

# TAXONOMY OF THE MUD CRAB, *Scylla serrata* (Forsk.), FROM INDIA

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## ABSTRACT

Mud Crab of the Indo-Pacific region appear to belong to more than *one* species of the genus *Scylla*. Of the two species *S. Serrata* and *S. tranquebarica*, the latter appears to be *synonymous* with *S. Oceanica*. The two species may be differentiated by colour and habitat. *S. Serrata* inhabits burrows in the mangrove habitat, while *S. tranquebarica*, which grows to a larger size, is more free swimming. Both species are found in the coastal waters of India.

## INTRODUCTION

Taxonomy of the mud crab, *Scylla serrata* (Forsk.), has become a subject of importance for carcinologists ever since a revision of the genus by Estampador (1949a: 1949b). Forskal (1755) described the species as *Cancer sertus*, but did not mention the type of locality. Later, Fabricius (1793) described *Portunus tranquebaricus*, probably from a specimen obtained, from Tranquebar (Tarangambadi), India. Keeping the burrowing habits of the species in mind, de Haan (1833) chose the genus name as *Scylla serrata*. In Greek mythology, *Scylla* was a sea monster living in a cave near the sea. Dana (1852) placed these crab as *Scylla tranquebarica* variety *oceanica*. However, Alcock (1899), who did extensive carcinological work on materials obtained from Indian waters, used the name for the specimens collected from various brackishwater areas in India. Estampador (1949a) recognized two species and one variety in *Scylla*, in the Philippines, namely *S. oceanica*, *S. tranquebarica* and var. *paramamosin*, based on colour markings on the walking legs, swimming legs and chelipeds, the general colour and shape of the carapace, the position of the frontal teeth, the spines on the cat-pus of the chelipeds, and their habitat. Subsequently, Estampador (1949b) justified his revision by studying the process of spermatogenesis and oogenesis and the differences in form and structure of their chromosome.

Estampador (1949a) classified the specimens of *Scylla serrata* into two groups: 'Banhawin' and 'Mamosain'. The first group consisted of crab with green colour and polygonal markings on all legs and chelipeds, while the second contained crab with dark brown colour and without any markings on legs and chelipeds. 'Banhawin' crab were free swimming, while 'Mamosain' inhabited holes.

Estampador (1949a) gave the status of a distinct species for *S. oceanica* and *S. tranquebarica* (belonging to 'Banhawin' group), as they were free swimming. *S. serrata* was assigned to the 'Mamosain' as they lived in burrows in the mangrove areas, justifying the generic name *Scylla* coined by de Haan. For the variations observed in the coloration, Estampador (1949a) described them as a variety of *S. serrata* and referred to them as *S. serrata* var. *paramamosain*.

Estampador's (1949a) observations on *S. oceanica*, *S. tranquebarica* and var. *paramamosain* are given in Table 1.

**Table 1: Colour, morphology and habitat of three species and one variety of *Scylla* from the Philippines**

| <i>Colour/morphological features</i> | <b>S.oceanica</b>                           | <b>S. tranquebarica</b>                 | <i>S. serrata</i>                                     | <i>S. set-rata</i> var <i>paramamosain</i>            |
|--------------------------------------|---|---|---|---|
| <b>Colour in carapace</b>            | <b>Greenish/ greyish</b>                    | <b>Olive</b>                            | <b>Deep-rusty brown</b>                               | <b>Brownish grey</b>                                  |
| <b>Polygonal pigmented area</b>      | <b>On chelipeds and all walking legs</b>    | <b>Only on last pair of legs</b>        | <b>Absent</b>   | <b>Only white pigments on last pair of legs</b>       |
| <b>'H' mark on carapace</b>          | <b>Deeply impressed</b>                     | <b>Deeply impressed</b>                 | <b>Faint impression</b>                               | <b>Relatively less impressed</b>                      |
| <b>Frontal teeth</b>                 | <b>Blunt in shape; levelled</b>             | <b>Blunt in shape; levelled</b>         | <b>Blunt in shape; Median ones slightly projected</b> | <b>Blunt in shape; Median ones slightly projected</b> |
| <b>Length of cheliped</b>            | <b>Not more than twice that of carapace</b> | <b>More than twice that of carapace</b> | <b>Not quite twice the length of carapace</b>         | <b>Not mentioned</b>                                  |
| <b>Size attained</b>                 | <b>To a maximum size of 9" (220 mm CW).</b> | <b>Not mentioned</b>                    | <b>Not mentioned</b>                                  | <b>Not mentioned</b>                                  |
| <b>Habitat</b>                       | <b>Prefers a 'nomadic' life</b>             | <b>Not mentioned</b>                    | <b>Lives in burrows</b>                               | <b>Lives in burrows</b>                               |

