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ORIGINAL ARTICLE

Morphological Study of Fiddler Crabs in Mumbai Region

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ABSTRACT
Three species of fiddler crabs namely Uca annulipes, U. vocans and U. dussumieri were recorded from intertidal areas of Mumbai region. Morphological structures of all the body parts of the three species of fiddler crabs were sketched with Camera-Lucida under dissecting and compound microscope. Study of morphological characters of the fiddler crabs, found in coastal areas of Mumbai region, has been done. Key to identification of the three species of fiddler crabs of Mumbai region was prepared.
Key words: Uca species-Mumbai region, morphological characters, key to identification

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INTRODUCTION

Fiddler crabs are small, semi-terrestrial crabs of the genus *Uca* that are characterized by extreme cheliped asymmetry in males. The common English name "Fiddler Crab" comes from the feeding of the males, where the movement of the small claw form the ground to its mouth resembles the motion of someone moving a bow across a fiddle (the large claw). They are most closely related to the ghost crabs of the "sister genus" Ocypode. There are currently 97 recognized species / subspecies of fiddler crabs worldwide. After reviewing the systematic history of the genus and its species, a phylogenetic analysis was performed for 88 species on a data matrix of 236 discrete morphological characters. [9], [5].
Like that of other crabs, fiddler crabs have also five pair of limbs. The first pair called cheliped, due to presence of claws. Remaining four pairs are used for walking and are called legs or ambulatories. In male fiddler crab, the larger cheliped is the major and smaller one is called minor cheliped. However, in female fiddler crab, both the cheliped are small. As the male *Uca* grows to maturity, the relative weight of its large claw, changes from 2% to 65% of its total body weight. The major claw is used for only functions of display and combat; whereas the minor claw is used for feeding. When their habitat is exposed at low tide, crabs emerge from their burrows, feed and interact socially [4].

MATERIAL AND METHODS

The selected sites were visited during low tide for collection of the fiddler crabs. The collected crabs were brought to the laboratory for taxonomic analysis. Morphological structures were studied and sketched with Camera-Lucida under dissecting and compound microscope. [2], [3].

RESULTS AND DISCUSSION

Comparison of morphological characters and Key to three species of fiddler crabs of Mumbai region

I) Porcelain fiddler, *Uca annulipes*

The porcelain fiddler prefers slightly sandier substrates and can be found on sandbanks. Size: 2- 2.5 cm. This species is distinguished by sub-quadrilateral carapace which brown in colour with three to four paler bands crossing the entire width of the carapace. Front is broad and Antero-lateral angle is acute, antero-laterally produced. Colour of the major cheliped pink. Oblique ridge on palm is usually high and thin, tubercles largest on highest point of ridge. Fingers are white distally. Tip of dactyl is curved. A pre distal, triangular tooth much enlarged and its distal margin concave. Merus of minor cheliped is without row of tubercles on dorsal margin. Gape about as wide as pollex. There are few setae in distal basket Third podomere in antennules is globular in shape and bears hair on its dorsal surface. Endopodite of mandibles is two jointed with long hairs on distal segment. Endopodite of first maxilla is thin leaf like with long hairs on its dorsal surface whereas in second maxilla it is leaf like with very short hair dorsally.

"Spooned hairs" are present on inner side of the second maxillipeds. Ischium of third maxillipeds is globular with two rows of hairs on it. The 'spoon' is wider and consists of about five lobes, the proximal three of which are pointed. The anterior flange in gonopod being larger with narrow and tapering inner process, Thumb short but well developed. Abdomen is made up of eight plates. Fourth plate much elongated. [1], [6].

