

PROTOCONCHS OF MURICIDAE PART 1

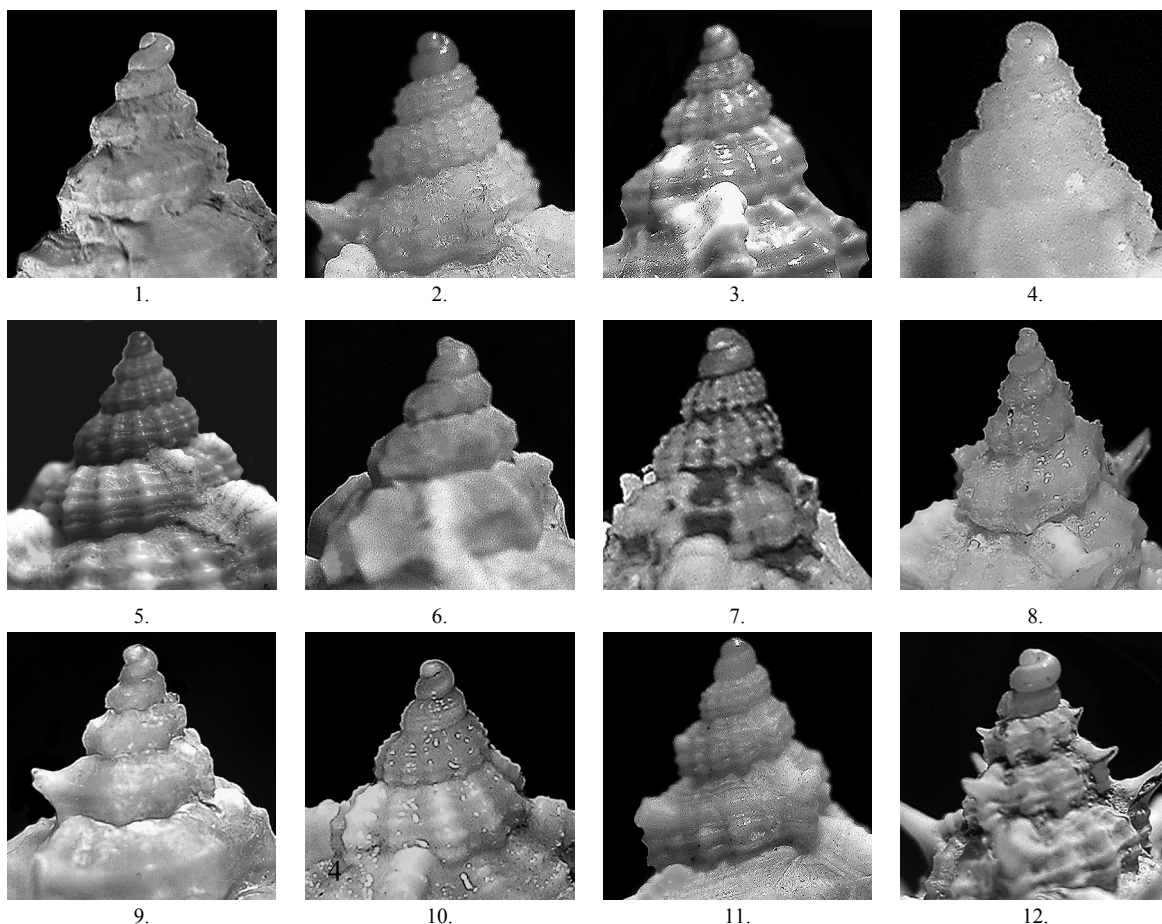
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Abstract: Protoconchs of muricid shells are often used as a diagnostic character for a specific level. The shape of protoconchs, number of whorls and their structure may be different. At first glance these characters can already be seen under a relatively low magnification of about 10 x. However the important point is the angle of view as is shown in this note where 65 protoconchs are pictured. In 62 of them the shape of the protoconch is rather similar and 138 other species with similar protoconchs are listed.

