

AN ILLUSTRATED KEY TO THE MALACOSTRACA (CRUSTACEA) OF THE NORTHERN ARABIAN SEA

PART VI: DECAPODA ANOMURA

Quddusi B. Kazmi and Feroz A. Siddiqui

Marine Reference Collection and Resource Centre,
University of Karachi, Karachi-75270, Pakistan.

E-mails: qbkazmi@yahoo.com (QBK);
safianadeem2001@yahoo.co.in (FAS).

ABSTRACT: The key deals with the Decapoda, Anomura of the northern Arabian Sea, belonging to 3 superfamilies, 10 families, 32 genera and 104 species. With few exceptions, each species is accompanied by illustrations of taxonomic importance; its first reporter is referenced, supplemented by a subsequent record from the area. Necessary schematic diagrams explaining terminologies are also included.

KEY WORDS: Malacostraca, Decapoda, Anomura, Arabian Sea – key.

INTRODUCTION

The Infraorder Anomura is well represented in Northern Arabian Sea (Pakistan) (see Tirmizi and Kazmi, 1993).

Some important investigations and documentations on the diversity of anomurans belonging to families Hippidae, Albuneidae, Lithodidae, Coenobitidae, Paguridae, Parapaguridae, Diogenidae, Porcellanidae, Chirostylidae and Galatheidae are as follows: Alcock, 1905; Henderson, 1893; Miyake, 1953, 1978; Tirmizi, 1964, 1966; Lewinsohn, 1969; Mustaqim, 1972; Haig, 1966, 1974; Tirmizi and Siddiqui, 1981, 1982; Tirmizi, *et al.*, 1982, 1989; Hogarth, 1988; Tirmizi and Javed, 1993; and Siddiqui and Kazmi, 2003, however these informations are scattered and fragmentary. In 1983 McLaughlin suppressed the old superfamily Coenobitoidea and combined it with the superfamily Paguroidea and placed all hermit crab families under the superfamily Paguroidea. The same is followed here. Recently Pakistani species of *Diogenes* Dana, 1951 have been reviewed by Siddiqui *et al.*, 2004 and there happens some change in the status of species. Other nomenclature changes have also been accepted and incorporated. Thus it was needed to update and present an illustrated key to the species. These species pertain to three superfamilies: Hippoidea, Galatheoidea and Paguroidea. Each species is accompanied by illustrations of taxonomic importance and the reference of first reporter alongwith the subsequent record to facilitate the user. Necessary schematic diagrams indicating terms are also included. We have followed McLaughlin, 2003 who have adapted the classification of the Anomura proposed by Martin and Davis (2001).

Maxillipeds are abbreviated as maxp.I-III, P.I indicates the first chelate pereiopod or cheliped, remaining pereiopods 2-5 are also shown as P. II-P.V.

INFRAORDER ANOMURA

- 1. Abdomen well-developed 2
- Abdomen much reduced in size (telson greatly elongate in family Hippidae).....
..... Superfamily Hippoidea Latreille, 1825 3

- 2. Abdomen symmetrical, more or less flexed beneath thorax. Body depressed. Tail fan welldeveloped. P.I chelate; dactyli of P II-IV rarely flattened
..... Superfamily Galattheoidea Samouille, 1819 54
- Abdomen asymmetrical. Tail fan reduced and adapted for holding in hollow objects.
..... Superfamily Paguroidea Latreille, 1803 7

- 3. P.I subchelate. Carapace adpressed Family Albuneidae Stimpson, 1858.
Eystalks narrow, triangular and flattened. Frontal margin with 8 or more spinules on either side of median ocular sinus.
 - A single genus: *Albunea* Fabricius, 1793
 - Dactylus of P.III bears a spur near articulation with propodus. Frontal margin with 9-11 spinules on either side of ocular sinus
 - A single species: *Albunea steinitzi* Holthuis, 1958
 - References: Tirmizi, 1978; Hogarth, 1988

