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*CLIO PYRAMIDATA* LINNAEUS, 1767 FORMA *CONVEXA* (BOAS, 1886) (MOLLUSCA, PTEROPODA)

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## INTRODUCTION

The pelagic fauna of the Red Sea shows special variation induced by its isolated character (Van der Spoel, 1971). *Clio pyramidata* from the Red Sea is usually incorrectly referred to as the tropical forma *lanceolata* (Lesueur, 1813) or the typical forma *pyramidata* Linnaeus, 1767. Some large samples with *C. pyramidata* from the northern Red Sea made it possible to establish the correct identity of these populations. Though special variation, like described for *Diacria* and *Cavolinia* species (Van der Spoel, l.c.), is found for Red Sea populations of *C. pyramidata*, the populations are not separated as an endemic taxon as the specimens resemble closely *Clio pyramidata* forma *convexa* (Boas, 1886) (figs.1-4). The anterior parts are almost identical to those of *convexa* as described by Boas; the upper parts show small differences.

## ORIGINAL MATERIAL

*C. pyramidata* forma *convexa* (figs.5-6) was originally described as a variety found in the Indian Ocean between 24° S and 40° S. Boas (1886) gives no exact type locality for the new variety but provides a list of the localities where the species *C. pyramidata* was found. The records for *C. pyramidata* var. *convexa* are included in this list. The material given in this list and labeled by Boas "*Cleodora pyramidata*", "*Cleodora pyramidata* var. *augusta*", "*Cleodora pyramidata* var. *lata*" and "*Cleodora pyramidata* var. *convexa*" is preserved in the collections of the Universitetets Zoologische Museum and of the Veterinary College at Copenhagen. Comparison of the published list and the available material enabled me to trace the original samples. Boas (1886) stated that the new variety occurs between 40° S and 24° S in the Indian Ocean. The material he described is, however,

from a range between 40° 50'S and 17° 20'N as can be concluded from the following five samples, considered to constitute the original material:

A sample listed (Boas, 1886: 77) under No. 140 and labeled: "140 coll. Hartmann, Boas det. 25° 40'S 23° 00'E, 1869".

A sample listed (Boas, 1886: 77) under No. 157 and labeled: "157 coll. Hartmann, Boas det. 34° 30'S 27° 50'E, 1864".

A sample listed (Boas, 1886: 77) under No. 159 and labeled: "159 coll. Hartmann, Boas det. 40° 04'S 53° 20'E, 1869".

A sample listed (Boas, 1886: 78) under No. 170 and labeled: "170 coll. Hartmann, Boas det. 40° 50'S 165° 00'E, 1879".

A sample listed (Boas, 1886: 76) under No. 125-127 and labeled: "Coll. Galathea Exp. No. 654, Reinhardt, No. 125-127, Boas det., 17° 20'N 88° 12'E".

In Boas' list, three dates are mentioned for the last-named sample: 28-X-'45, 7-XI-'45, and 20/21-XII-'45; hence the sample may be a mixture of specimens taken in one locality at different dates in 1845. There are now only three specimens in the sample, one of which clearly resembles that illustrated by Boas (1886) in fig. 97<sup>b</sup>; this sample has therefore been adopted as the syntype series.

From it, a lectotype of the var. *convexa* has been selected, viz. a specimen in damaged condition with a length of 4.5 mm (figs. 5-6); the two smaller specimens become paralectotypes, having a length of 4.3 and 3.7 mm, respectively. The north-south range of this forma as given by its original author can not be considered a restricted type locality indication.

#### PACIFIC POPULATIONS

A new species was proposed by McGowan (unpubl.) for Pacific populations (figs. 7-8) of *Clio pyramidata* f. *convexa*, which he gave the name "*Clio teschi*" which is still a manuscript name only. There exist some minor differences between the Pacific and Indian Ocean populations but they are too small to distinguish a separate taxon for the former populations. The only difference between the original descriptions of *convexa* and *teschi* is the absence of convexity in the anterior part of the lateral shell edges. This convexity is, however, also frequently absent in specimens of the Indian Ocean, and the name "*convexa*" is certainly not well chosen. The rather fragmentary description of the present forma by Boas (1886), the special variation in the Red Sea and the frequently quoted man-

uscript name "*Clio teschi*" of McGowan (unpubl.) induced me to make the following redescription.