Key words: Mollusca, Gastropoda, Muricidae, taxonomy, diagnostic characters, protoconchs.

The protoconch in shells of gastropod molluscs is important for diagnosing taxa and it is often used as a specific character. In practice the protoconchs of many groups of gastropods show substantial differences, but sometimes they may have much in common and cannot be used to a certain extent in classification. The protoconch may be of a different shape, however, that depends also on the angle of view. Therefore an adequate impression of the true shape is of much importance.

Pictures of the protoconchs of 65 species of the family Muricidae are here given. The photographed specimens belong either to the Malacological Collection of the Tel Aviv University (TAU) or to that of the senior author. Numbers of the specimens from the TAU collection are underlined. In 62 of the 65 species these protoconchs are similar to Figs 1-4: if observed from the same angle then this protoconch consists of about two smooth whorls which are regularly increasing in size.



1. *Murex forskoehlilii* Röding, 1798.

2. *Haustellum cabritti* (Bernardi, 1858).

3. *Murex chrysostoma* Sowerby, 1834.

4. *Murex spectabilis* Ponder & Vokes, 1988.

5. *Haustellum multiplicatus* (Sowerby, 1895)

6. *Murex carbonnieri* (Jousseume, 1881)

7. *Murex olssoni* Vokes, 1967.

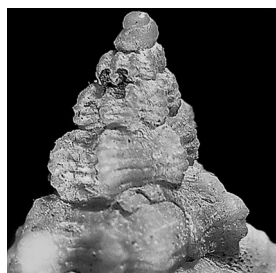
8. *Siratus formosus* (Sowerby, 1841).

9. *Murex tribulus* Linnaeus, 1758.

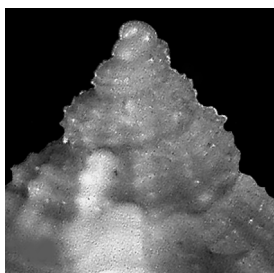
10. *Murex tryonia* Hidalgo in Tryon, 1873.

11. *M. acanthostephes* Watson, 1883.

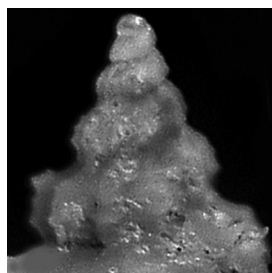
12. *Murex tenuirostrum africanus*
Ponder & Vokes, 1988.



