



Taxonomy, length-weight relationship, food and feeding habits of flower moon crab *Matuta planipes* Fabricius, 1798 from coastal waters of Gopalpur, Odisha, India

DURGA PRASAD BEHERA¹, S. Y. TENJING², ROCKTIM RAMEN DAS³, LAXMAN NAYAK¹
AND D. MOHAPATRA

¹Department of Marine Sciences, Berhampur University, Berhampur - 760 007, Odisha, India

²Department of Biosciences, Mangalore University, Mangalore - 574 199, Karnataka, India

³Department of Ocean Studies and Marine Biology, Pondicherry University, Port Blair - 744 112
Andaman and Nicobar Islands, India

e-mail: durga.marine@gmail.com

ABSTRACT

The relationship between carapace length (CL), carapace width (CW) and total weight (TW) in the flower moon crab *Matuta planipes* Fabricius, 1798 was studied and found to be $CL = 0.144 + 1.319 CW$ and $CL = 0.356 + 1.273 CL$ for males and females respectively. In case of the carapace width and total weight, the relationships were: $TW = 0.272 CW^{3.011}$ and $TW = 0.474 CW^{2.555}$ for males and females respectively. The relationships of carapace length and total weight were: $TW = 0.128 CL^{2.917}$ for males and $TW = 0.184 CL^{2.650}$ for females. A linear pattern was found between the relationship of CL and CW for *M. planipes*, whereas a curvilinear pattern was found between the relationship of CL/CW and TW in the present study. It was also observed that *M. planipes* is an opportunistic omnivore, seaweed being the most dominant food item followed by crustaceans, seagrass, amphipods and miscellaneous matter.

Keywords: Allometric relationship, Distribution, Food and feeding habits, Gopalpur, *Matuta planipes*

Introduction

The western bank of the Bay of Bengal is enclosed by 2,019 km long coastline of the east coast of India (Vivekanandan and Krishnakumar, 2010), which consists of four maritime states, namely Tamil Nadu (TN), Andhra Pradesh (AP), Odisha and West Bengal (WB). The coastal and offshore waters of Odisha form a rich habitat for many macrofaunal organisms (Nagabhushanam, 1972). Decapod crabs are considered as a biologically and ecologically important group in marine ecosystem which play vital role in such biodiverse habitats. The information on Decapoda from Indian waters are available in plenty. However, along the east coast of India, several researchers have reported three species of crabs belonging to the genus *Matuta* from different regions, namely Hugli Malta Estuary in WB (Bhadra, 1995); Chilika Lake in Odisha (Sahoo *et al.*, 2008); Godavari Estuary in AP (Roy and Bhadra, 2001) and Parangipettai waters in TN (Selvakumar and Khan, 1993).

The flower moon crab *Matuta planipes* Fabricius, 1798 belonging to the family Matutidae and subfamily Matutinae, is included in the super family Calappoidea due to presence of their ambulatory legs and chelipeds (Bellwood, 1996). Recently, information on *M. planipes* from the coastal region of south Odisha was reported by Rath and Roy (2010) from

Bahuda Estuary. Later they have also reported the same species from Banshadhara and Nagabali estuaries (Rath and Roy, 2011). Recently, this species was also reported from the subtidal zone of Gujarat by Jigneshkumar and Kauresh (2012). The present study is an attempt for taxonomic confirmation, evaluation of allometric relationships as well as food and feeding habits of *M. planipes* along Gopalpur coastal waters in Odisha.

Materials and methods

The specimens of *M. planipes* (Fig. 1) were collected from trawl landings at Gopalpur Port (19°15'33.73"N; 84°54'42.84"E) during April to September 2013. A total of 320 specimens (160 males and 160 females) were examined. Standard measurements of the specimens such as carapace width (distance from the tip to tip of the last antero-lateral teeth) and carapace length (distance from the tip of the frontal teeth to the posterior end of the carapace) were taken using a digital vernier caliper. The total body weight was taken using an electronic balance at a precision of 0.01g. After taking morphometric measurements, specimens of carapace length ranging from 5-6 cm were dissected and the guts were collected and preserved in 4% formaldehyde solution for gut content analysis.