#### *Clio pyramidata* Linnaeus, 1767 forma *convexa* (Boas, 1886)

##### Synonymy.-

*Cleodora pyramidata* var. *convexa* Boas, 1886: 73, 203, pl. 9, fig. 97 a-d; *Clio pyramidata convexa* Tesch, 1913: 37, fig. 33; *Euclio pyramidata* var. *convexa*-Tesch, 1946: 14; *Clio teschi*, m.s. name, McGowan, unpubl.: 101, fig. 35 a-e; *Clio pyramidata* forma *convexa*-Van der Spoel, 1967: 70, figs. 55-56, 59.

##### Material.-

Gulf of Aqaba: south of Elath, neuston net 6-X-1969, Stat. 1.

-----: south-west of Murach, IKMT, 6-X-1969, Stat. 2, 0-175 m.

-----: north of Nuweiba, IKMT, 6-X-1969, Stat. 14, 140-0 m.

-----: off Nuweiba, IKMT, 8-X-1969, Stat. 25, 30-0 m.

-----: off Nuweiba el Museima, triangular dredge, 8-X-1969, Stat. 29, 180-220 fm; ibid., Stat. 31, 150-160 fm.

Indian Ocean: 7° 22'N 121° 16'E, S150, 5-IV-1929, Dana Stat. 3685 X, 1000 mw.

-----: 3° 40.5'N 137° 53'E, S200, 12-VII-1929, Dana Stat. 3751 V, 50 mw.

-----: 8° 31'S 109° 37'E, S200, 1-IX-1929, Dana Stat. 3805, 150 mw.

-----: 2° 57'S 99° 36'E, S200, 19-X-1929, Dana Stat. 3860 VII, 300 mw.

Description.- Shell hyaline, of pyramidal shape. Embryonic shell droplet-shaped, and except for the small cusp at its pole, more blunt than in the other formae of the species. Its diameter at the cranial margin is relatively larger than in the formae *pyramidata* or *lanceolata*. The separation between adult and embryonic shell is marked by two or three imbricate transversal rings. However, a strong incision is never found. For figures of embryonic shells in *Clio pyramidata* one is referred to Van der Spoel (1969). The triangular ventral side shows in its middle a longitudinal rib, while the posterior 2/3 of the ventral side is hollow notwithstanding the bulging rib. The lateral sides of the ventral surface are straight (in Pacific specimens) or concave caudally and convex anteriorly (in Red Sea and some Indian Ocean specimens). The lateral sides are provided with flattened and sometimes partly concave margins. This structure is continuous from the aperture to the embryonic shell. The dorsal surface in lateral view is concave caudally and convex in the anterior half, though the Indian Ocean specimens show

sometimes a straight, diverging dorsal rib. The dorsal aperture border is slightly higher than the ventral one, but this difference is never as strong as in the forma *lanceolata*. The cross-section through the shell is concave-triangular. The growth lines on the shell are less closely set and their mutual distance is more constant than in the other formae of the species, while their total number is always small. The special characters of this growth-line pattern are discussed in a previous paper (Van der Spoel, 1969). No discriminating characters have been found so far in the soft parts, though it is clear that the specimens are sexually mature at a much smaller size than those of the formae *lanceolata* or *pyramidata*.

Variation.- The Red Sea specimens differ from the Indian Ocean specimens in being a little broader in dorso-ventral sense (fig. 8) and in having a more concave ventral surface. The Pacific specimens are less convex in the anterior parts of their lateral sides (fig. 4). Differences in maximum and minimum size are not obvious (fig. 9) but different average sizes are found in different areas in each ocean.

Restricted type locality.- 17° 20'N 88° 12'E.