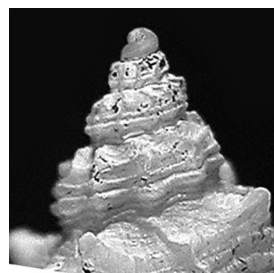
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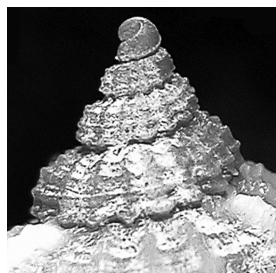
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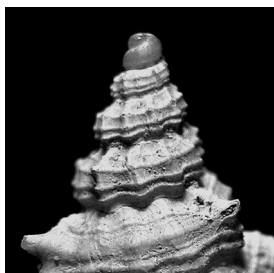
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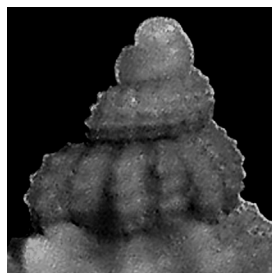
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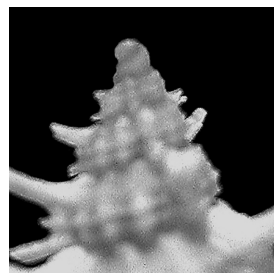
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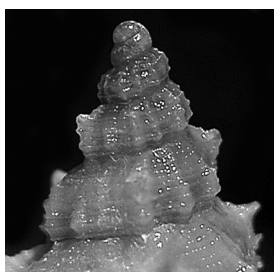
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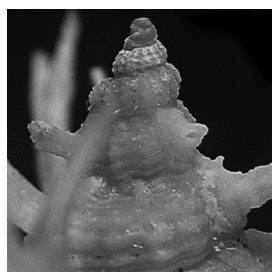
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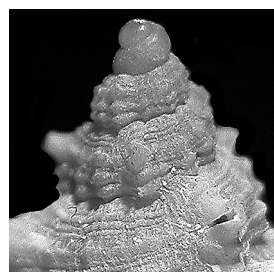
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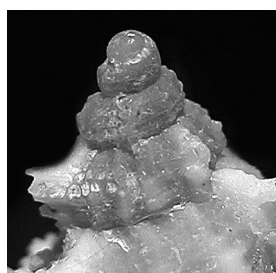
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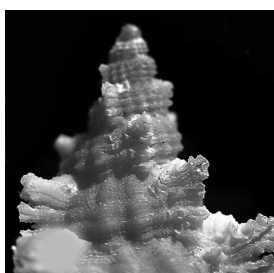
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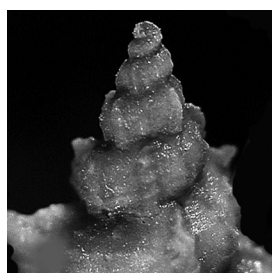
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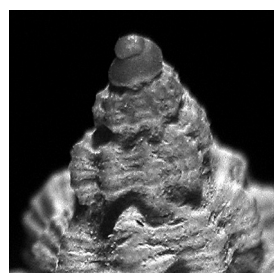
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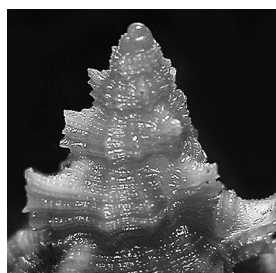
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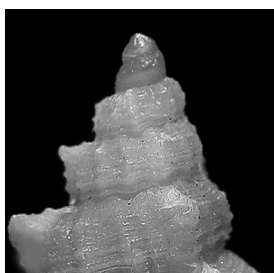
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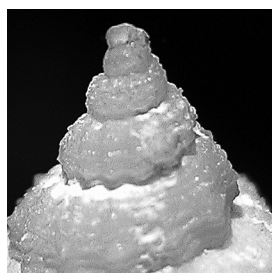
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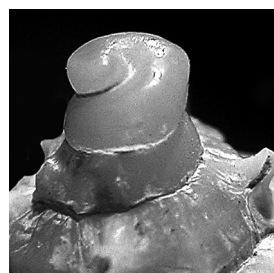
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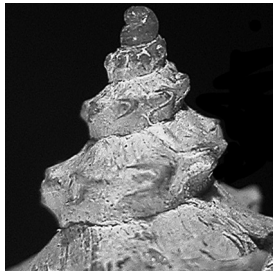
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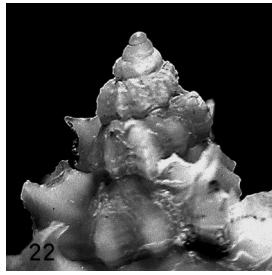
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13. *Haustellum rectirostris* (Sowerby, 1841).
14. *Haustellum rubidus* F.C.Baker, 1897.
15. *Haustellum ruthae* (Vokes, 1988).
16. *Haustellum mindanaoensis* (Sowerby, 1841).
17. *Haustellum multiplicatus* (Sowerby, 1895).
18. *Haustellum sobrinus* (A.Adams, 1863).
19. *Haustellum anniae* (Smith, 1940).
20. *Haustellum bobyini* (Kosuge, 1983).
21. *Chicoreus megrus* Vokes, 1974.
22. *Chicoreus damicornis* (Hedley, 1903).