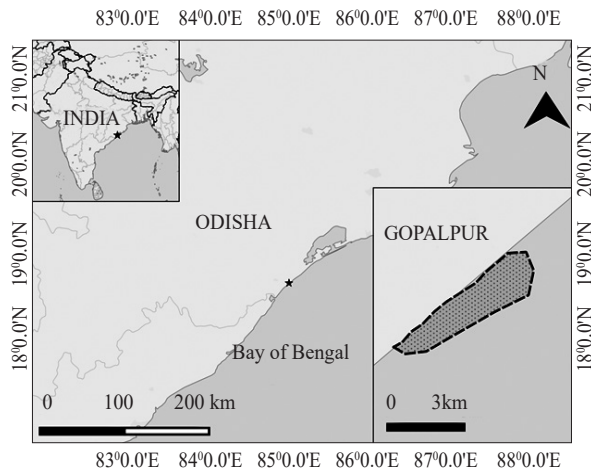


Fig. 1. Location of study area along Odisha coast

Results and discussion

Taxonomic hierarchy

Matuta planipes Fabricius, 1798

Phylum : Arthropoda

Class : Malacostraca

Order : Decapoda

Family : Matutidae

Genus : *Matuta* Weber 1795

1798 *Matuta planipes*: Fabricius, *Ent. Syst. Suppl.*, 2: 369.

1896 *Matuta victor*: Alcock, *J. Asiat. Soc. Bengal*, 65:160.

1987 *Matuta planipes*: Anonymous, *Mangrove Ecosystem of Sundarbans*, 74 (Mangroves, Sundarbans, West Bengal).

1989 *Matuta planipes*: Mandal and Nandi, *Fauna of Conservation Areas*, 3 *Zool. Surv. India*: 26 (Mangroves, Sundarbans, West Bengal).

1994 *Matuta planipes*: Chaudhuri and Choudhuri, *Mangroves of the Sundarbans, India*, 1: 232 (Mangroves, Sundarbans, West Bengal).

2000 *Matuta planipes*: Anonymous, Mangrove associated fauna. In: *An ecological study of kachchh, mangroves and its associated fauna with reference to management and conservation*, 31 (Mangrove; Munraj and Jakhau, Gulf of Kachchh, Gujarat).

2001 *Matuta planipes*: Dev Roy and Nandi, *Bull. Nat. Inst. Ecol.*, 11:16 (Mangroves, Sundarbans, West Bengal and Andamans).

2004 *Matula planipes*: Venkataraman, Jeyabaskaran, Raghuram and Alfred, *Rec. Zool. Surv. India, Occ. Paper No. 226*:311 (Coral reef, Gulf of Mannar, Tamil Nadu, Andaman and Nicobar Islands).

2005 *Matuta palmipes*: Subba Rao and Sastry, *An Overview, Conservation Area Series 23: Zool. Surv. India* 51 (Marine National Park, Gulf of Kachchh, Gujarat) (incorrect spelling of 'planipes').

2008 *Matuta planipes*: Roy, M. K. D, *An annotated checklist of Mangrove and Coral Reef inhabiting Brachyuran Crabs of India, India. Rec. Zool. Surv. India, Occ. Paper No.*, 289.

Material examined: 320 specimens from trawl landings at Gopalpur port

Diagnosis: Carapace subcircular, slightly convex, postero-lateral sides strongly convergent, with a ½ inch horizontal epibranchial spine on either side. Tubercle at the angle of propodus where it touches the external angle of the merus indistinct. Carapace finely granular on epibranchial, post-gastric and cardiac regions. Of the six, the anterior two tubercles on the middle of carapace are obsolete; in adults the other four tubercles also less prominent. Antero-lateral sides of carapace crenulate. The postero-lateral sides of carapace form a finely beaded slightly raised ridge which ends at rear of the lateral spine. Front distinctly bilobed. Chelipeds equal and symmetrical. Carapace coloured with vermicular red line, forming spots or incomplete rings on the anterior portion of the carapace. Posterior region with narrow longitudinal loops (Fig. 2).