Serene (1952) reported the occurrence of three species and one variety recognized by Estampador (1949a) in Vietnamese waters, agreeing with Estampador (1949a). But working on the systematics of Australian portunid crab, Stephenson and Campbell (1959) did not agree with Estampador (1949a) and Serene (1952) on recognizing the three species and one variety in *Scylla*; they thought more work should be done on this group.

### *RECENT STUDIES ON INDIAN SPECIES ON Scylla*

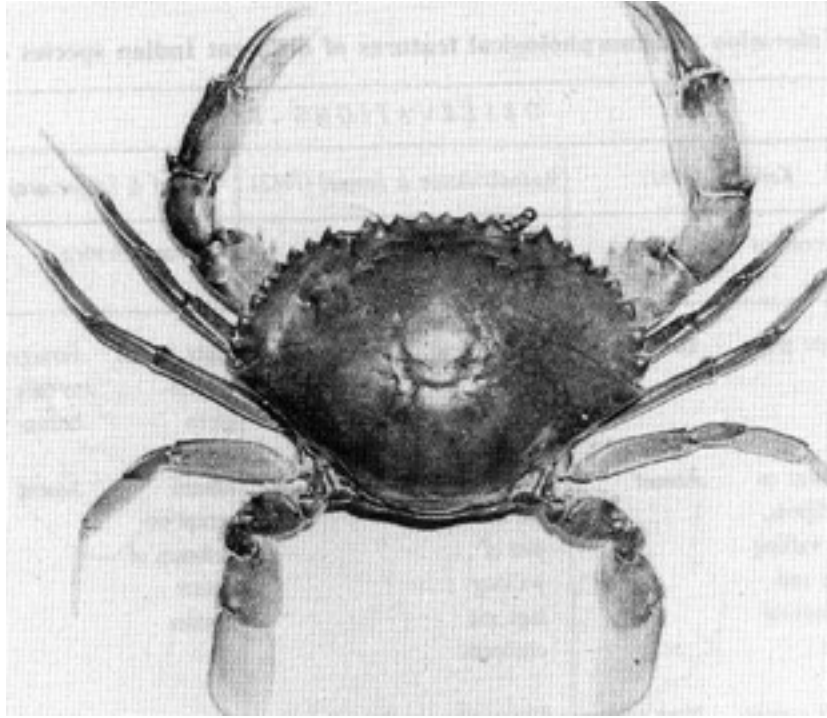
While studying the biology of the portunid crab of the Cochin backwaters, Kerala, Kathirvel (1981) came across one larger and one smaller species of *Scylla*. Colour and morphological characters of the larger and smaller species agree with Estampador's (1949a) *S. oceanica* and *S. serrata*, respectively. The examination of 622 specimens of *S. tranquebarica* (*S. oceanica*) and 934 *S. serrata* indicated the maximum size as being 202 mm for males and 198 mm for females of *S. oceanica* and 120mm for both sexes of *S. serrata*. Further, the size at first maturity for females was 120mm for *S. oceanica* and 85mm for *S. serrata*. Subsequently, Radhakrishnan and Samuel (1982) dealt with *S. serrata* from the Cochin backwaters and described a subspecies *S. serrata serrata*, while Joel and Sanjeevaraj (1983) reported *S. tranquebarica* and *S. serrata* from Pulicat Lake. The salient

findings of Kathirvel (1981), Radhakrishnan and Samuel (1982) and Joel and Sanjeevaraj (1983) are tabulated in Table 2.