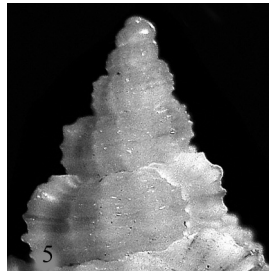
23. *Chicoreus cervicornis* (Lamarck, 1822); NW Australia.
24. *Chicoreus longicornis* (Dunker, 1864); QLD.
25. *Chicoreus denudatus* (Perry, 1811); Sydney.
26. *Chicoreus strigatus* (Reeve, 1849).
27. *Chicoreus setionoi* Houart, 2001; Indonesia.
28. *Chicoreus territus* (Reeve, 1845).
29. *Chicoreus corrugatus* Sowerby, 1841.
30. *Chicoreus litos* Vokes, 1978; Mozambique.
31. *Hexaplex hoplites* (P. Fischer, 1876).
32. *Murex somalicus* Parth, 1990.



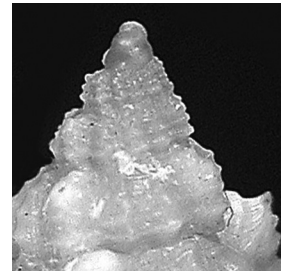
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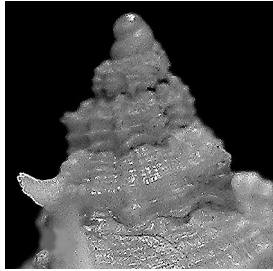
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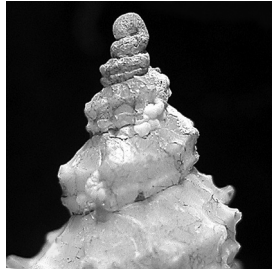
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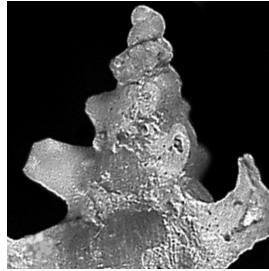
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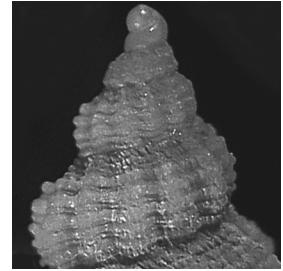
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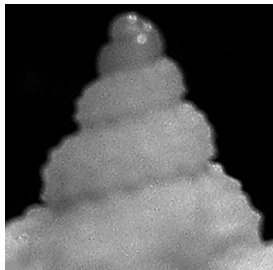