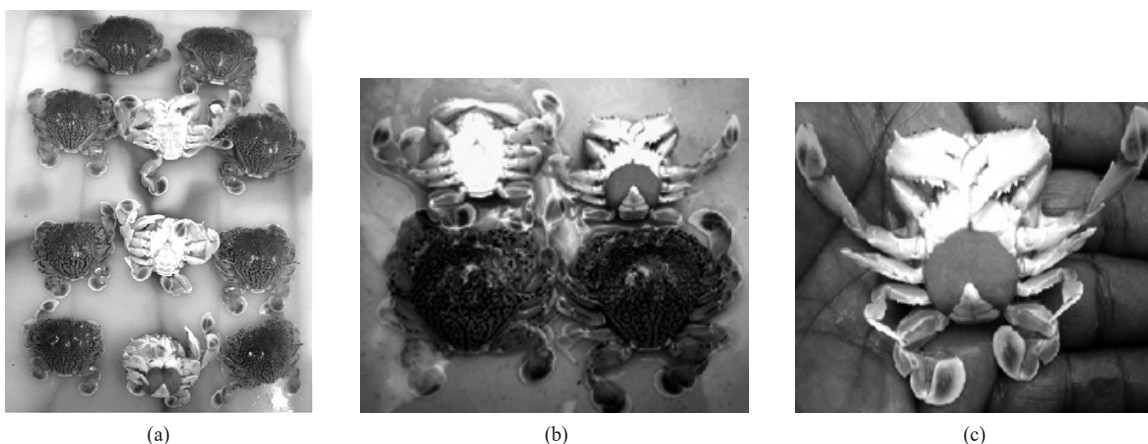


Fig. 2. (a) Male and Female *M. planipes*, (b) Ventral and dorsal sides of *M. planipes*, (c) Egg mass carried by female crab during spawning season

Remarks: The presence of a tubercle at the angle where the propodus comes in contact with the distal lobule of the merus clearly distinguish the species from other species. *M. planipes* differs from *M. victor* (Fabricius, 1781) in having a single spine on external surface of male chela, straight lateral frontal lobes and carapace covered with reticulated loops as compared with the bispinose chela, rounded lobes and minutely spotted carapace of the latter. Generally smaller than *M. lunaris* which is now accepted as *Ashtoret lunaris* (Forsk., 1775). In *M. planipes*, a small granulate tubercle appears at lower proximal angle of palm and lower margin has a row of tubercles terminating at base of dactylus. In case of *A. lunaris*, lower margin has a row of triangular tubercles terminating at base of dactylus and a distalmost largest tubercle.

Colour: Carapace with reticulating brown lines forming small rings anteriorly and larger, elongate loops posteriorly.

Habitat: Occur in sandy beach between high and low tide marks to a depth of 10-15 m.

Distribution: West Bengal, Gujarat, Maharashtra (Roy, 2008); Karnataka (Dineshababu *et al.*, 2011); Kerala (Biju Kumar *et al.*, 2007); Odisha (Deb, 1995); Andhra Pradesh (Roy and Nandi, 2008); Tamil Nadu (Krishnamoorthy, 2007); Lakshadweep (Varadharajan *et al.*, 2012); Andaman and Nicobar Islands (Rao, 2010).

Elsewhere: Persian Gulf (Stephensen, 1945); Pakistan (Galil and Clark, 1995); Sri Lanka (Galil and Clark, 1995); Burma (Alcock, 1896), Sumatra-Aceh (de Man, 1898), Malaysia (Galil and Clark, 1995); Japan (Ortmann, 1892), Korea (Sakai, 1937), China (Shen, 1932), Taiwan (Lin, 1949); Vietnam (Galil and Clark, 1995); Singapore (Galil and Clark, 1995); Indonesia (Galil and Clark, 1995); New Guinea (Galil and Clark, 1995); Australia (Goeij *et al.*, 2008).

In the present study, total number of specimens was 320, of which 160 were males and 160 females. The minimum and maximum sizes found in this study are given in Table 1. Carapace width of males ranged from 3.1 to 6.8 mm with a mean of 5.52 mm and that of females from 4.1 to 6.8 mm, with mean of 5.49 mm. Carapace length varied from 2.4 to 5.1 mm for males with a mean of 4.07 mm and for females, the range was 3.1-4.8 mm with a mean value of 4.03 mm. Total weight varied from 3.1 to 35.0 g for males, whereas the range was 8.0 to 28.2 g for females. The equations of relationships between the variables for both sexes are given in Table 2. Monthly variations of length-width relationships of *M. planipes* are depicted in Fig. 3. It was found that linear pattern occurs in all the months. The relationships between carapace width (CW)-carapace length (CL) for males and females were: $CL = 0.144 + 1.319 CW$ and $CL = 0.356 + 1.273CW$