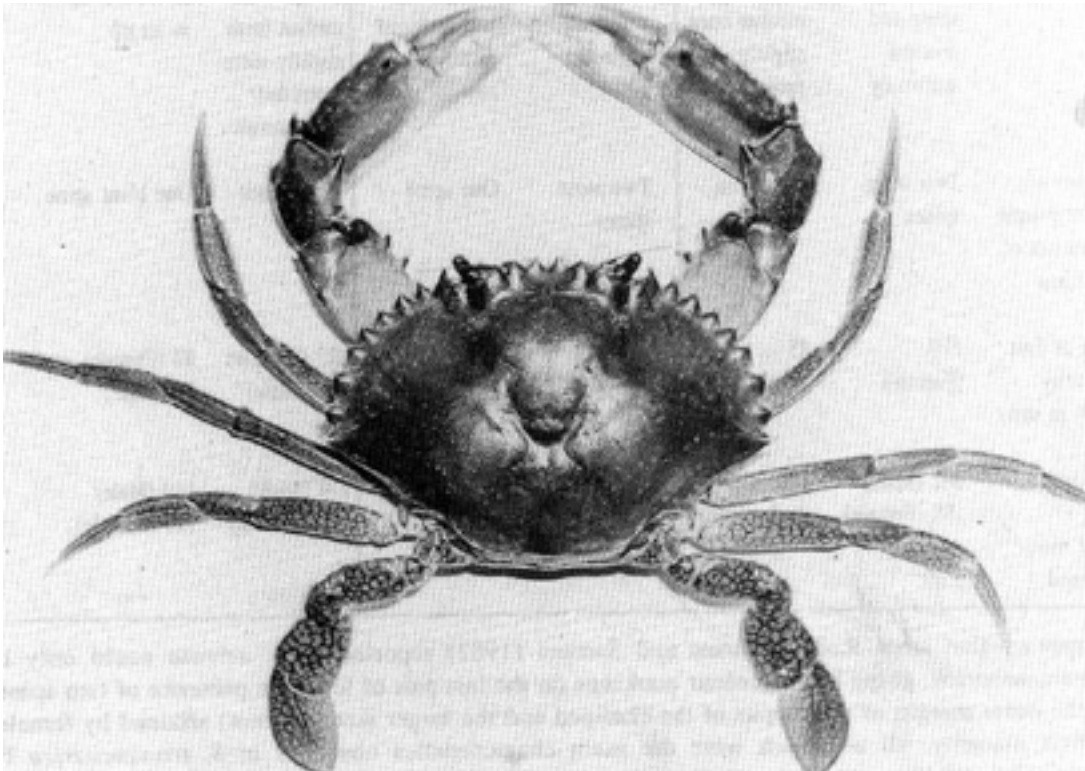
Table 2: Coloration and morphological features of different Indian species of Scylla

