ISSN: 2347-5129
(ICV-Poland) Impact Value: 5.62
(GIF) Impact Factor: 0.352
IJFAS 2016; 4(2): 166-169

www.fisheriesjournal.com
Received: 03-01-2016
Accepted: 05-02-2016

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Occurrence of violet vinegar crab *Episesarma versicolor* Tweedie, 1940 (Crustacea: Decapoda: Brachyura) in mangroves of Pichavaram and Vellar, Tamil Nadu

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Abstract
During the present study on the diversity of brachyuran crabs from the mangroves of Pichavaram and Vellar, five male specimens of a sesarmid crab having stunning blend of violet and white pincers were caught from burrows at the base of mangrove trees. On closer examination, the species was found to be different from the other species which were already recorded. This was identified as *Episesarma versicolor* with the help of taxonomic keys. This happens to be the first report of this species from the mangroves of Tamil Nadu.

Keywords: Mangrove crab, Sesarmidae, *Episesarma versicolor*, Tamil Nadu**.**

1. Introduction
The union of brachyuran crabs with mangrove flora and their behaviour, feeding and ecology are of great interest to biologists [1]. Brachyuran crabs are the most species-rich faunal groups which exhibit an outstanding diversity in numbers of extant and extinct taxa [2-5]. Over 300 species of crabs have been reported from mangroves worldwide with two families, the Sesarmidae and Ocypodidae accounting for over 80% of the species diversity. In particular, family Sesarmidae attained extreme diversity and richness. Even though they are not important in commercial fishery, their ecological role is significant as they serve as food for the predatory organisms and their faecal matter containing carbon, nitrogen, phosphorus and some trace metals also form a rich food for other consumers in the food web [6]. Crabs are considered as the 'Keystone species' of the mangrove swamps because of their vital role in carbon recycling, decomposition of organic matter due to their burrowing habits and degradation of mangrove leaf litter. Because of this, sesarmids play a key role as a major link between primary and secondary producers. In view of the importance of sesarmids, their role in the mangrove ecosystem of Hong Kong was studied in detail [7-9]. In a way, the saying 'no mangroves, no prawns' is more applicable to the crabs as well.
Delineating the genus *Episesarma* is quite a challenging task in sesarmidae. Totally there are seven species under this genus at the world level namely *Episesarma chentongense* (Serene and Soh, 1967), *Episesarma mederi* (H. Milne Edwards, 1853), *Episesarma palawanense* (Rathbun, 1914), *Episesarma singaporense* (Tweedie, 1936), *Episesarma versicolor* (Tweedie, 1940), *Episesarma lafondii* (Hombron and Jacquinot, 1846) and *Episesarma crebrestriatum* (Tesch, 1917) [2]. The first five species are among the largest and most common sesarmids in Peninsular Malaysia and Singapore and a simplified key for the identification of these five species based on the characters of the adult male chelae such as the number of tubercles lying on dorsal margin of the dactylus and the colouration was formulated [10]. However figures depicting the colour pattern have not been included in the key leading to the criticism that interpretation based on colour of chelae causes bias [11].
The fishing of sesarmid crabs especially *Episesarma* spp. for commercial purpose is increasing sharply in the Southeast Asian countries, Australia and China where these are consumed in different ways [12]. Understanding regarding the distribution of a species helps to know its population dispersal [13]. In this context five male specimens of *E. versicolor* (Tweedie, 1940) a Southeast Asian and southern China species belonging to the family sesarmidae, type

locality Singapore was caught in the burrows at the base of mangroves of Pichavaram and Vellar. This species is rare in Indian mangroves. Despite its large size, the crab has not been reported earlier in Tamil Nadu. There is no much information regarding the distribution of this crab from the Indian mangroves and present paper reports the occurrence of *E. versicolor* for the first time from the mangroves of Tamil Nadu.