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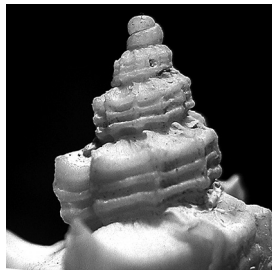
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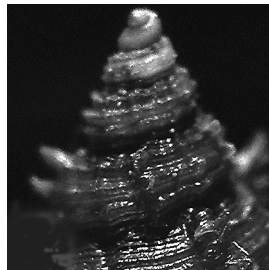
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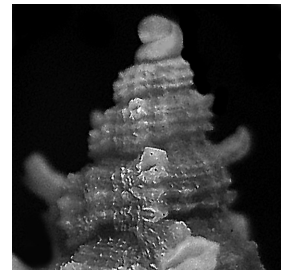
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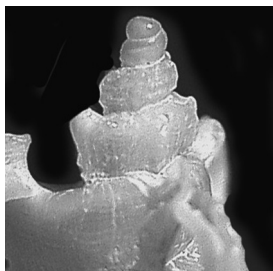
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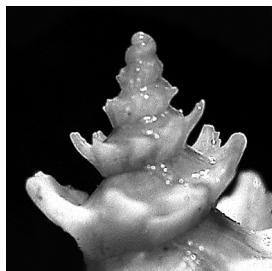
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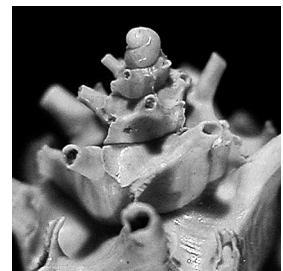
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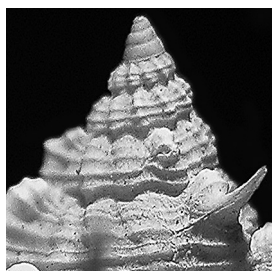
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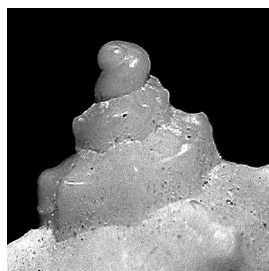
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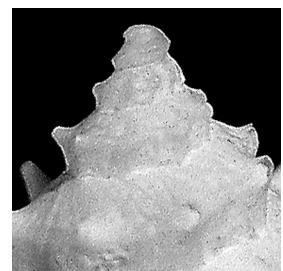
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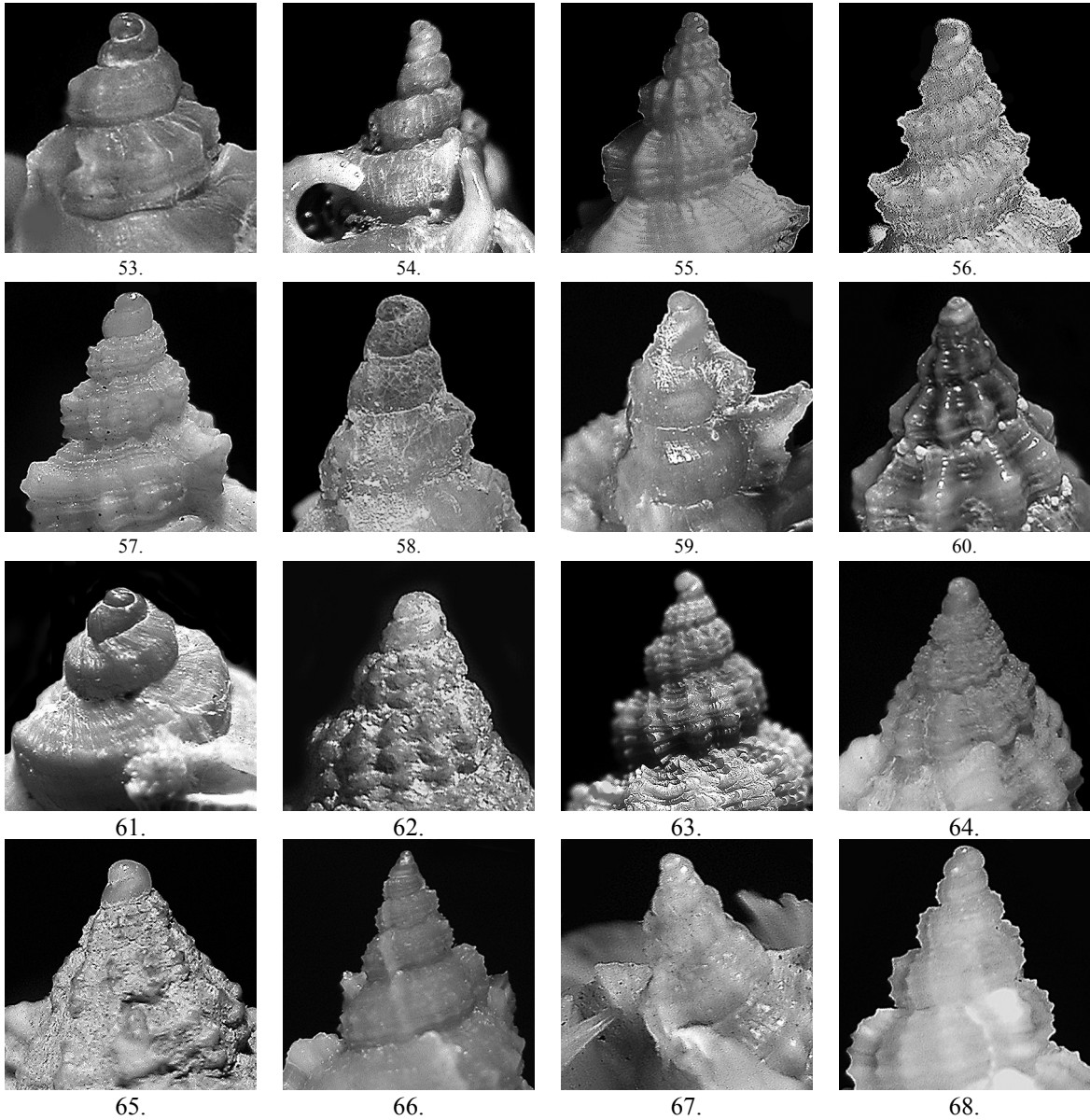
51.