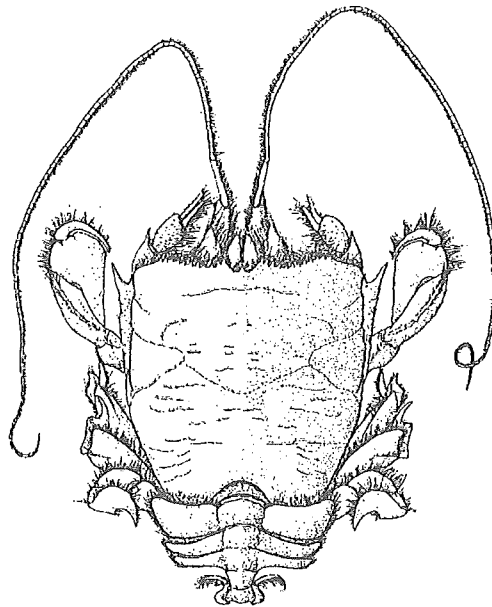


Fig. 1. *Albunea steinitzi* Holthuis, 1958; entire, dorsal view (after Tirmizi, *et al.*, 1982).

- P.I simple. Carapace subcylindrical Family Hippidae Latreille, 1825 4

- 4. Antennal flagella very long. Dactylus of P.I lamellate....Genus *Emerita* Scopoli, 1777 5
- Antennal flagella short. Dactylus of P.I subcylindrical, styliform
..... Genus *Hippa* Fabricius, 1787 6

5. Dactylus of P.I falcate, broad at base, distal half subacute and thin. Front with 3 short and wide lobes *Emerita holthuisi* Sankolli, 1965
 = *Emerita karachiensis* Niazi and Hoque, 1974
 References: Sankolli, 1965; Tirmizi, 1976

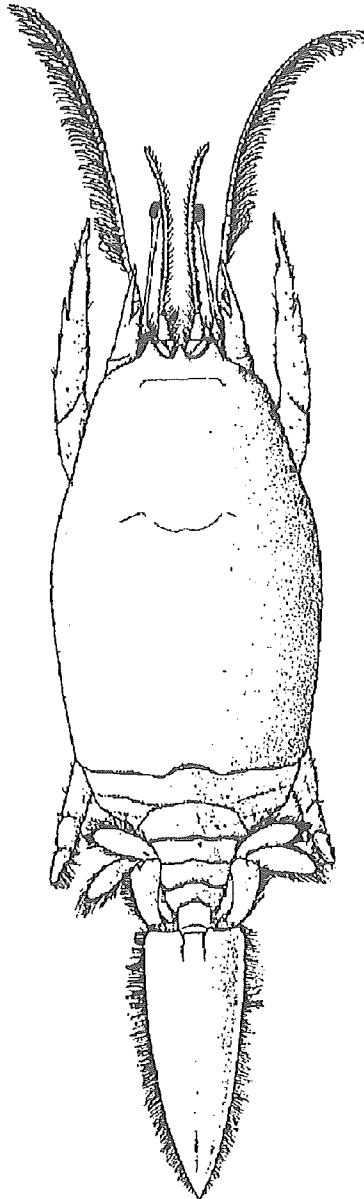


Fig. 2. *Emerita holthuisi* Sankolli, 1965; entire, dorsal view (after Tirmizi, *et al*, 1982).

- Dactylus of P.I. broadly ovate. Front with 3 long and slender lobes
 *Emerita emeritus* (Linnaeus, 1767)
 Reference: Patil, 1951.
 (Not illustrated)

6. Rostrum composed of 3 lobes. Submarginal row on carapace with about 50 setiferous pits. Dactyli of P.II and P.III each with right angled concave margin
 *Hippa adactyla* Fabricius, 1787
 References: as *Remipes testudinarus*; Haig, 1974