2. Materials and Methods

During routine survey, five male crab specimens were collected by hand-picking from the burrows and outside the base of mangrove trees in Pichavaram *(latitude* 11º 25' N; *longitude* 79º 47' E) and Vellar mangroves [(Parangipettai) (latitude 11^0 29'N; *longitude* 79^0 46'E)] Tamil Nadu (Fig. 1). The identification was done based on the presence of number of tubercles on the dorsal margin of dactylus of cheliped [11]. After confirming the identity as *E. versicolor* (Tweedie, 1940) belonging to the family sesarmidae. The specimens were preserved in -20 ^{0}C deep freezer for long term storage. The specimens were then deposited in the Museum of Centre of Advanced Study in Marine Biology, Faculty of Marine Sciences, Annamalai University, Parangipettai, Tamilnadu, India (Catalogue No. EV690). Samples were also collected for DNA barcoding.

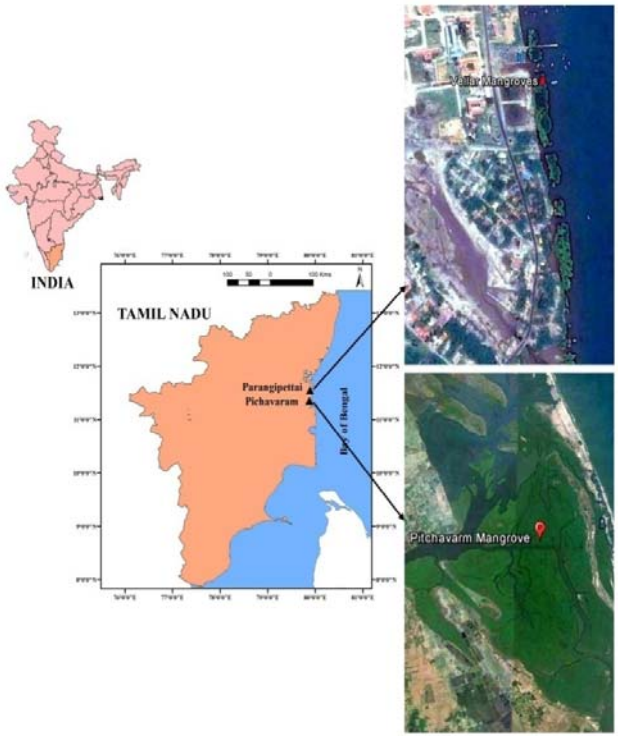

Fig 1: Pichavaram and Vellar mangroves situated in the Southeast coast of India

3. Results

The specimens were identified as *Episesarma versicolor*.

3.1 Systematics

Phylum: Arthropoda
Sub Phylum: Crustacea
Class: Malacostraca
Order: Decapoda
Family: Sesarmidae
Genus: *Episesarma*
Species: *versicolor* (Tweedie, 1940)

(A)

(B)

Fig 2: Dorsal (A) and ventral (B) views of *E. versicolor*.

3.2 Diagnosis

Carapace slightly wider than long; anterolateral region with 2 teeth, first tooth larger in size with sharp angle. Dorsal surface relatively flat, regions well defined, granular and covered with tufts of setae on entire carapace. Dorsal margin of dactylar finger of chela with 40–50 tubercles, forming a stridulatory organ; tubercles increasing in size towards distal end, tubercles not continuous up to tip. Inner surface of male chela with single vertical row of 10–13 distinct granules, cluster of granules on inner surface of proposal finger. Tip of telson oval; abdomen narrow. First gonopod with relatively narrow truncate pectinated tip. Vulvae with flattened operculum, with slight protrusion distally; sternal vulvar cover not obvious. The most characteristic feature is the two tympana on the ventral side. They have a specialized breathing net like arrangement of setae on the pterygostomian region (side of the carapace next to the mouth parts) and water stored among these setae can re-circulate in the gill chamber, keeping the gills moist so that they can breathe atmospheric oxygen to adapt to terrestrial life for some time. The morphometric and meristic characters of the crabs are given in (Table 1).

