

## Chapter 7

*Solenocera*

A. P. Dineshababu

**Family SOLENOCERIDAE (Wood-Mason & Alcock, 1891)**

Shrimps are generally distinguished into two categories; penaeid shrimps and non-penaeid shrimps. The penaeid shrimps come under sub-order Dendrobranchiata and are distinguished from other shrimps (Caridea) by their gill structure (Dall *et al.*, 1990). Solenoceridae comes under Dendrobranchiata, under super family Penaeoidea. Thus the shrimps of Solenoceridae family are also referred as penaeid shrimps (as per their infraorder). Majority of the species belonging to Solenoceridae family occur in offshore, deeper waters and were earlier caught by exploratory surveys. Since the fishing in deeper waters started during last 25 years species belong to the family became regular fishery in many parts of the world.

**DIAGNOSIS:** Rostrum laterally compressed, usually shorter than the antennular peduncle, mostly with dorsal with dorsal teeth only and more than three; ventral teeth if present, restricted to the tip. Antennular flagella usually longer than the peduncle, often longer than the carapace. Prosartema variable, usually prominent, sometimes reduced to a small lobe; ocular scale present sometimes poorly developed. Cervical sulcus well defined, reaching or nearly reaching the mid-dorsum of the carapace. A postorbital spine (sometimes called postantennal spine) and hepatic spine are always present; antennal spine usually present, other carapace spines variable. Abdomen wholly or partially carinated. Telson with two fixed sub-apical spines, occasionally with moveable lateral spines as well; very rarely without spines at all. Exopods present on thoracic somites 1-7, in some genera on 8 as well; those on the pereopods sometimes reduced. Petasma tubular and simple; appendix masculine with two endites and with a projection on the outer side of the basal segment; thelycum open, often a simple basin shape. Pleurobranchs on thoracic somites 3-8; usually a single arthrobranch, but sometimes two, which may be small or rudimentary on somite 1; two well-developed arthrobranchs on somites 2-7; a podobranch on somite 2, except in *Haliporus* where they are on 2 and 3, sometimes with very small or rudimentary podobranchs on 4-6; epipods on 1-7. (Dall, 1999)

Diagnostic features of the family are the presence of post-orbital spine, cervical sulcus reaching to or almost to the mid-dorsum, the long antennular flagella and a spur-like projection on the outer side of the basal segment of the appendix masculine. Most inhabit the outer continental shelf down to several hundred metres, with a few occurring at over 1,000 m.