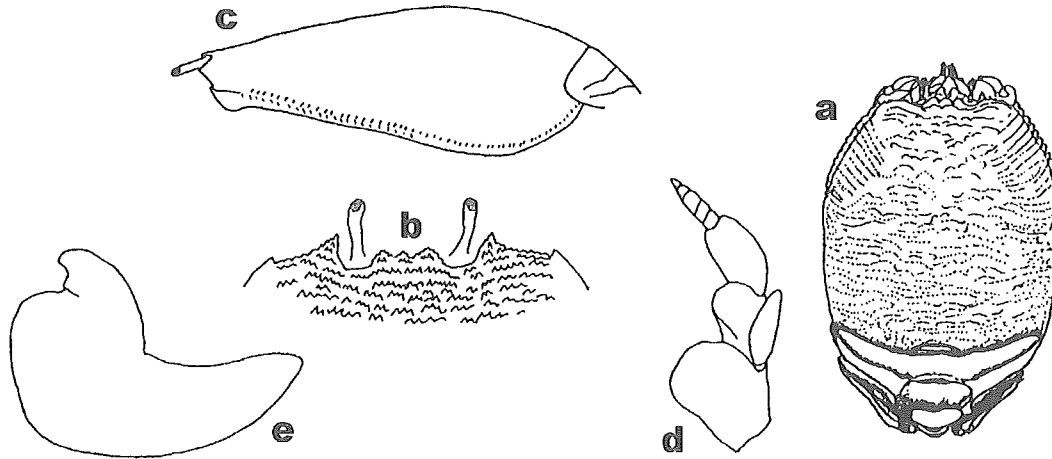


Fig. 3. *Hippa adactyla* Fabricius, 1787; a) entire, dorsal view (after Miyake, 1978); b) anterior region of carapace; c) carapace, lateral view; d) left antenna; e) dactylus of right P. II (after Haig, 1974).

- Rostrum composed of two lobes. Submarginal row of carapace with about 40 setiferous pits. Dactyli of P. II and P.III each with obtuse-angled concave margin
 *Hippa pacifica* (Dana, 1852)
 Reference: Hogarth, 1988

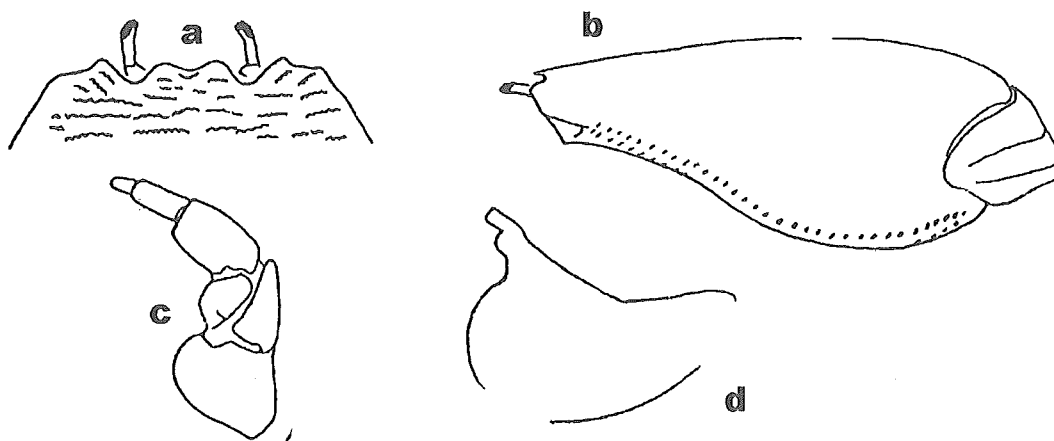


Fig. 4. *Hippa pacifica* (Dana, 1852); a) anterior region of carapace; b) carapace, lateral view; c) left antenna; d) dactylus of right P. II (after Haig, 1974).

- 7. Antennules with upper rami of flagella terminating bluntly, somewhat stick like (semiterrestrial) Family Coenobitidae Dana, 1851
 Carapace elongate. Rostrum obsolete. Abdomen soft, spirally coiled.
 A single genus: *Coenobita* Latreille, 1825 13
- Antennules with upper rami of flagella terminating in tapered filament, not stick like (marine, estuarine). 8

- 8. Maxp. III generally approximated basally. P. 1 equal, subequal, left frequently larger Family Diogenidae Ortmann, 1892 15
- Maxp. III generally widely separated basally. P.1 unequal or less frequently subequal, right usually larger. 9

- 9. P. IV not developed as normal walking leg, body not crab-like. Abdomen usually not recurved and carried under cephalothorax 10
- P. IV developed as normal walking leg. Body crab-like. Abdomen recurved and carried under cephalothorax Family Lithodidae Samouelle, 1829