II) Orange fiddler, *Uca vocans*

Size: 3-4 cm. The Orange fiddler is very common on sandy-muddy substrates, often at the edge of mangroves. Found lower on the shore in very muddy, organic sediments; more common is estuarine mangroves. Carapace is with anterior margin almost straight. The carapace sides are more converging and absence of antero-lateral margin. Narrow front, it is less than one fifteenth of the greatest breadth of carapace. Antero-lateral angles are slightly produced and acute. Characteristic of species is an orange patch on the lower manus and pollex base of major cheliped. Colour of major cheliped is yellow-orange. The postero-dorsal ridge on merus of major cheliped is distinctly crested distally. A second small tooth is present at base of large sub distal tooth on antero-dorsal margin. Tubercles of outer manus are large, largest on lower half of manus. Oblique ridge inside palm high, thin sharp; it is usually crowned with close-set tubercles. High oblique ridge end abruptly on proximal side is characteristic of the species. Both pollex and dactyl are much compressed and notably broad. Fingers in minor cheliped are clearly longer than palm, serrations absent, gape varying from moderate to broad. Inner process of gonopod is always broad and distally flat; flanges always present, anterior flange is wider. Antennules with dome shaped endopodite and bears 2 to 3 patches of sensory hairs only on inner side. Abdomen is made up of eight plates. Fourth plate much elongated. Endopodite of mandible is two jointed, its distal segment is swollen at the base and bears tuft of hairs on it. Endopodite of first is thin leaf like with short hairs on its dorsal surface and that of second maxilla it is leaf like with long hairs dorsally. Second maxillipeds is with long and narrow 'spoon' consisting of about 13 large, well separated, rounded lobes, followed by 13 smaller lobes. Ischium of third maxillipeds is elongated with three rows of hairs on it. [7], [8].

III) Purple fiddler, *Uca dussumieri*

Size: Up to 5 cm. It is an obligate mangrove crab, and often occurs in soft mud. Carapace is narrow fronted with distinct fronto-orbital margins and antero-lateral margins. Width of carapace at posterior end is $4/6^{th}$ of the anterior width. Antero-lateral angle is acute, curved and projecting laterally. Suborbital crenellations is low but separate and truncate. The colour of major cheliped is reddish yellow. Tubercles of outer mans small, smallest on upper half of manus. Oblique ridge moderately high, crowned with tubercles gradually slopping down on both side. In gape, an enlarged median or sub median tooth on the pollex is characteristic of the species. Tip of both dactyl and pollex curved. The minor chelipeds are deeply excavated distally forming setae-fringed large spoon. Inner process of gonopod is broad and flat; anterior flange large, with a large spine; posterior ridge small; thumb short. In antennules antero-dorsal margin bears tuft of sensory hairs on basis; its third podomere have long sensory hairs at distal end. Abdomen is made up of seven plates. Endopodite of mandible is three jointed with small hairs on it. Distally endopodite of the first maxilla shows teeth like serration. Endopodite of second maxilla is comparatively small with hairs present distally. The 'spoon' in the second maxillipeds consists of about five rounded lobes on each side, ending in hairs. Ischium is elongated and pointed proximally in third maxillipeds.

Uca annulipes ***Uca vocans*** ***Uca dussumieri***

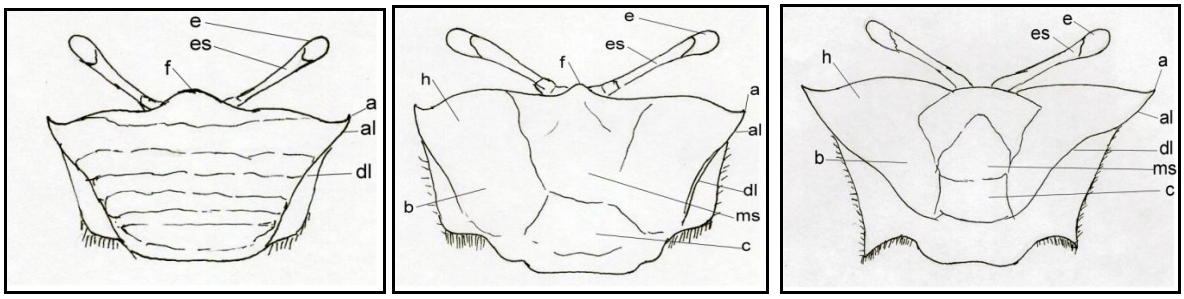

Fig. No. 2 - Carapace of *Uca*

a- antero-lateral angle, al- antero-lateral margin, b- branchial, c- cardiac, dl- dorso-lateral margin, e- eye, es- eye stalk, f- front, h- hepatic, ms- meso-gastric