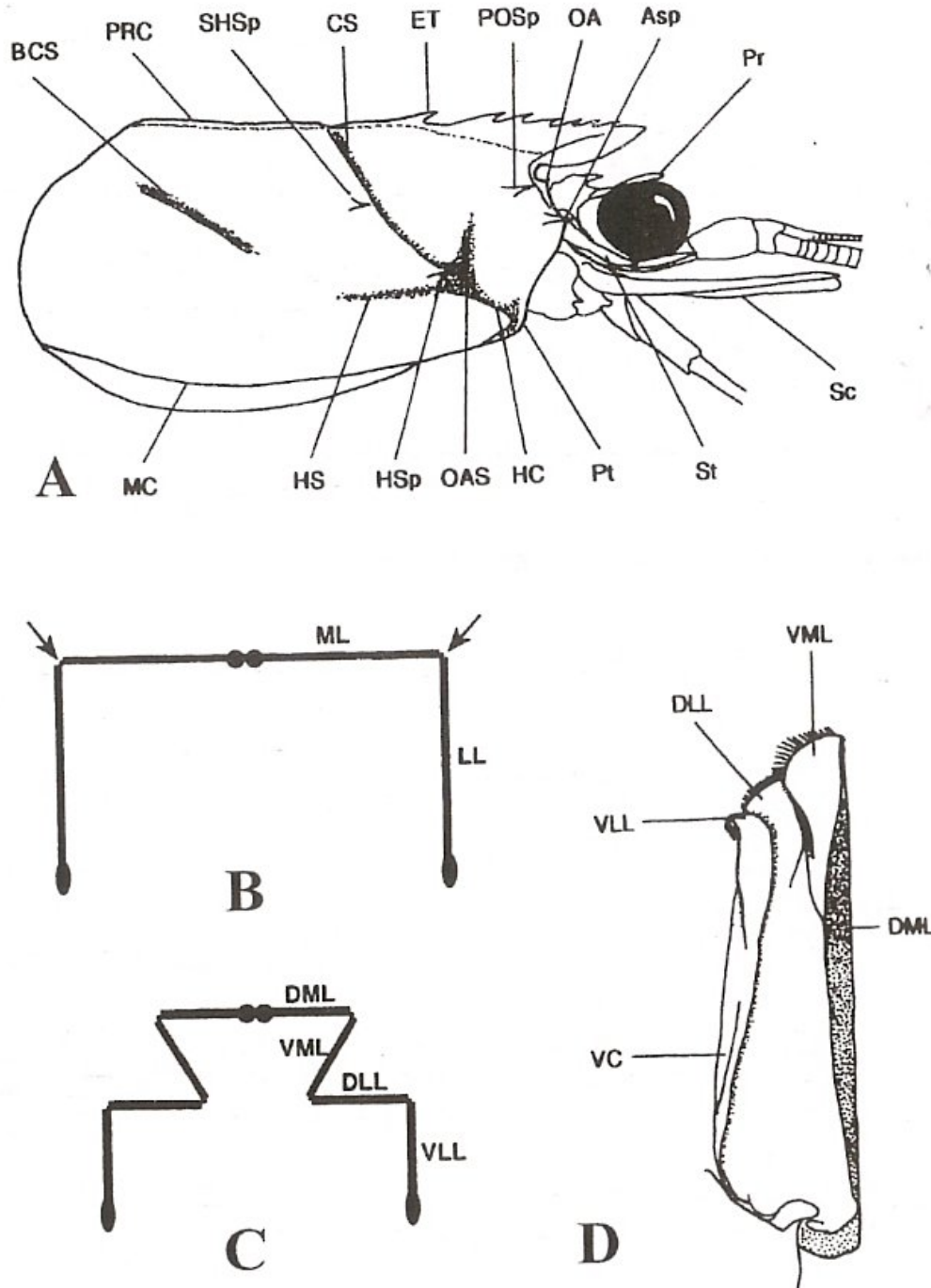


Fig.1.A. features of taxonomic importance on the cephalothorax of a Solenocerid.

Asp, Antennal spine ; BCS, branchiocardiac sulcus (a carina may also be present); Cs, cervical sulcus and carina; Et, epigastric tooth (next tooth is the first rostral tooth); Hc, hepatic carina; Hs, hepatic sulcus; HSp, hepatic spine; MC, marginal or submarginal carina; OA, orbital spine (may be only an angle); OAS, orbito antennal sulcus; POSp, post orbital spine; PRC, postrostral carina, Pr, prosartema; Pt, pterigostomial angle (may be a spine), Sc, scaphosclerite; SHsp suprahepatic (post cervical spine); St, stylocerite.

*B, diagrammatic cross section of an immature petasma before folding has taken place. The junction of the two halves of the cincinnuli is indicated by two solid circles; arrows indicate the direction of infolding; ML, median lobe, LL, lateral lobe, C, cross section after folding is taken place; DML, dorsomedian lobule; VML, ventromedian lobule; DLL, dorsolateral lobule; VLL ventrolateral lobule; D, ventral aspect of the right half of a solenocerid petasma; Vc, ventral coasta;*

*(Reproduced from, Dall, 1999, Australian species of Solenoceridae (Penaeoidea: Decapoda), Memoirs of Queensland museum 43(2) 553-587, Brisbane ISSN 0079-8835)*

### KEY TO THE GENERA OF THE SOLENOCERIDAE

1. Telson with three widely spaced pairs of moveable spines, which may be minute, anterior to a sub-apical fixed pair; with an accessory branchiocardiac carina dorsal to the sulcus ..... 2  
 Telson with a single pair of fixed sub-apical spines only, or with none; without an accessory branchiocardiac carina..... 3
2. Mid-dorsum deeply indented at its junction with the cervical sulcus; with a supra-hepatic (postcervical) spine. A podobranch on the 2<sup>nd</sup> thoracic somite only..... *Gordonella*  
 Mid-dorsum with a shallow depression only in the region of the cervical sulcus; supra-hepatic spine absent. Podobranchs on at least the 2<sup>nd</sup> and 3<sup>rd</sup> thoracic somites..... *Haliporus*
3. **Dorsal and ventral antennular flagella lamellate and forming a respiratory tube; external ramus of uropod without a distolateral spine..... *Solenocera***  
 Dorsal and ventral antennular flagella not forming a respiratory tube, but with the ventral flagellum sometimes flattened; external ramus of uropod with a distolateral spine..... 4
4. Ventral antennular flagellum strongly compressed proximally, orbital spine well developed..... *Mesopenaeus*  
 Ventral antennular flagellum more or less cylindrical,. Orbital spine absent or only a weak orbital angle present..... 5