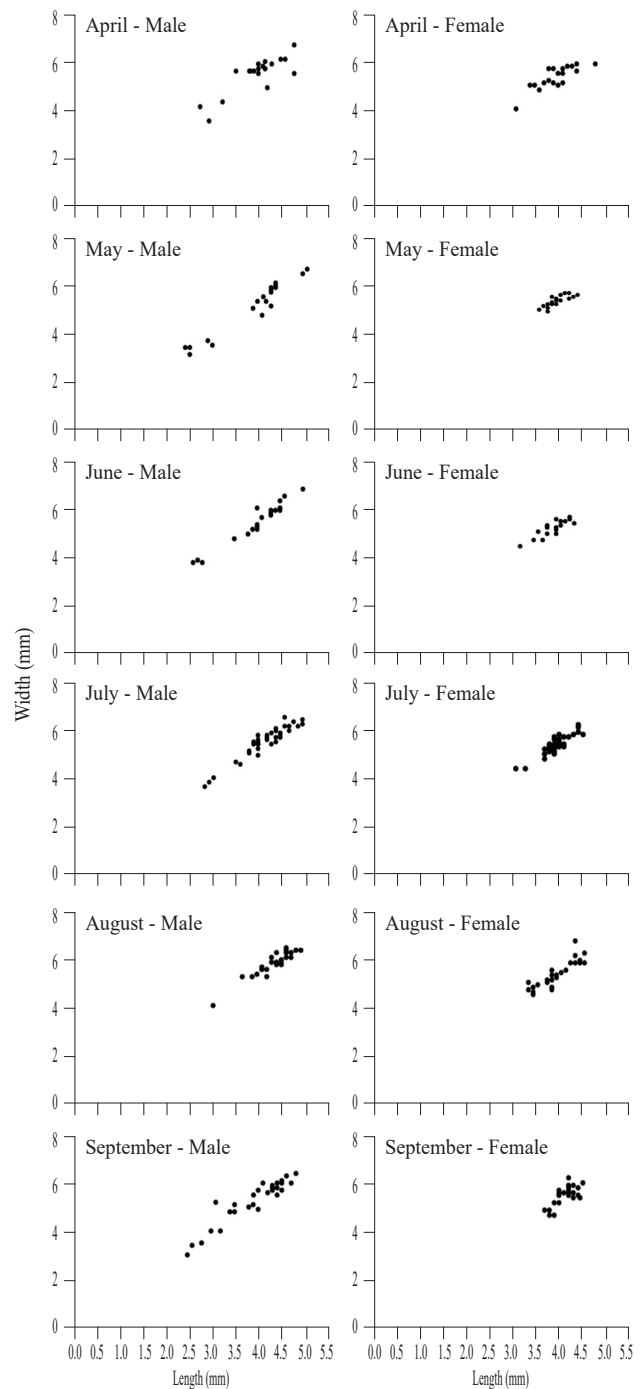


Fig. 3. Monthly length-width relationships of *M. planipes*

respectively. Overall length-width relationship also showed linear pattern (Fig. 4). The relationships between carapace width (CW) - total weight (TW) for males and females were $TW = 0.272CW^{3.011}$ and $TW = 0.4742CW^{2.555}$ respectively. In case of carapace length (CL) - total weight (TW) relationships, the equations for males and females for the entire dataset was of curvilinear pattern (Fig. 4).

Table 1. Range and mean \pm SD (Standard Deviation) of body dimensions of male and females crabs

Male			Female		
Carapace length (mm)	Carapace width (mm)	Total weight (g)	Carapace length (mm)	Carapace width (mm)	Total weight (g)
2.4-5.1 (4.07 \pm 0.60)	3.1-6.8 (5.52 \pm 0.84)	3.1-35.0 (20.05 \pm 7.62)	3.1-4.8 (4.03 \pm 0.32)	4.1-6.8 (5.49 \pm 0.42)	8.0-28.2 (17.14 \pm 4.31)

Table 2. Allometric equations of body dimensions (carapace width vs carapace length) and length/width vs weight

Parameters	Male		Female	
	Regression equation		Regression equation	
Carapace width (CB)- Carapace length (CL)	CL = 0.144 + 1.319CB	$r = 0.956$	CL = 0.356 + 1.273CB	$r = 0.927$
Carapace width (CB)- Total weight (TW)	TW = 0.272CB ^{3.011}	$r = 0.941$	TW = 0.4742CB ^{2.555}	$r = 0.777$
Carapace length (CL)-Total weight (TW)	TW = 0.128CB ^{2.917}	$r = 0.948$	TW = 0.184CB ^{2.650}	$r = 0.810$