Distribution.- In the Pacific Ocean the forma occurs in the Equatorial current system and is not sympatric with the forma *lanceolata* (c.f. McGowan, unpubl.). In the Red Sea it is the only representative of the species and it also occurs there in fossil deposits (Herman, 1971). In the Indian Ocean it is found near the tropical and subtropical convergences. In the north-east Indian Ocean only the forma *convexa* is sympatric with the forma *lanceolata*, as appears from Dana Expedition samples with long duration.

Etymology.- The name *convexa* (convex) alludes to the shape of the lateral sides in this form, though this proves to be a variable character.

#### ACKNOWLEDGEMENTS

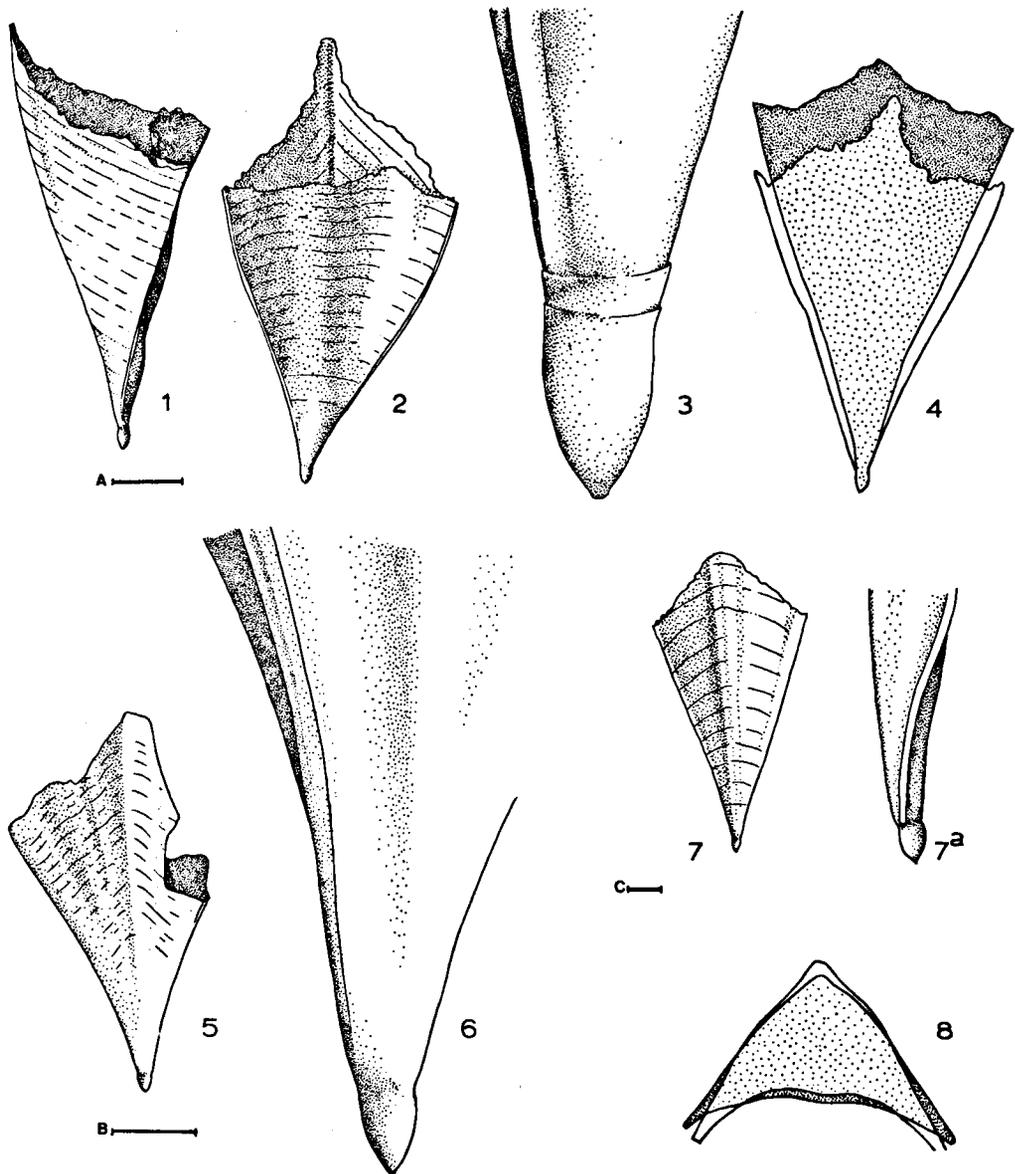
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Figs. 1-8 *Clio pyramidata* forma *convexa*