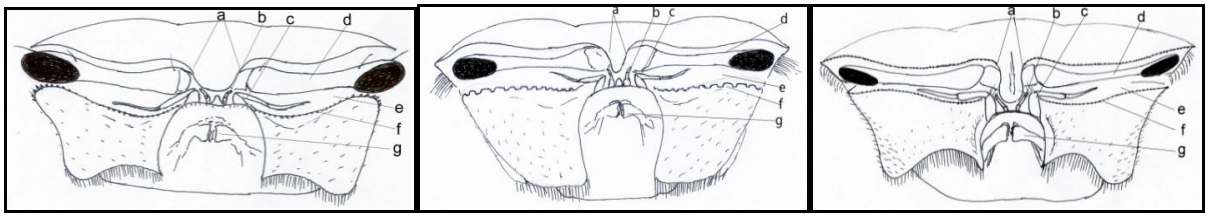

Fig. No. 3 - Front view of *Uca*

a- front; b- antennule, c- antenna, d- eye stalk, e- orbit, f- suborbital margin, g- mandible.

b-

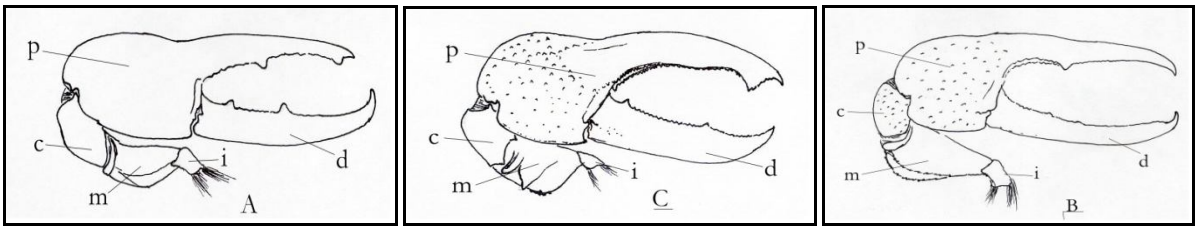

Fig. No. 4 - Major cheliped in *Uca* i- ischium, m- merus, c- carpus, p- propodus, d- dactyl

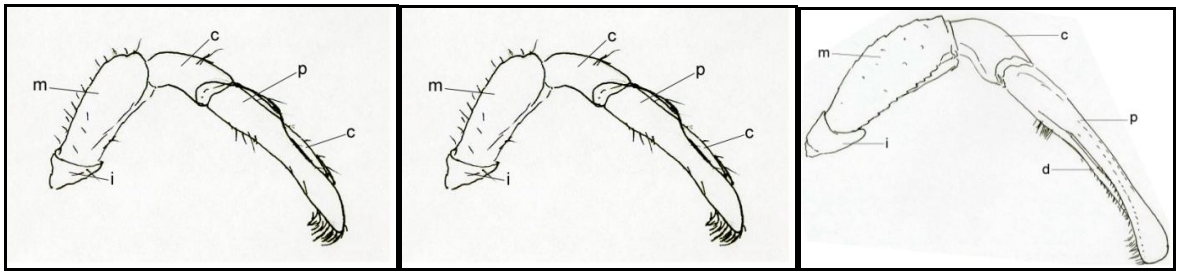

Fig. No. 5 - Minor cheliped in male *Uca* i- ischium, m- merus, c- carpus, p- propodus, d- dactyl

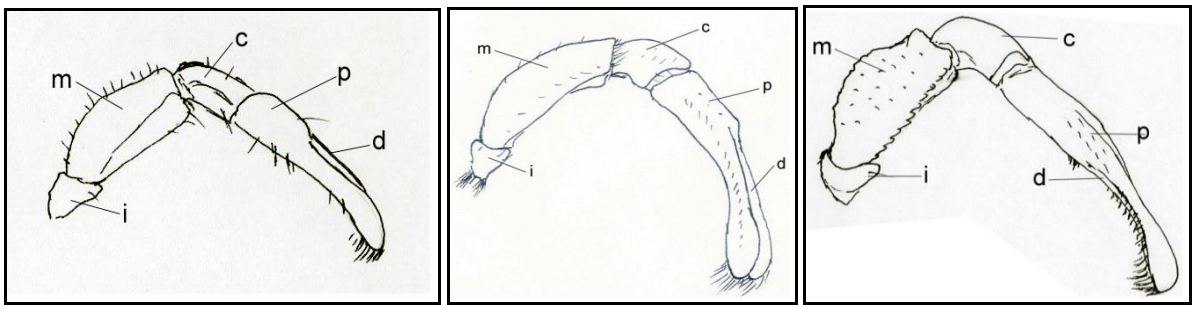

Fig. No. 6 - Minor cheliped in female *Uca* i- ischium, m- merus, c- carpus, p- propodus, d- dactyl.