5. Epigastric tooth separated from the 1<sup>st</sup> rostral tooth by an interval not markedly different from that between the 1<sup>st</sup> and 2<sup>nd</sup> rostral teeth..... 6
- Epigastric tooth, or epigastric tooth and 1<sup>st</sup> rostral tooth separated from the remaining teeth by a relatively long interval..... 8
6. Rostrum low, with ventral margin straight or concave; submarginal carina present..... *Pleoticus*
- Rostrum deep, with ventral margin markedly convex; submarginal carina absent..... 7
7. Pterygostomial spine present, branchiostegal spine absent; postrostral carina well defined and almost reaching the posterior rim of the carapace ..... *Cryptopenaeus*
- Branchiostegal spine present, pterygostomial spine absent; postrostral carina not extending much beyond the top of the cervical sulcus..... *Hadropenaeus*
8. Post-cervical (supra-hepatic) spine absent. Epigastric and 1<sup>st</sup> rostral tooth separated from the remaining teeth by a relatively long interval..... *Hymenopenaeus*
- Post-cervical (supra-hepatic) spine present Epigastric tooth separated from the 1<sup>st</sup> rostral tooth by a relatively long interval..... *Haliporoides*

### Description of the Genus

*Solenocera* H. Lucas, 1849

**DIAGNOSIS:** Moderately robust, medium-sized prawns, with firm cuticle; pereopods well developed, pleopods not exceptionally long. Carapace glabrous except for the rostral area which is setose. Antennular flagella wide and when apposed forming a respiratory tube, often as long or longer than the carapace. Rostrum laterally compressed, usually deep and not exceeding the 1<sup>st</sup> segment of the antennular peduncle and with dorsal teeth only. Postorbital, antennal and hepatic spines present; branchiostegal and pterygostomial spines present or absent, but never with both. Cervical sulcus reaching to or almost to the dorsal midline. First and 2<sup>nd</sup> abdominal somites narrowing towards the dorsal mid-line so that the cephalothorax may be flexed almost at right angles to the abdomen. Exopods on thoracic somites 1 to 7. Telson usually armed with fixed

subapical spines, never with lateral moveable spines. Lateral ramus of uropod without a distolateral spine.

The species of this genus are inhabitants of the continental shelf and slope, from about 15 m down to several hundred metres, sometimes to greater depths. The body form suggests that they are predominantly benthic and environmental data for a few species indicate that soft substrates are preferred. The long respiratory tube and ability to flex the cephalothorax upwards almost 90° to the abdomen, indicates that they bury deeply in these soft sediments. It is by far the largest genus within the Solenoceridae, with at least 21 Indo-West Pacific species, mostly with similar facies.

Phylum	:	Arthropoda
Class	:	Crustacea
Subclass	:	Malacostraca
Series	:	Eumalacostraca
Superorder	:	Eucarida
Order	:	Decapoda
Sub-order	:	Dendrobrachiata.
Infraorder	:	Penaeidae
Superfamily	:	Penaeoidea
Family	:	Solenoceridae Wood-Mason & Alcock, 1891
Genus	:	<i>Solenocera</i> H. Lucas 1849

*Solenocera crassicornis*: Established as a regular fishery

*S. choprai* Nataraj, 1945: Established as a regular fishery

*S. melentho* deMan, 1907: Established as a regular fishery

*S. hextii* Wood-Mason & Alcock, 1891: Stray catches from a depth of 120 to 500 m off east and west coasts of India.

*S. pectinata*, (Bate): Stray catches.

*Solenocera koelbeli* Burkenroad, 1959: Stray catches

*S. alticarinata* Kubo, 1949: Stray catches

*S. (Parasolenocera) annectens* (Wood-Mason, 1891),

*S. indica* Nataraj, 1945,

*S. walterensis* George & Muthu, 1970,

*S. melentho* deMan, 1907

*S. subnuda* Kubo, 1949.

#### KEY TO THE INDO-WEST INDO-PACIFIC SPECIES OF *SOLENOCERA* (Dall, 1999)

- |                                      |   |
|--------------------------------------|---|
| 1. Pterygostomian spine present..... | 2 |
| Pterygostomian spine absent.....     | 4 |