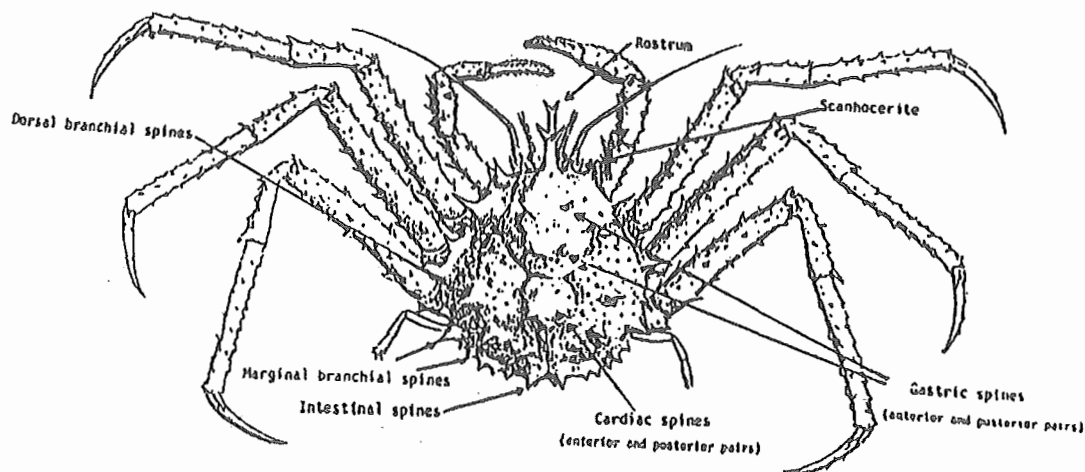


Fig. 5. Schematic diagram of a lithodid; entire, dorsal view (modified from Dawson and Yaldwyn, 1985).

A single subfamily: Lithodinae Ortmann, 1901

Carapace more or less pentagonal in shape, thickly covered with rounded, prominent granules of different sizes. Branchial region with only 2 spines on the lateral margin, walking legs with prominent granules.

A single species: *Paralomis ceres* Macpherson, 1989

References: Macpherson, 1989

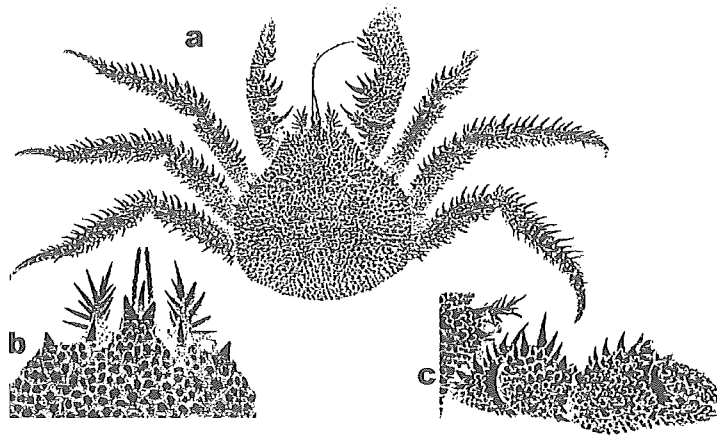


Fig. 6. *Paralomis ceres* Macpherson, 1989; a) entire, dorsal view; b) anterior region of carapace; c) P. 1, outer surface (after Macpherson, 1989)