Uca annulipes ***Uca vocans*** ***Uca dussumieri***

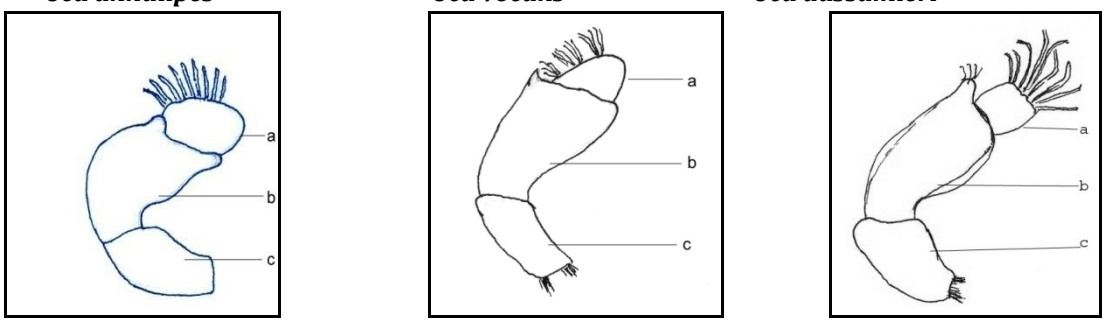

Fig. No. 7 - Antennules (right) a- endopodite, b- basis, c- coxa

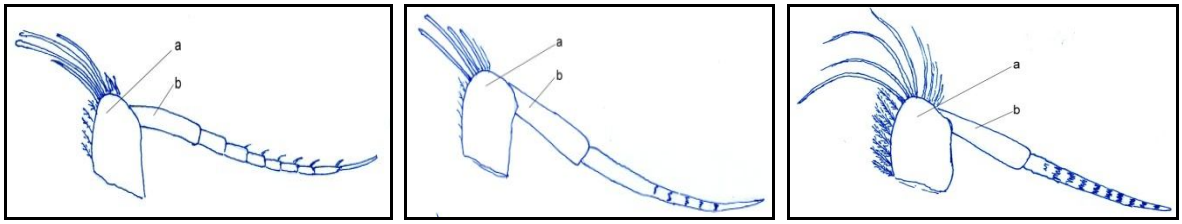

Fig. No. 8 - Antennae (right) in *Uca* species a- protopodite, b- endopodite.

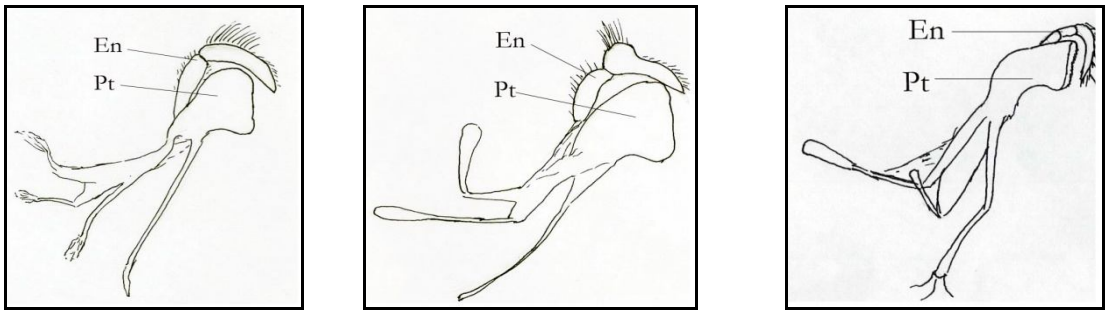

Fig. No. 9 - Mandibles (right) in *Uca* species En- endopodite, Pt- protopodite

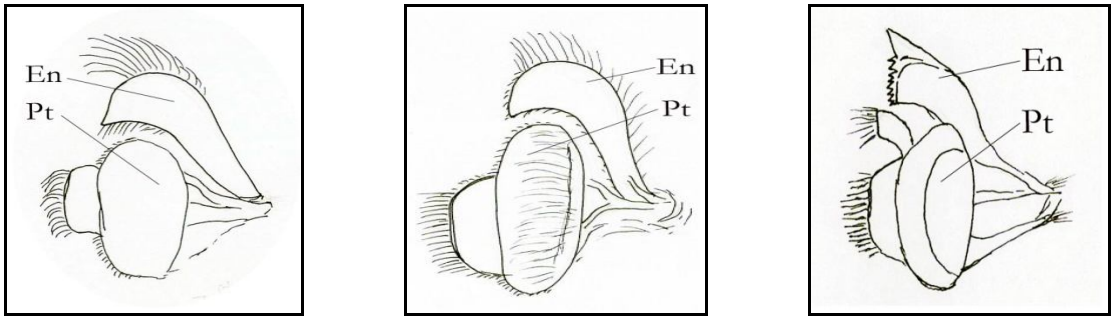

Fig. No. 10 - First maxillae (left) in *Uca* species En- endopodite, Pt- protopodite.