2. Postrostral carina distinct behind the cervical sulcus anterior part of the hepatic carina recurved posteriorly to form a quadrangular lobe 3
- Postrostral carina absent behind the cervical sulcus; anterior part of the hepatic carina almost straight..... *S. comata*
3. Cervical carina with a shallow notch about 1/3 its length above the hepatic spine ..... *S. Africana*  
Cervical carina without a notch..... *S. algoensis*
4. Postrostral carina reaching to, or almost to, the posterior border of the carapace and clearly defined along its length..... 5
- Postrostral carine extending little if any beyond the cervical sulcus, or poorly defined..... 13
5. Postrostral carina interrupted by a deep notch at the level of the cervical sulcus..... 6
- Postrostral carina not interrupted by a deep notch at the level of the cervical sulcus (often a shallow depression in this region)..... 8
6. Postrostral carina high and blade like; postrostral sulcus feebly developed, less than 1/3 the length of the carina or absent..... 7
- Postrostral carina low along its length; postrostral sulcus more than 1/2 the length of the carina and widening posteriorly..... *S. koelbeli\****  
(\* probably a synonym for *S. alfonso*)
7. **Postrostral carina highest posteriorly, sloping steeply towards the posterior border of the carapace..... *S. alticarinata***
- Postrostral carina highest anteriorly, tapering gradually towards the posterior border of the carapace..... *S. choprai***
8. **Telson without a pair of subapical fixed spines..... *S. crassicornis\*\****  
(\*\*probably a synonym for *subnuda*)  
Telson with a pair of subapical fixed spines..... 9
9. Post-rostral carina behind the cervical sulcus distinctly humped in profile, with a median tooth or with a small median nodule; branchiocardiac sulcus and carina well defined, the former running from the posterior edge of the carapace almost to the hepatic sulcus..... *S. alfonso*
- Post-rostral carina behind the cervical sulcus only slightly and smoothly convex in profile and without a median tooth or nodule; branchiocardiac sulcus and carina feebly defined ..... 10

10. Anterior part of the hepatic carina slightly curved, but not bordering the ventral side of a clearly-defined shallow depression at its anterior end ..... *S. bifurcate*
- Anterior part of the hepatic carina distinctly curved and bordering the ventral side of a clearly-defined shallow depression at its anterior end... 11
11. Anterior part of the hepatic carina forming a shallow arc, much less than a semicircle, round the lower border of a shallow depression near the pterygostomial angle; ventral margin of rostrum convex..... 12
- Anterior part of the hepatic carina forming a deep, upward-facing arc, almost a semicircle, round the lower border of a shallow depression near the pterygostomial angle; ventral distal margin of rostrum usually straight, sometimes slightly concave.....** *S. melantho*
12. Postrostral sulcus a series of pits and not dividing the carina into two posteriorly; north Australian seas..... *S. australiana*
- Postrostral sulcus consisting of long depressions and pits, usually dividing the carina into two posteriorly; Malaysia, Strait of Malacca..... *S. halli*
13. Anterior end of hepatic carina curving ventroposteriorly, blunt or forming a sharp, almost spinous point ..... 14
- Anterior end of hepatic carina not curving posteriorly, either straight or ending in an upward-facing are..... 20
14. Anterior hepatic carina sharp or spinous..... 15  
Anterior hepatic carina blunt or forming an angle..... 18
15. Rostrum short, reaching about half the length of the cornea..... 16
- Rostrum reaching or exceeding the distal end of the cornea.....*S. barunajaya*
16. Dorsal carina present on abdominal somite 3; maximum diameter of the eye equal to a or exceeding 0.18 the length of the carapace; prosartema not reaching as far as the eye..... 17
- Dorsal carina absent on abdominal somite 3; eye small, maximum diameter about 0.14 the length of the carapace; prosartema exceeding the distal end of the cornea..... *S. faxoni*
17. Usually 7 rostral spines, including the epigastric; hepatic carina ending in a spine that just reaches the anterior border of the carapace; no spine on the basis of the 2<sup>nd</sup> pereopod..... *S. spinajugo*

- Usually 6 rostral spines, including the epigastric; hepatic carina ending in a prominent point that exceeds the antero-ventral border of the carapace; a spine on the basis of the 2<sup>nd</sup> pereopod..... *S. moosai*
18. Rostrum short, not reaching as far as the distal end of the eye; anterior end of hepatic carina rounded..... 19  
Rostrum long, well exceeding the eye, and reaching to about half the 2<sup>nd</sup> segment of the antennular peduncle; anterior end of hepatic carina almost angular..... *S. annectens*
19. Six or seven rostral teeth including the epigastric; inferior antennular flagellum with 39-53 segments..... *S. pectinulata*
- Eight or nine rostral teeth including the epigastric; inferior antennular flagellum with 57-77 segments..... *S. pectinata***
20. Rostrum slender, reaching about 1/3 the length of the cornea ..... *S. bedokensis*.  
Rostrum deep, reaching at least ½ the length of the cornea..... 21
21. **Epigastric tooth well behind the level of the hepatic tooth; ventral margin of rostrum strongly convex; length of the superior antennular flagellum 1.3-1.43 times that of the carapace and the inferior flagellum with 55-59 segments..... *S. rathbuni***

