 (± 0.05)	[1.13, 1.16]
Ratio length/width	1.53 (± 0.09)	[1.50, 1.55]
Ratio height/width	1.33 (± 0.09)	[1.31, 1.37]

[min – max] measurements based on holotype and all paratypes from type locality.

Distribution: Only known from the Red Sea.

Remarks: In most of the literature and on different websites, *Lioconcha kovalisi* sp. nov. is named *Lioconcha sulcatina* (Lamarck, 1818) originally described by Lamarck as *Cytherea sulcatina*. Even though many authors consider *L. sulcatina* and *L. polita* as subjective synonyms, H. Dekker (pers. comm.) and I have some doubts about their status as synonyms. It seems that *L. sulcatina* is only present in old museum collections. Its exact origin is therefore unclear, but probably situated around Indonesia.

More research and fresh collected material is needed to solve the problem, but this issue lies beyond the scope of this paper. It is clear that the new species has nothing to do with the generally used name of *L. sulcatina*. Therefore, the holotype of *L. sulcatina* (reg. 1084/24) from MHNG is figured here (Plate 2, Figs 4a-b). The drawing 40b in Reeve's (1863) monograph of *Circe*, named as *Circe sulcatina*, is probably not that species, but resembles the new species (Plate 2, Fig. 5).

Comparison: A comparison of *Lioconcha kovalisi* sp. nov. with congeneric species from the area is presented in table 2. Although the identity of *Lioconcha polita* (Röding, 1798) / *Lioconcha sulcatina* (Lamarck, 1818) is questionable, they are still included in this table, because of their presence in several papers and on different websites (for more details see "Remarks").

Lioconcha kovalisi sp. nov. can easily be distinguished from *L. philippinarum* (Hanley, 1844) by the absence of the clearly visible concentric raised ridges found in *L. philippinarum* (Plate 1, Fig. 7d). Moreover, the internal colour as well as the colour of the lunule are different in both species.

The differences between *Lioconcha kovalisi* sp. nov. and *Lioconcha ornata* (Dillwyn, 1817) are sometimes less clear due to the high variability in shape and colour in *L. ornata*. Nevertheless, the remaining features can still positively separate the two

species. The shell of *Lioconcha kovalisi* sp. nov. is more solid, so, when held against the light, the outside pattern does not shine through, in contradiction with *L. ornata*. Moreover, the external pattern in *L. ornata* can be detected at the very edge of the inside. The second and more important differing feature is the lunule of both species. In *Lioconcha kovalisi* sp. nov., it is more clearly defined, differently coloured, and the area around it is usually white. In *L. ornata*, the border between the outside pattern and that of the lunule is vague to non-existent (see Plate 2, Figs 1-3).

	<i>L. kovalisi</i> sp. nov.	<i>L. ornata</i>	<i>L. sulcatina / polita</i>	<i>L. philippinarum</i>
Shape and outlook	Solid, inflated. Subovate-trigonal. Smooth / glossy	Ovate-trigonal to trigonal. Smooth / glossy	Solid. Trigonal. Smooth / glossy	Robust but not thick. Elongate – ovate. Glossy.
Sculpture	Fine dense concentric growth striae.	Obscure concentric striae. Strong growth pauses.	Flattened concentric ridges posteriorly. Growth pauses.	Fine growth striae. Dominant concentric raised ridges.
Lunule	Elongate heart-shaped fine groove. Chestnut brown near umbos.	Elongate heart-shaped. Incised line. Uniform brown at the umbos.	Heart-shaped. Well incised line. Brownish.	Heart-shaped. Well incised line. Purple-brown.
Lunule area	No pattern	Pattern present	Vague pattern	Vague pattern.
External colour and pattern	White with very small chestnut brown chevron shaped markings, which gets denser towards the ventral outline of the shell. Radial rays are darker.	White with brown to dark brown bigger chevron markings over the entire surface of the shell.	White with dark, radial, brown to orange rays, which are sometimes interacting with chevron or zigzag composed rays.	Light brown with rays of darker brown. Sometimes underlying zigzag pattern.
Internal colour	Canary yellow to pale orange. Always across the pallial line but not reaching the ventral margin.	White, usually with yellow/pale orange medially. Not or very rare passing the pallial line.	White. Sometimes brown or orange medially.	White, with mauve-brown flecks subumbonally.