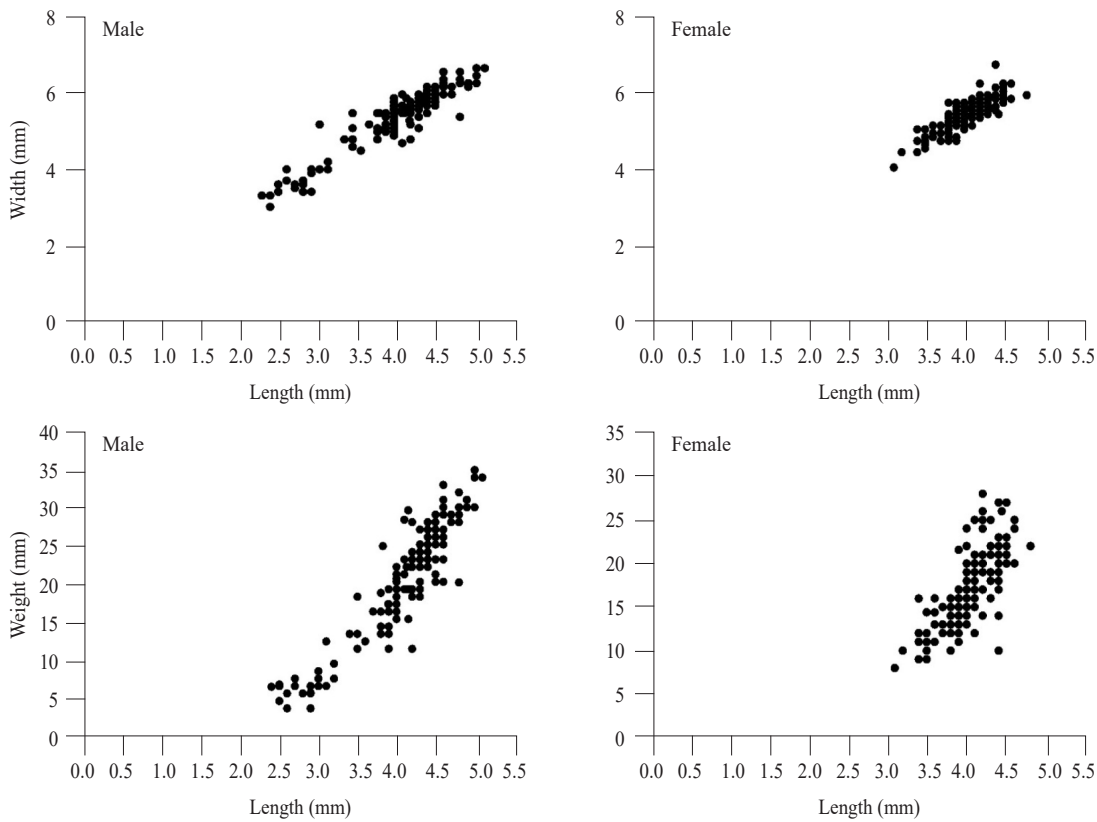


Fig. 4. Length-width and length-weight relationships of *M. planipes* for the entire study period

Scatter diagram for males and females of *M. planipes* was obtained by plotting length against width and length against weight (Fig. 3). It is clear from Fig. 4 that there is a good relationship between width and length. Coefficient of correlation (r) obtained for width-length, width-weight and length-weight relationships of males were nearly equal to 1 indicating that the values were significant and hence, a high degree of positive correlation existed between width-length, width-weight and length-weight in these

crabs. The width-weight and length-weight relationships were closely correlated for males with “ r ” value almost near to 1. For females, “ r ” value was less than 0.9 for the width-weight and length-weight relationships. It showed that there is variation in these relationships. The curvilinear pattern observed for length-weight relationships of *M. planipes* (Fig. 4) is in agreement with the findings of Fatima (2003) who worked on *M. planipes* along Karachi coast of Pakistan.

The exponential values (b) of the width-length, width-weight and length-weight of male were 1.319, 3.011 and 2.917 respectively, whereas in female, the width-length, width-weight and length-weight were 1.273, 2.555 and 2.650 respectively. In the present study, the weights of individuals having same size varied. Perhaps it is due to food availability and spawning period. On the other hand, selectivity of the gears used by the various fleets was identified as a factor influencing the size structure.

Various species of crabs studied earlier viz., *Scylla serrata* (Hill, 1976; Joel and Raj, 1986; Prasad and Neelakantan, 1988); *Callinectes sapidus* (Laughlin, 1982); *Scylla tranquebarica* (Joel and Raj, 1986) and *Thalamita crenata* (Cannici *et al.*, 1996) were found to consume mixed diets of polychaetes, crustaceans, molluscs and fishes. Whenever food was found in stomach, it always consisted of a mixture of various groups. In the present study, seaweed contributed 31.71%, mysid fragment 23.78%, seagrass 20.12%, amphipods 3.02% and miscellaneous matter formed 10.37% in the gut contents. The results of the present study indicated that *M. planipes* is an opportunistic omnivore. Williams (1982) stated that crabs are opportunistic omnivores with preferences for animal prey, but rarely feed on more mobile prey such as prawns and fish. Branco *et al.* (2010) also stated that crabs carry over the primitive behaviour of being opportunistic omnivores with a preference for animal food in conjunction with predatory propensity. Our results indicated that *M. planipes* is involved in biotic interactions and trophic relations.

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