**Epigastric tooth at about the level of the hepatic tooth; ventral margin of rostrum slightly convex; length of the superior antennular flagellum 2.1-2.2 times that of the carapace; inferior flagellum with 89-109 segments..... *S. waltirensis***

*S. hexti*: Although Alcock has not been included in *Solenocera* because Alcock (1901: 20) considers that the antennules could not form a respiratory tube, suggesting a *Mesopenaeus* species; also the flagella are shorter than the carapace, another *Mesopenaeus* feature. But in general context it follows all other characters of *Solenocera* and is included in *Solenocera* genus in the present text.

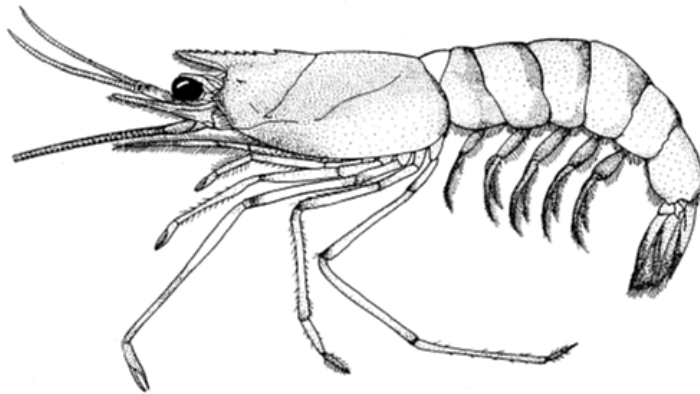
### ***Solenocera* species reported from Indian waters**

Along northwest coast of India, *Solenocera crassicornis* was established as a regular fishery since long time and the presence of *S. choprai* in the landings was very rare and occasional. *S. crassicornis* was caught from a depth within 40 m and *S. choprai* from the ground beyond 50 m depth. Another species *S. hextii* was reported as stray catches from a depth of 120 to 500 m off east and west coasts of India. George (1966), Mohamed (1973) and Kurien and



Sebastian (1976) collected and described altogether ten species of shrimps belonging to *Solenocera* genus from Indian waters. The species collected were *S. pectinata*, (Bate), *S. koelbeli* de Man, *S. hextii* Wood-Mason & Alcock, 1891, *S. alticarinata* Kubo, 1949, *S. (Parasolenocera) annectens* (Wood-Mason, 1891), *S. indica* Nataraj, 1945, *S. choprai* Nataraj, 1945, *S. walterensis* George & Muthu, 1970, *S. melentho* deMan, 1907 and *S. subnuda* Kubo, 1949.

***Solenocera crassicornis*** (H. Milne Edwards, 1837)  
Coastal mud shrimp



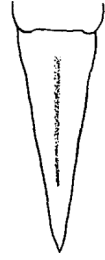
**OTHER SCIENTIFIC NAMES STILL IN USE:** *Solenocera indica* Nataraj, 1945

*Solenocera subnuda* Kubo, 1949

**DISTINCTIVE CHARACTERS:**

Body hairless except at base of rostrum; rostrum reaching to distal margin of eye or little beyond, armed with 8 to 10 (12) dorsal teeth; its ventral margin slightly convex or straight; postrostral crest low and rounded, reaching posterior margin of carapace; cervical groove deep, reaching to, or nearly to, dorsal midline; postorbital spine present; suprahepatic and branchiostegal spines absent; pterygostomian angle unarmed; hepatic crest curved ventrally on anterior part, delimiting a broadly rounded loop slightly behind frontal margin of carapace; branchiocardic crest slightly sinuous and sloping anteroventrally.

Telson unarmed, not trifurcate; fifth pereopod without a coxal spine. Colour: body, pereopods and pleopods reddish-orange to red; posterior margin of each abdominal segment darker; antennae, pleopods and uropods uniform red.



Telson of *S. crassicornis*

#### DISTINGUISHING CHARACTERS OF SIMILAR SPECIES OCCURRING IN THE AREA:

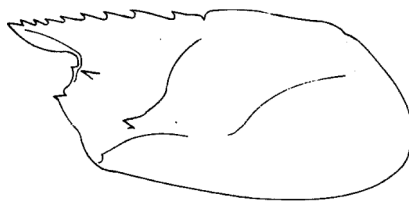
None of the other species of *Solenocera* possess the characteristic unarmed telson of *S. crassicornis*. Further distinguishing characters of these species are:

*S. choprai*: postrostral crest markedly elevated and laminose (low and rounded in *S. crassicornis*); anterior part of hepatic crest differently shaped.