| <i>OBSERVATIONS</i> B Y                             |  |   |  |  |  |  |
|---|--|---|--|--|--|--|
| <i>Colour/<br/>Character</i>                        | <i>Kathirvel (1981)</i>                                  |   | <i>Radhakrishnan &amp; Samuel (1982)</i>               |  | <i>Joel &amp; Sanjeevaraj (1983)</i>                         |  |
|   | <i>S. oceanica</i>                                       | <i>S. serrata</i>                             | <i>S. serrata</i>                                      | <i>S. serrata serrata</i>                | <i>S. tranquebarica</i>                                      | <b>S. serrata</b>                        |
| <b>Colour on carapace</b>                           | Light green  | Dark green                                    | Dark green   | Dark green                               | Light to dark greyish-green                                  | Ferruginous brown to dark greenish brown |
| <b>Polygonal marking areas</b>                      | Present on chelipeds, all walking legs and swimming legs | Absent  | Present on the last pair of walking legs and chelipeds | Absent                                   | Absent except on abdomen of mature females                   | Absent                                   |
| <b>Shape of the carapace</b>                        | Less convex  | More convex and less convex                   | Unsmooth and less convex                               | Smooth and more convex                   | —  | —  |
| <b>H' mark on carapace</b>                          | Deep   | Less deep                                     | Deep   | Less deep                                | —  | —  |
| <b>Frontal teeth</b>                                | Relatively sharp and levelled uniformly                  | Blunt and median ones slightly projecting out | Pointed and anteriorly projected                       | Not pointed and arranged in the same row | Sharp and median teeth slightly more protruded than laterals | Blunt and equal in length                |
| <b>Spines at outer margin of carpus of cheliped</b> | Two sharp spines   | One blunt tubercle                            | Two stout spines                                       | One spine                                | Two spines   | One blunt spine                          |
| <b>Size at first maturity (CW in mm)</b>            | 110 (Female)   | 85 (Female)                                   | 140 (Female)   | 98 (Female)                              | 123 (Female)<br>113 (Male)                                   | 83 (Female)<br>116 (Male)                |
| <b>Maximum size (CW mm) attained</b>                | 202 (Male)<br>198 (Female)                               | 120 (both sexes)                              | Not mentioned  |  | 179 (Male)<br>190 (Female)                                   | 110 (Male)<br>126 (Female)               |

It appears that what Radhakrishnan and Samuel (1983) reported as *S. serrata* could only be *S. tranquebarica*, going by the colour markings on the last pair of legs, the presence of two spines on the outer margin of the carpus of the cheliped and the larger size (140mm) attained by females at first maturity, all of which were the main characteristics observed in *S. tranquebarica* by Estampador (1949a) and Joel and Sanjeevaraj (1983). Also, the subspecies (*S. serrata serrata*) described by the same authors appears to be *S. serrata*, whose characteristics are well in agreement with those given by Estampador (1949a), Kathirvel (1981) and Joel and Sanjeevaraj (1983).



*Scylla serrata* (Forskol)



*Scylla tranquebarica* (Fabricius)

## GENERAL REMARKS

In the carcinological study on brachyuran crab, the shape and structure of the first male pleopod has been considered as a specific tool for identification (Stephensen 1945).

Joel and Sanjeevaraj (1983), who described the male pleopod of *S. tranquebarica* and *S. serrata*, found only minor variations. Such similarity in the shape and structure of the male pleopod in a closely related species of portunid crab has been shown earlier (Stephenson and Campbell 1959). While summarizing the evolution and ecology of Australian portunid crab, Stephenson (1960) thought that *S. serrata* was the only species of portunids that successfully invaded the estuarine habitat and that their estuarine life had led to the isolation of *Scylla* populations, enabling speciation. Speciation in *Scylla* is the result of 'translocation' of chromosomes (Estampador 1949a).

Colour, morphological and biological characteristics reported on *Scylla* from the Philippines, Vietnam and India have established the existence of more than one species. Further species-wise biological studies in the major fishing areas would throw more light on the population dynamics of a species co-existing in the same environment. To create an awareness of the existence of more than one species of *Scylla*, a critical colour photographic atlas may be necessary to conduct research and development programmes on this valuable seafood.

A critical study of the available information on the taxonomy of *Scylla* suggests that there are at least two distinct species, namely *S. serrata* (Forsk. 1755) (top, facing page) and *S. tranquebarica* (Fabricius 1798) (bottom, facing page), characterized by differences in size, spines on the outer border of the carpus of the cheliped, and habitat preferences.

*S. oceanica* appears to be a synonym of *S. tranquebarica*. Both of them grow to a larger size, do not live in burrows and have two sharp spines on the outer border of the carpus of the cheliped. Colour variations noted by various scientists may be due to geographic variations.

*S. serrata* grows to a smaller size, lives in burrows and has one spine on the outer border of the carpus of the cheliped, the other tooth being absent or blunt. The differences noted in coloration may be due to geographic variations. However, a detailed study of material from various regions of the Indo-Pacific is needed to come to a definite conclusion.

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