Red Sea specimen in lateral view (1), in ventral view (2), and its embryonic shell more enlarged (3); ventral view of a Pacific (dotted) and Red Sea (open) specimen (4); lectotype in dorsal view (5) with its embryonic shell more enlarged (6); a Pacific specimen (7, 7a), after McGowan's "*Clio teschi*" illustrations; cranial view of an Indian Ocean (dotted) and Red Sea (open) specimen (8).

Scale A applies to figs. 1-2; scale B to fig. 5; scale C to figs. 7 and 7a; each scale represents 1 mm.

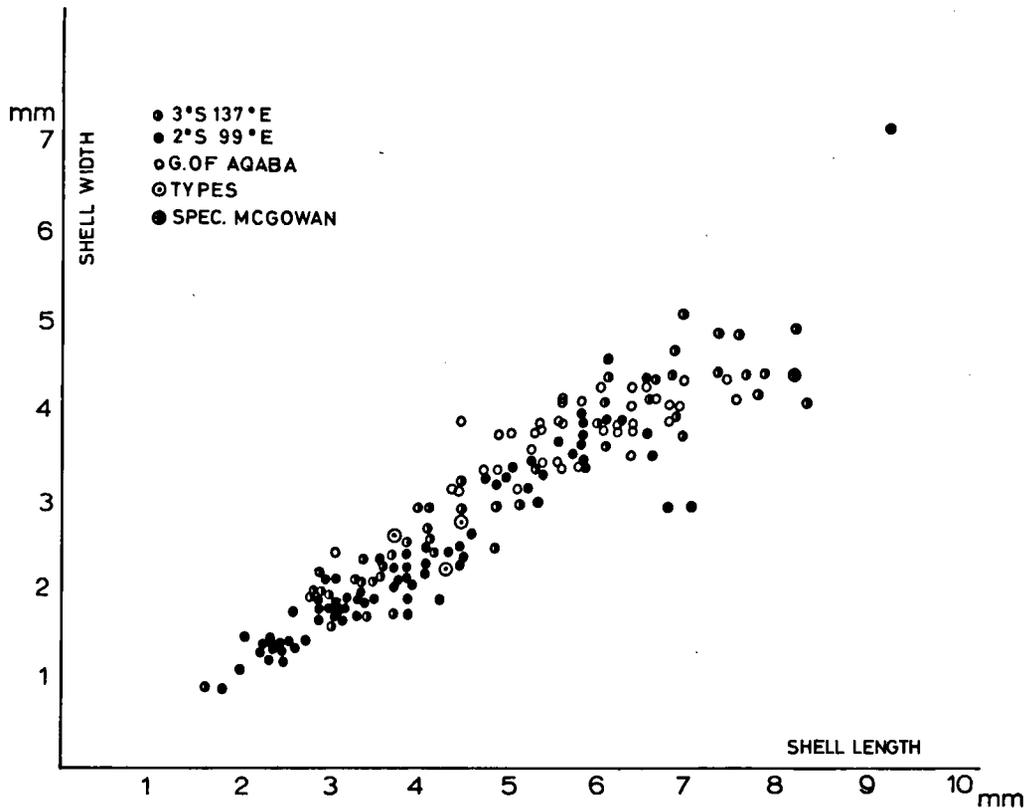


Fig. 9 Graph of the shell length/width ratio for *Clio pyramidata* forma *convexa*.