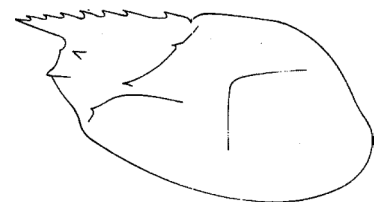
*S. hextii*: branchiocardiac crest very distinct and Lshaped (slightly sinuous in *S. crassicornis*); suprahepatic spine present (absent in *S. crassicornis*)



*S. crassicornis*

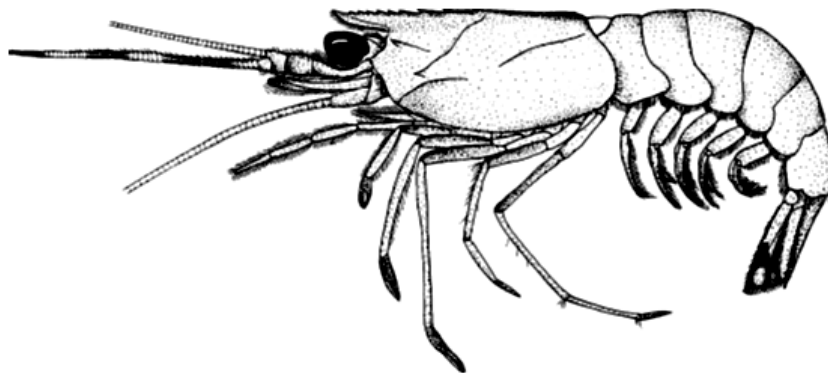


*S. choprai*



*S. hextii*

***Solenocera choprai*** Nataraj, 1945  
Ridgeback shrimp



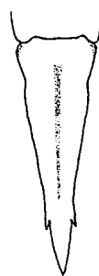
**OTHER SCIENTIFIC NAMES STILL IN USE:** *Solenocera alticarinata* Kubo, 1949

**DISTINCTIVE CHARACTERS:**

Body hairless except at base of rostrum where it is distinctly pubescent; rostrum reaching middle to 3/4 of eye, convex on ventral margin and with 6 to 9 dorsal teeth; postrostral crest markedly elevated and laminose, reaching posterior margin of carapace and interrupted by a notch just ahead of cervical groove; the latter is deep and reaches or almost dorsal midline; postorbital spine present; suprahepatic and branchiostegal spines absent; pterygostomial angle broadly rounded and unarmed; hepatic crest curved downward anteriorly, with a sharp bending near its anterior end delimiting a round loop just behind frontal margin of carapace; branchiodardic crest oblique, its anterior part curving ventrally.

Telson trifurcate, with a pair of fixed distolateral spines; fifth pereopod with a coxal spine.

Colour: body, pereopods and pleopods red; antennae banded dark red and white; uropods dark red, except for some white areas. telson



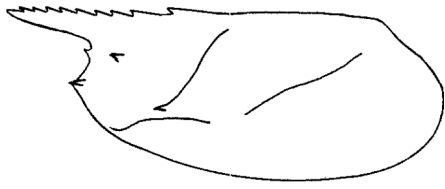
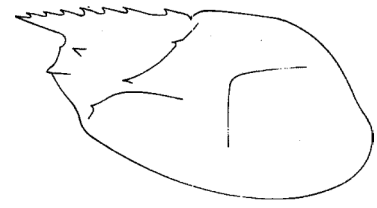
Telson in *S. choprai*