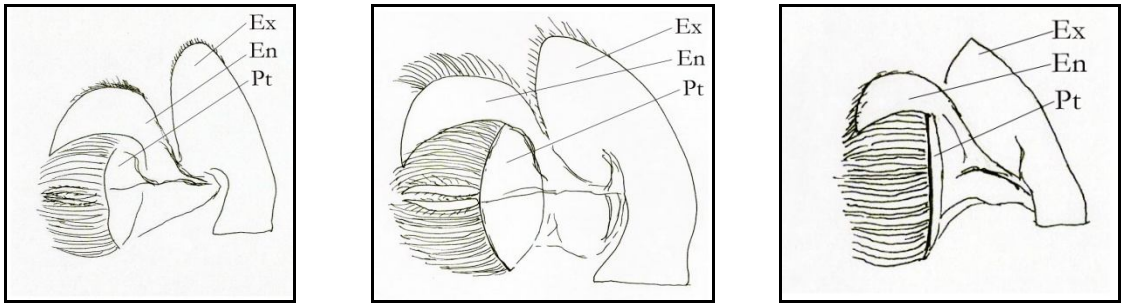

Fig. No. 11 - Second maxilla (left) in *Uca* species Ex- exopodite, En- endopodite, Pt- protopodite.

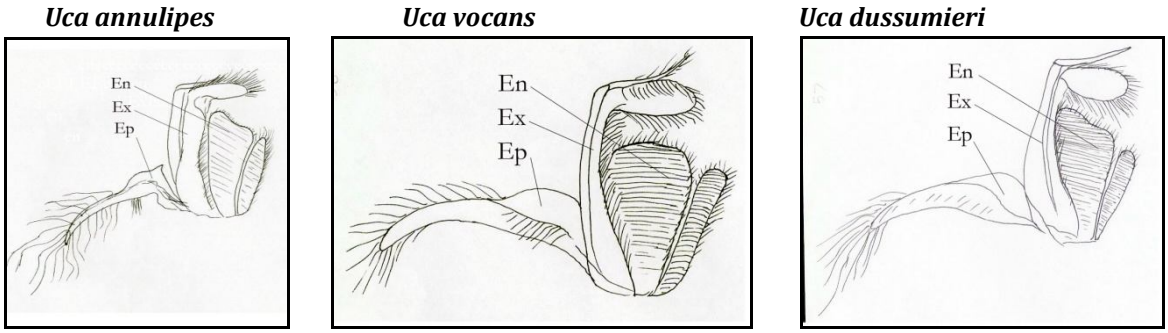

Fig. No. 12 - First maxillipeds (right) En, endopodite; Ex, exopodite; Ep, epipodite.

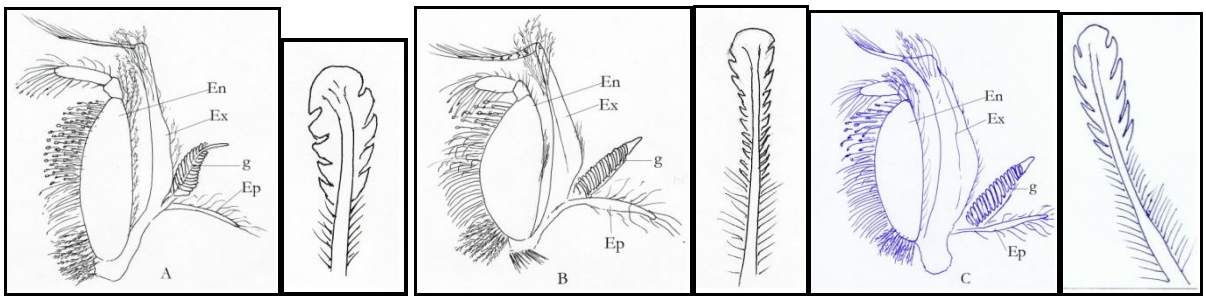

Fig. No. 13 - Second Maxillipeds (right)
D- enlarged tip of spooned hair, En- endopodite, Ex- exopodite, Ep- Epipodite, g- gill.