3.3 Colour

Carapace has an earthen ground colour with deep violet patches. The chelae are stout and have beautiful coloration with outer surface of palm violet at the proximal part, distal part and fingers white. The legs are flat with yellow pointed tips.

3.4 Habitat, biology and fisheries

E. versicolor lives in mangroves by digging burrows at the base of trees. Feed on calyx, leaves by gathering these at night from the ground or by climbing up trees as high as 6 m and

also feeds on water plants. They may also scavenge on dead animals they come across and found to be omnivore/deposit feeders. During high tide in day time, tree-climbing activity is often seen clinging to tree trunks just above the water line. Here they remain motionless. They probably do this to avoid both aquatic predators in water as well as airborne predators such as birds. These crabs are harvested in large numbers for use as food in many Southeast Asian countries.

3.5 Distribution

The original type locality of mangrove crab *E. versicolor* is Singapore. These crabs are distributed widely in mangroves of Southeast Asian countries like Southern China, Hong Kong, Indonesia, Malaysia, Philippines, Singapore, Thailand, northern Australia and South Asian countries like Bangladesh and Sri Lanka. It has limited distribution in Indian mangroves [14].

Table 1: Morphometric and meristic characters of male *Episesarma versicolor* (n=5).

a. Carapace data		
		Range (in mm)
i.	Carapace width	27-37
ii.	Carapace length	25-35
iii.	Frontal width	13-17
iv.	Posterior width of carapace	10-13
v.	Abdominal width	9-12
vi.	Abdominal length	19-27
vii.	Sternum width	5-7
viii.	No. of anterolateral teeth	2 nos.
b. Cheliped data		
		Range (in mm)
i.	Propodus length	18-27
ii.	Propodus width	10-16
iii.	Dactyl length	11-20
iv.	Merus length	10-16
v.	No. of tubercles on dorsal margin of dactylus	40-50 nos.
vi.	No. of vertical distinct granules of ventral propodus	10-13 nos.

4. Discussion

The five male specimens from Pichavaram and Vellar mangroves match with the previous descriptions and illustrations of *E. versicolor* by Tweedie (1940) from Singapore mangroves. From the Indian mangroves *E. versicolor* has been recorded only in Coringa (16°-30' to 17°-00' N *lat.* and 82°-14' to 82°-23'E *long*) as a primary producer in intertidal mangrove forests [15]. There are chances for the occurrence of this crab in other Indian mangroves too. *E. versicolor* was recorded in Bangladesh mangroves [16]. The feeding ecology of *E. versicolor* was studied in Philippines [17]. The population genetics of *E. versicolor* was also studied all along the Andaman coast of Thailand [18].

E. versicolor has a vital role in mangrove ecosystem like carbon recycling, organic decomposition by its burrowing habit. Besides, its fecal matter potentially contributes to secondary production through a coprophagous food chain [19]. In addition to its ecological importance, it has commercial importance as well as an important protein source for people. More or less around 18,000 tons of *E. versicolor* are annually consumed domestically in Thailand [20]. But in some countries like India, Africa America, etc. its significance is not known.

Episesarma was synonymised with *Neoepisesarma* with the former having priority [21]. However all the species moved to *Neoepisesarma* genus were transferred back to genus *Episesarma* later [22]. Based on the key for the identification of five species of *Episesarma* (*E. mederi, E. palawanense, E. chentongense, E. singaporense and E. versicolor*), the identity of this species was confirmed as *E. versicolor* [11]. Characters of male chela (number of tubercles and colour) and gonopod (first gonopod with relatively narrow truncate pectinated tip) helped in the delineation of this species from others.

5. Acknowledgements

The authors are grateful to the Authorities of Annamalai University and the Director of their centre for providing necessary facilities. The authors are thankful to the MoES (CMLRE) Ministry of Earth Sciences (Centre for Marine Living Resources and Ecology) (Grand No. 10-IT IS/17/2012 dt.01/10/2012) for the financial support.

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