**DISTINGUISHING CHARACTERS OF SIMILAR SPECIES OCCURRING IN THE AREA:**

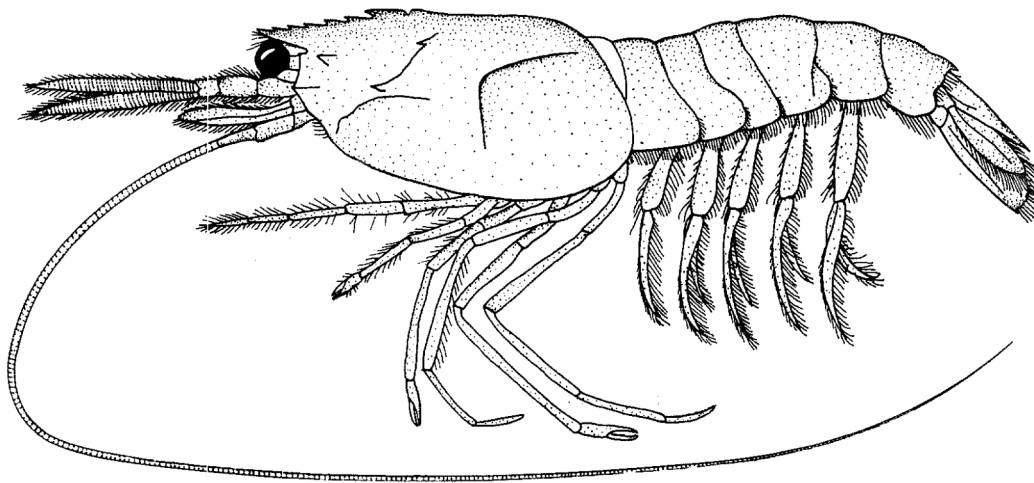
*Solenocera crassicornis*: postrostral crest low and rounded (markedly elevated and laminose in *S. choprai*); telson unarmed (with lateral spines in *S. choprai*); anterior part of hepatic crest differently shaped.

*S. hextii*: branchiocardiac crest very distinct and Lshaped (oblique in *S. choprai*); suprahepatic spine present (absent in *S. choprai*)

Other species of *Solenocera*: postrostral crest not laminose posterior to cervical groove.

*S. crassicornis**S. choprai**S. hextii*

*Solenocera hextii* Wood-Mason & Alcock, 1891  
Deep-sea mud shrimp

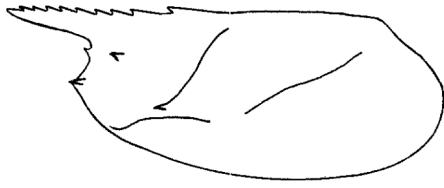
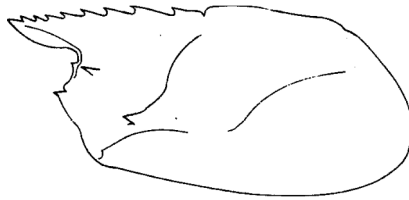
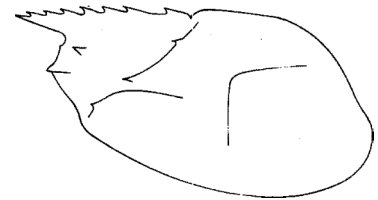


**DISTINCTIVE CHARACTERS:**

Body hairless, except, the rostrum; rostrum high, reaching to about distal margin of eye, armed with 6 to 8 dorsal teeth, its ventral margin nearly straight; postrostral crest elevated and laminose, reaching posterior margin of carapace and interrupted by a notch just in front of cervical groove (in small specimens, the crest is less developed and the notch may be absent); cervical groove deep, reaching to, or almost, to dorsal midline; postorbital and suprahepatic spines present; branchiostegal and pterygostomian spines absent; hepatic crest curved ventrally on its anterior part, with a sharp bending near its anterior end; branchiocardiac crest very distinct and L-shaped (its posterior half nearly horizontal its anterior half turning ventrally at right angle); telson with a pair of fixed distal lateral spines (trifurcate); fifth pereopod with a coxal spine. Colour: bright pink

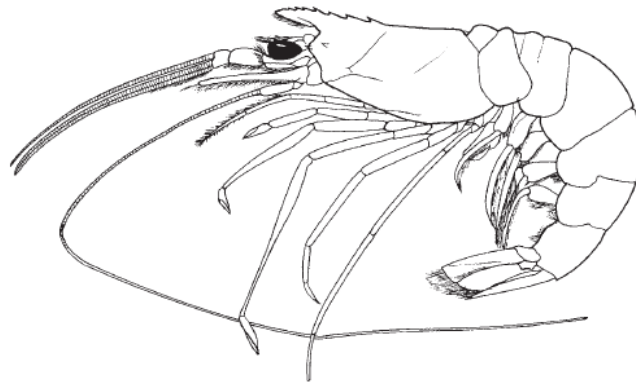
**DISTINGUISHING CHARACTERS OF SIMILAR SPECIES OCCURRING IN THE AREA:**

None of the other species of *Solenocera* have a suprahepatic spine or the characteristic L-shaped branchiocardiac crest and groove of *S. hextii*.

*S. crassicornis**S. choprai**S. hextii*

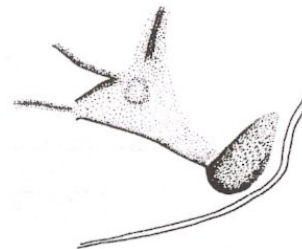
Apart from these species *S. melantho* is caught in good numbers from Indian waters especially from east coast.