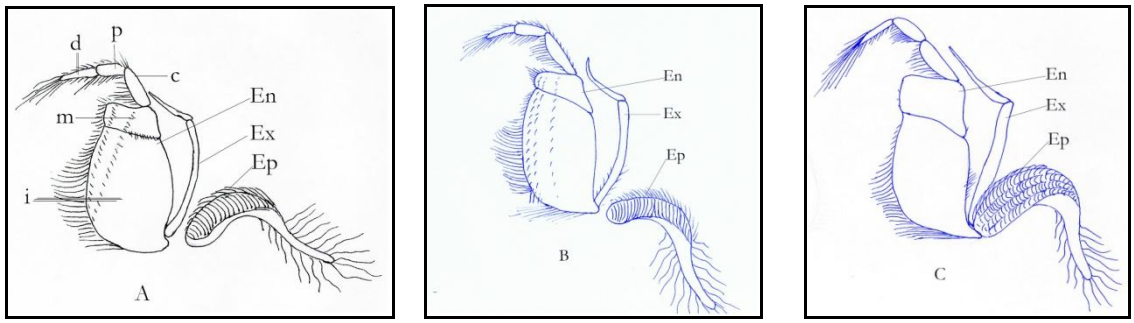

Fig. No. 14 - Third Maxillipeds (left) En- endopodite, Ex- exopodite, Ep- epipodite. i- ischium, m- merus, c- carpus, p- propodus, d- dactyl

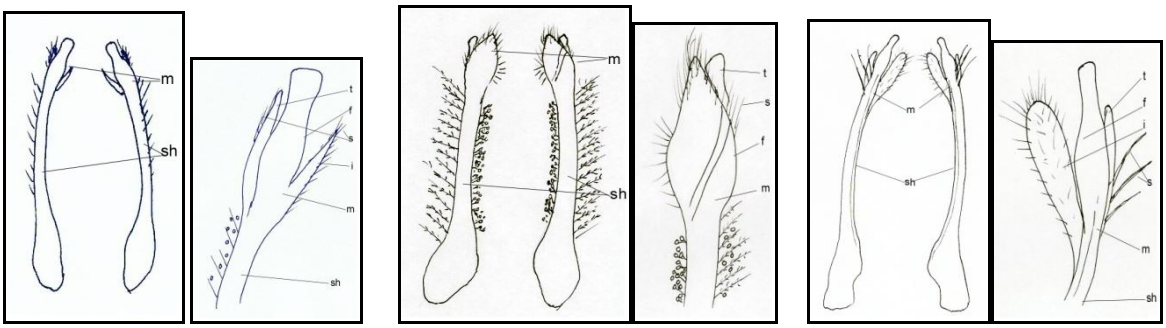

Fig. No. 15 - First abdominal appendages of male *Uca* and its enlarged tip
f- flanges, t- thumb, i- inner process, s- setae, sh- shaft, m- modified tip.

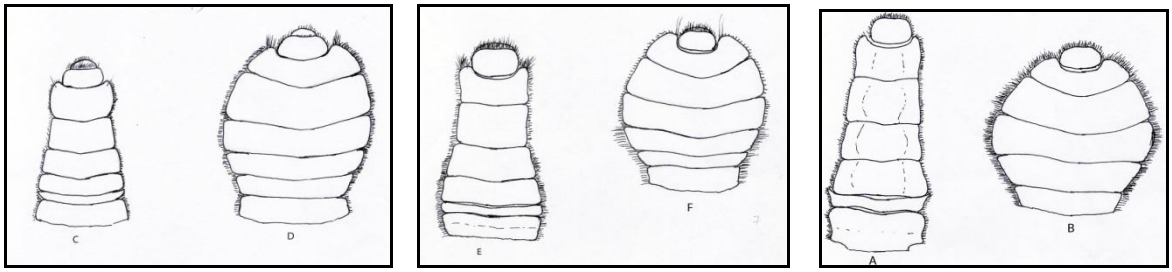

Fig. No. 16 - Abdomens in *Uca* (ventral view)

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