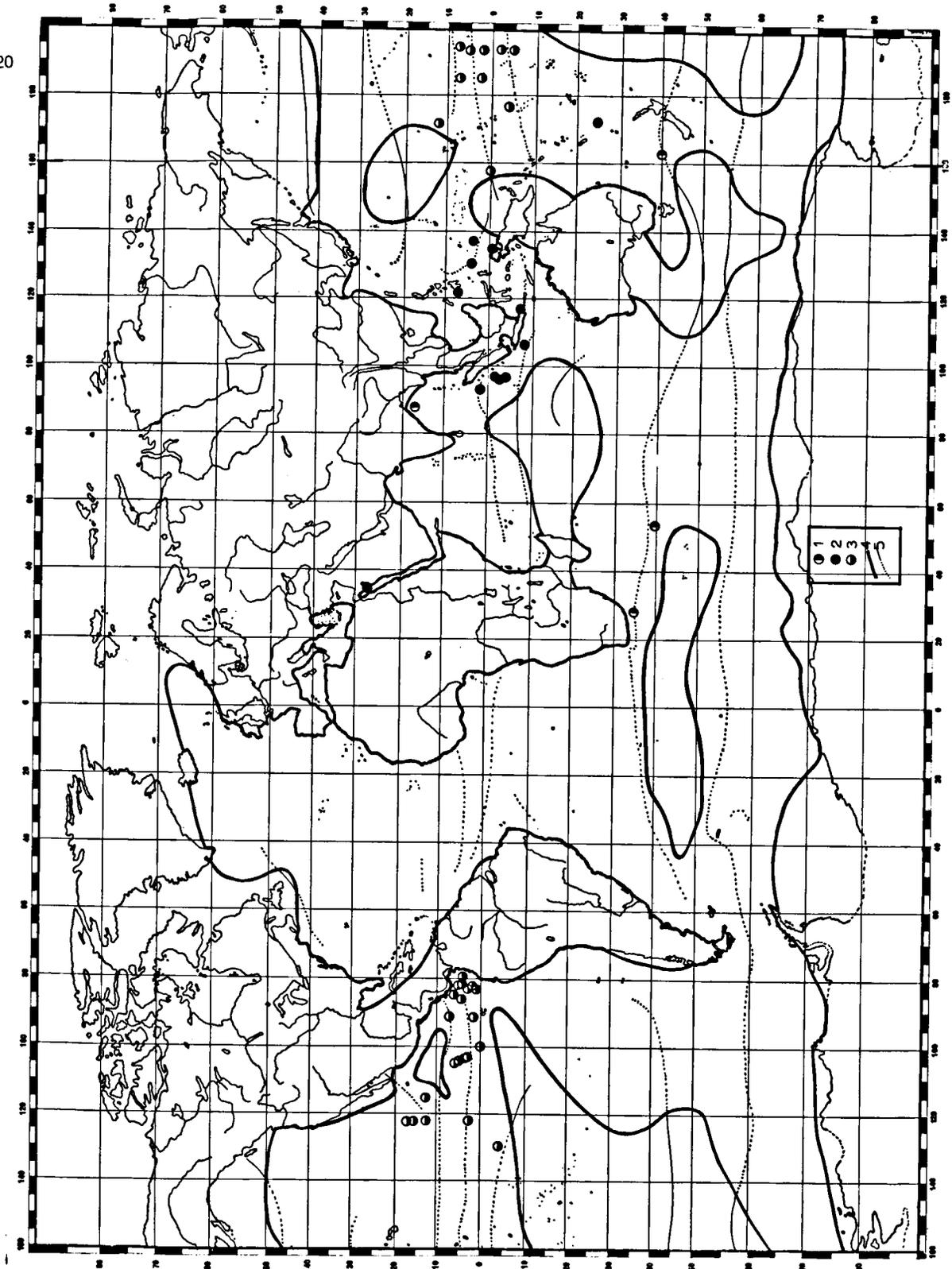


Fig. 10 Distribution of *Clio pyramidata*, all its formae included, with localities of the forma *convexa* indicated.

- 1 = *convexa* records by Boas (1886)
- 2 = *convexa* records from Dana Expeditions
- 3 = *convexa* records by McGowan, unpubl.
- 4 = distributional border of *Clio pyramidata*
- 5 = convergences