*Solenocera melantho* de Man, 1907



**DIAGNOSIS:** Rostrum deep and reaching to about the extremity of the eye; with a total of 8-9 teeth, with the 4<sup>th</sup>, occasionally the 3<sup>rd</sup> above the orbital margin. Postrostral carina well defined and reaching almost to the posterior edge of the carapace; postrostral sulcus represented only 1-4 small pits, sometimes with none. Orbital angle sharp, antennal and hepatic spines of similar size, postorbital spine large; cervical sulcus reaching almost to the dorsum, which is only barely indented at this point. Posterior orbito-antennal sulcus deep, almost vertical and reaching the base of the postorbital spine.

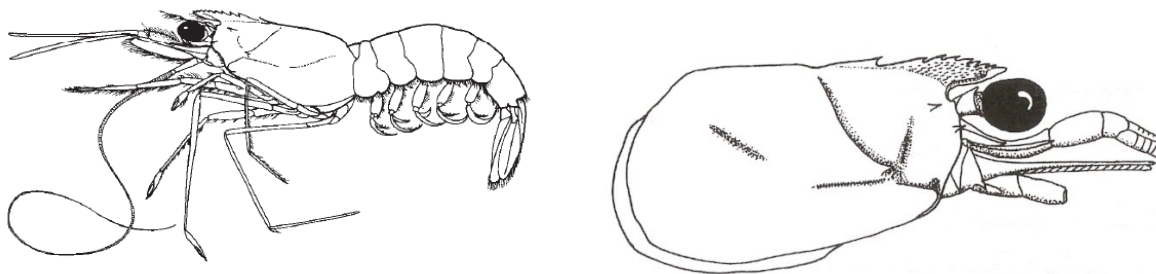
Anterior end of the hepatic carina curving ventrally around a deep depression at the pterygostomial angle, forming an arc, almost a semicircle (Fig)



Hepatic sulcus extending posteriorly and almost joining an indistinct branchiocardiac sulcus, which nearly reaches the posterior edge of the carapace. Antennular flagella 0.9-1.25 the length of the carapace in females, longer in males and juveniles. Thelycal plate between the 5<sup>th</sup> pereopods sometimes with a low anterior median ridge, sometimes with none.

*S. melentho* differs from *S. choprai* in the nature of cervical groove, which in *S. choprai* cuts the post-rostral carina deeply whereas in *S. melentho* it does not.

***Solenocera pectinata*** (Bate, 1880)



**DIAGNOSIS:** Dorsal edge of rostrum convex, with 8-9 small teeth including the epigastric; postrostral carina not extending past the top of the cervical sulcus; orbital angle blunt. Postorbital and hepatic spines of similar size, antennal spine small; cervical sulcus deep and ending just below the dorsum, which is slightly depressed at this point; posterior part of the orbito-antennal sulcus deep, its upper end reaching just above the level of the antennal spine. Anterior hepatic carina recurved, forming a blunt projection, raised above the carapace surface; the carina ending posteriorly at the tip of the hepatic tooth. Hepatic sulcus extending posteriorly to about the level of the top of the cervical sulcus; branchiocardiac sulcus barely defined. Inferior antennular flagella 1.13-1.24 the length of the carapace and with 57-63 segments. Distal third of the petasma pectinate, the ventrolateral lobe ending in a single tooth, accessory lobe with 18-20 spinules. Trapezoidal plate of thelycum with a small anterior median boss, median sulcus poorly defined.

In comparison with *S. choprai* which is only having three to four teeth are present on the rostrum *S. pectinata* (Spence Bate, 1888) have a rostrum with 8 to 9 densely packed small upper teeth (Chan,1998).

*S. alticarinata* Kubo 1949 and *S. koelbeli* De Man, 1911

Like *S. pectinata* (Spence Bate, 1988), *S. alticarinata* Kubo 1949 and *S. koelbeli* De Man, 1911 also termed along with *S. choprai* in many instances. In the case of *S. alticarinata* Kubo, 1949, the posterior part of the rostral crest behind the cervical notch is distinctly higher than anterior part (Chan, 1998) (whereas in *S. choprai* height of the posterior part of the post rostral carina progressively decreases). *S. koelbeli* De Man, 1911, is distinguished (from most similar species, *S. choprai*) by its characteristic post-rostral crest. Post-rostral crest in *S. koelbeli* is continuous, uninterrupted by cervical furrow (Nataraj, 1945; Chan, 1998) whereas, in *S. choprai* it is plate like and is interrupted by a cervical groove.

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