52.

33. *Poirieria zelandica* (Quoy & Gaimard, 1833).
 34. *Siratus pliciferoides* (Kuroda, 1942); Philippines.
 35. *Siratus formosus* (Sowerby, 1841).
 36. *Siratus consueta* (Verrill, 1950); British W Indies.
 37. *Siratus cailletii* (Petit de la Saussaye, 1856).
 38. *Nipponotrophon gorgon* (Dall, 1913) Japan.
 39. *Favartia crouchi* (Sowerby, 1894).
 40. *Hadriana oreteia* (De Gregorio, 1885).
 41. *Chicoreus florifer* (Reeve, 1846); Florida.
 42. *Chicoreus boucheti* Houart, 1983.

43. *Chicoreus dunnii* Petuch, 1987.
 44. *Chicoreus bullisi* Vokes, 1974; Honduras.
 45. *Poropteron uncinarius* (Lamarck, 1822).
 46. *Trophon echinatus* (Kiener, 1848); Italy.
 47. *Murexsul azami* Kuroda, 1929; Japan.
 48. *Typhinellus sowerbyi* (Broderip, 1833).
 49. *Murex queenslandicus* Ponder & Vokes, 1988.
 50. *Murex ternispina* Lamarck, 1822.
 51. *Murex scolopax* (Dillwyn, 1817); Masirah I.
 52. *Murex occa* Sowerby, 1834.



53. *Pteropurpura plorator* (Adams & Reeve, 1849).

54. *Poropteron graagae* (Coen, 1947); Natal, S. Africa.

55. *Pteropurpura bequaerti* (Clench & Farfante, 1945); Florida.

56. *Pteropurpura modesta* (Fulton, 1936); Japan.

57. *Pteropurpura adunca* (Sowerby I, 1834); Japan.

58. *Pterynotus swainsoni* (Hertlein & Strong, 1951); Gulf California.

59. *Pterynotus vespertilio* (Kira, 1959).

60. *Ergalatax constricta* (Reeve, 1846); Japan.

61. *Pteropurpura esycha* (Dall, 1925) Japan.

62. *Ocenebra lurida* (Middendorf, 1848).

63. *Hadriania oretae* (De Gregorio, 1885); Spain.

64. *Siratus thompsoni* (Bullis, 1964) Surinam

65. *Poropteron multicornis* Houart, 1991.

66. *Naquetia annandalei* (Preston, 1910).

67. *Pterynotus miyokoae* Kosuge, 1979. Philippines.

68. *Haustellum dentifer* (Watson, 1883).

The pictures above belong to a first batch of various species belonging to the Muricidae in order to give a preliminary impression of the shape of their protoconchs. More detailed structure will perhaps be revealed if equipment with a better resolution is used.