Table 2: comparison

Etymology: The new species is named in honour of Moti Kovalis, a keen diver, skipper and passionate shell collector, who collected the holotype and most of the paratypes.

Acknowledgements: I would like to thank following persons for their overall contribution: Rose Sablon & Yves Samyn (KBIN, Brussels, Belgium); Markus Huber (Zoological Museum Zurich, Switzerland); Jean Mariaux & Philippe Wagneur (MHNG, Geneva, Switzerland). Special thanks are also due to: Gilbert Verbinnen (Belgium) for the loan of material and literature; Henk Dekker (Zoological Museum Amsterdam, The Netherlands) and Willy Segers (Belgium) for the critical review of the manuscript.

References

- Chenu, J.C.**, 1859-62. *Manuel de Conchyliologie et de Paléontologie conchyologique*. Vol 1&2. Masson, Paris.
- Huber, M.**, 2010. *Compendium of bivalves*. ConchBooks, Hackenheim.
- Lamprell, K. & Healy, J.M.**, 2002. A review of the Indo-Pacific *Lioconcha* Mörch (Mollusca: Bivalvia: Veneridae), including a description of four new species from Queensland, New Caledonia and the Philippine Islands. *Molluscan Research* 22(2): 101-147.
- Oliver, P. G.**, 1992. *Bivalved seashells of the Red Sea*. Verlag Christa Hemmen, Wiesbaden and National Museum of Wales, Cardiff.
- Reeve, L.A.**, 1864. *Conchologia Iconica 14; or illustrations of the shells of molluscous animals. Monograph of the genus Cytherea*. Lovell Reeve, London.
- Rusmore-Vilaume**, 2008. *Seashells of the Egypt Red Sea*. American University in Cairo Press.
- Sharabati, D.**, 1984. *Red Sea Shells*. KPI, London etc.
- van der Meij S.E.T., Moolenbeek R.G. & Dekker H.**, 2010. The *Lioconcha castrensis* species group (Bivalvia: Veneridae), with the description of two new species. *Molluscan Research* 30(3): 117-124.

Plate 1:

1-4: *Lioconcha kovalisi* sp. nov. Red Sea, Israel, Eilat, North Beach, sand, 0-15m.

1a-1g: Holotype (KBIN) 28.2 mm (1a: rv; 1b: lv internal; 1c: ventral view; 1d: lv; 1e: detail pattern; 1f: eschutcheon; 1g: lunule).

2: Paratype 5 (CRDP reg. nr. 24678) 22 mm.

3a-b: Paratype 1 (CRDP reg. nr. 24317) 26.2mm (3a: rv; 3b: lv internal)

4a-b: Paratype 3 (CRDP reg. nr. 24677) 28.6 mm (4a: rv; 4b lv internal view pallial line and adductors)

All specimens from type locality.

5-6: *Lioconcha ornata* (Dillwyn, 1817)

5a-b: (CRDP reg. nr. 8084) 25.6 mm. Red Sea, Israel, Eilat, on sand (5a: lv +rv; 5b: lunule).

6a-b: (CGV reg nr. 468a) 26.6 mm. Red Sea, Egypt, Abu Soma (6a: rv; 6b: lunule).

7a-7d: *Lioconcha philippinarum* (Hanley, 1844) (CRDP reg. nr. 24318) 19 mm. Red Sea, Israel, Eilat, on sand. (7a: rv; 7b: lv internal; 7c: lunule & eschutcheon; 7d: detail sculpture).





1



2a



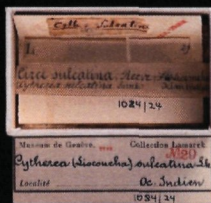
2b



3



4a



4b



5

Plate 2:

1: *Lioconcha kovalisi* sp. nov. Holotype. Detail lunule.

2a-b: *Lioconcha ornata* (Dillwyn, 1817). Detail lunule.

3: *Lioconcha philippinarum* (Halley, 1844). Detail lunule.

4a-b: *Lioconcha sulcatina* (Lamarck, 1818). Holotype (MHNG).
Picture: MHNG/Philippe Wagneur

5: *Circe sulcatina* (drawing from Reeve's 'Monograph of the genus *Circe*')