The species of which the protoconchs are figured in this work are listed in Table. 1. The names underlined in the table are of those taxa, of which the protoconchs look differently from those figured in Ponder & Vokes (1988).

In Ponder & Vokes (1988) protoconchs of the species belonging to two genera: *Murex* and *Haustellum*, are given. Above we pictured the protoconchs of 14 species of genus *Murex* (## 1, 3-4, 6-7, 9-12, 32, 49-52) and 10 species of the genus *Haustellum* (## 2, 5, 13-20, 68). As can be seen in Table 1 our figures of 6 taxa in *Murex* and 4 in *Haustellum* are different from those in Ponder and Vokes (1988).

Table 1
Protoconchs of Muricidae pictured in this work

<i>Chicoreus boucheti</i> Houart, 1983.	<i>Murex olssoni</i> Vokes, 1967.
<i>Chicoreus bullisi</i> Vokes, 1974.	<i>Murex queenslandicus</i> Ponder & Vokes, 1988.
<i>Chicoreus cervicornis</i> (Lamarck, 1822)	<i>Murex scolopax</i> (Dillwyn, 1817).
<i>Chicoreus corrugatus</i> Sowerby, 1841.	<i>Murex somalicus</i> Parth, 1990.
<i>Chicoreus damicornis</i> (Hedley, 1903).	<i>Murex spectabilis</i> Ponder & Vokes, 1988.
<i>Chicoreus denudatus</i> (Perry, 1811)	<i>Murex ternispina</i> Lamarck, 1822.
<i>Chicoreus dunni</i> Petuch, 1987.	<i>Murex tribulus</i> Linnaeus, 1758; Papua New Guinea.
<i>Chicoreus florifer</i> (Reeve, 1846)	<i>Murex tenuirostrum africanus</i> Ponder & Vokes, 1988.
<i>Chicoreus litos</i> Vokes, 1978.	<i>Murex tryonia</i> Hidalgo in Tryon, 1873. Florida, Sarasota.
<i>Chicoreus longicornis</i> (Dunker, 1864).	<i>Murexsul azami</i> Kuroda, 1929
<i>Chicoreus megrus</i> Vokes, 1974.	<i>Naquetia annandalei</i> (Preston, 1910).
<i>Chicoreus setionoi</i> Houart, 2001	<i>Nipponotrophon gorgon</i> (Dall, 1913)
<i>Chicoreus strigatus</i> (Reeve, 1849)	<i>Ocenebra lurida</i> (Middendorf, 1848).
<i>Chicoreus territus</i> (Reeve, 1845).	<i>Poirieria zelandica</i> (Quoy & Gaimard, 1833).
<i>Ergalatax constricta</i> (Reeve, 1846)	<i>Poropteron graagae</i> (Coen, 1947).
<i>Favartia crouchi</i> (Sowerby, 1894).	<i>Poropteron multicornis</i> Houart, 1991
<i>Hadriana oreta</i> (De Gregorio, 1885).	<i>Poropteron uncinarius</i> (Lamarck, 1822).
<i>Haustellum anniae</i> (Smith, 1940).	<i>Pteropurpura adunca</i> (Sowerby I, 1834)
<i>Haustellum bobyini</i> (Kosuge, 1983).	<i>Pteropurpura bequaerti</i> (Clench & Farfante, 1945)
<i>Haustellum cabritti</i> (Bernardi, 1858); Honduras.	<i>Pteropurpura esycha</i> (Dall, 1925)
<i>Haustellum dentifer</i> (Watson, 1883).	<i>Pteropurpura modesta</i> (Fulton, 1936).
<i>Haustellum mindanaoensis</i> (Sowerby, 1841).	<i>Pteropurpura plorator</i> (Adams & Reeve, 1849).
<i>Haustellum multiplicatus</i> (Sowerby, 1895).	<i>Pterynotus swainsoni</i> (Hertlein & Strong, 1951)
<i>Haustellum rectirostris</i> (Sowerby, 1841).	<i>Pterynotus vespertilio</i> (Kira, 1959).
<i>Haustellum rubidus</i> F.C.Baker, 1897.	<i>Pterynotus miyokoae</i> Kosuge, 1979.
<i>Haustellum ruthae</i> (Vokes, 1988).	<i>Siratus cailleti</i> (Petit de la Saussaye, 1856).
<i>Haustellum sobrinus</i> (A. Adams, 1863).	<i>Siratus consuela</i> (Verrill, 1950)
<i>Hexaplex hoplites</i> (P. Fischer, 1876).	<i>Siratus formosus</i> (Sowerby, 1841).
<i>Murex acanthostephes</i> Watson, 1883.	<i>Siratus thompsoni</i> (Bullis, 1864).
<i>Murex carbonnieri</i> (Jousseume, 1881); Eritrea.	<i>Siratus pliciferoides</i> (Kosuge, 1942).
<i>Murex chrysostoma</i> Sowerby, 1834; Tobago.	<i>Trophon echinatus</i> (Kiener, 1848).
<i>Murex forskoehlii</i> Röding, 1798; East Sinai.	<i>Typhinellus sowerbyi</i> (Broderip, 1833).
<i>Murex occa</i> Sowerby, 1834.	

One can find in the works, mentioned below, drawings and photographs of the protoconchs of another 138 Muricid species of which the shape is similar to Fig. 1 above. Perhaps we can already consider such a shape of protoconchs as typical to a large group of Muricidae and name it Type 1.

Discussion and preliminary conclusions:

1. A protoconch—the larval shell—is widely used for separating species of Muricid gastropods (Radwin & D'Attilio, 1976). It is often considered to be an important distinguishing feature of a species in the family Muricidae. As mentioned in Ponder and Vokes (1988): “In some cases species are hardly separable on teleoconch characters but have completely different protoconchs, presumably at least partly, as a result of the species employing a different development strategy.”
2. At first glance one can easily examine the protoconch with the help of a simple magnifying glass of at least 10 x and good light. When doing this it is important to examine the protoconch from different angles in order to find the most adequate view of its three dimensional shape.

3. It is of course an oversimplification just to look at the protoconchs using only a magnifying glass because with better equipment giving a higher resolution one can examine also details of the structure of the whorls of the protoconch.
4. Pictures of the protoconchs of 65 Muricid species given above are similar and can be treated as "Type 1". More detailed pictures will be given when new equipment becomes available.
5. A shape of a protoconch in many species of Muricidae may be similar if observed at the proper angle. Hence several questions arise:
 - To what extent does the protoconch vary in shape and structure within a species?
 - Does the shape of the protoconch always functions as a diagnostic character at the specific level?

Literature

- D'Attilio, A. & Hertz, C.M. 1988. An illustrated catalogue of the family *Typhidae* Cossmann, 1903. The Festivus Vol. XX Supplement.
- Houart R. 1992. The genus *Chicoreus* and related genera (Gastropoda:Muricidae) in the Indo-West Pacific. 200 pp. Mémoires du Muséum National d'Histoire Naturelle Zoologie, tome (A) 154.
1994. Illustrated catalogue of recent species of Muricidae named since 1971. Verlag Christa Hemmen. 179 pp.
1996. The West African Muricidae. Apex 11(3-4):95-161.
1997. The West African Muricidae. Apex 12(2-3):49-91.
2001. A review of the recent Mediterranean and North eastern Atlantic species of Muricidae. Evolver. Rome. 228 pp.
- Ponder W.F. & E.H. Vokes. 1988. A revision of the Indo-West Pacific fossil and recent species of *Murex* s.s. and *Haustellum* (Mollusca: Gastropoda:Muricidae). Records of the Australian Museum Supplement 8. 160 pp.
- Radwin G. E. & A. D'Attilio. 1976. Murex shells of the world. An illustrated guide to the Muricidae. Stanford University Press. Stanford, California.

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