10. Exopod of maxp. I with flagellum Family Paguridae Latreille, 1803 11

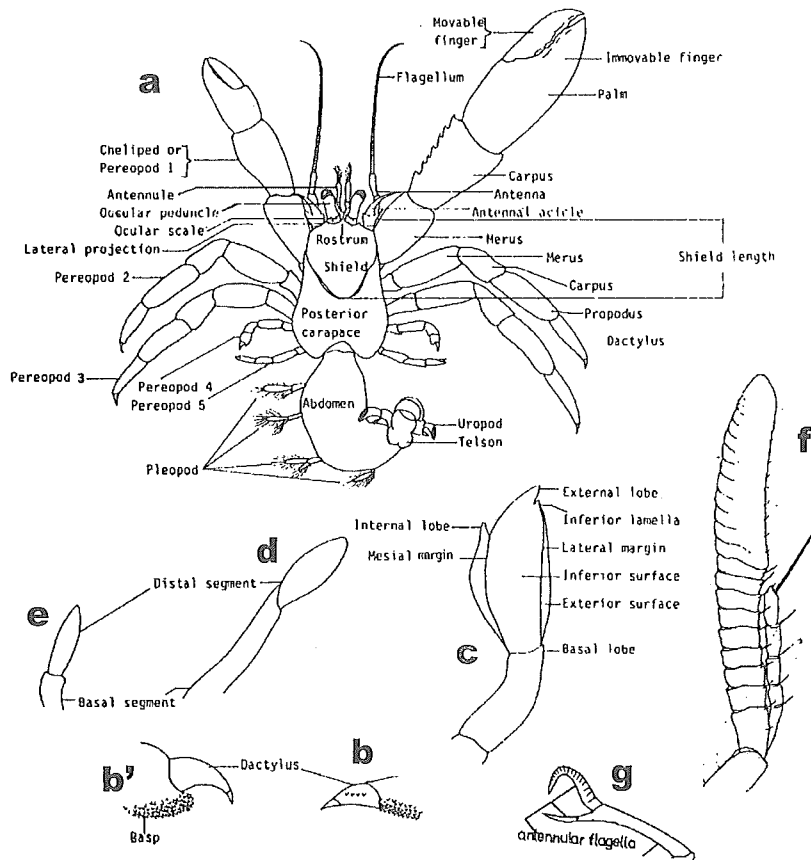


Fig. 7. Schematic diagram of a pagurid (modified after Baba *et al.* 1986); a) entire, dorsal view; b) P.IV propodus and dactylus of simple type; b') same, subchelate type; c) ♂ gonopod I; d) ♂ gonopod II; e) ♀ gonopod I; f) antennular flagellum blunt; g) antennular flagellum tapering (b-g after Tirmizi and Siddiqui, 1981)

Exopod of maxp. I without flagellum Family Parapaguridae Smith, 1882

Gill structure quadriserial; segment 4 of antennal peduncle unarmed; length of ocular peduncles including corneas, less than half length of shield

..... Genus *Parapagurus* Smith 1879

Carapace strongly calcified in anterior half. Abdomen well developed, soft, spirally coiled or straight. Pereopods remarkably long; dactylus specially long and twisted. Male with 2 paired and 3 unpaired pleopod female with 4 unpaired pleopod.

A single species: *Parapagurus pilosimanus* Smith, 1879

Reference: Alcock, 1905

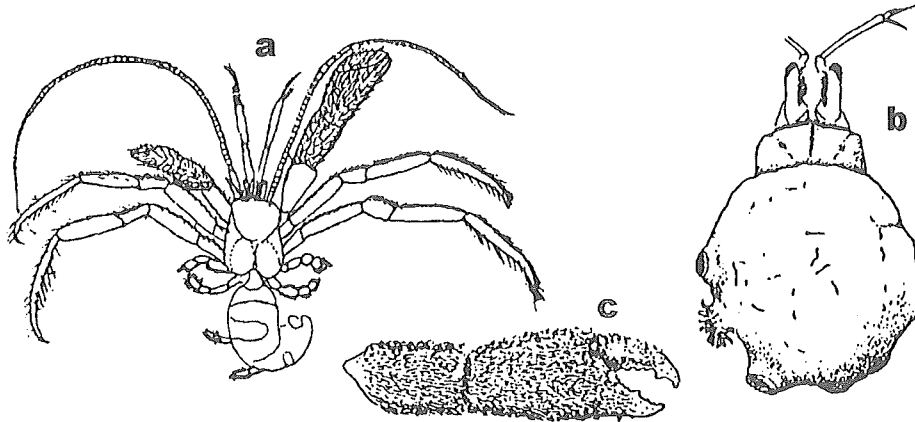


Fig. 8. *Parapagurus pilosimanus* Smith, 1879; a) entire, dorsal view; b) anterior part of carapace with eyes and antennules (projecting from colony of *Epizoanthus*); c) carpus, propodus and dactylus of P. I, outer surface (after Barnard, 1950)

11. Gill formula includes 3 well-developed or reduced pleurobranchs, each one on somites XI-XIII (thoracomeres 5-7 above 2-4)...Genus *Pylopaguropsis* Alcock, 1905

A pair of appendages on the first abdominal segment of the female only. Gills biserial phyllobranchiate.

A single species: *Pylopagurus magnimanus* (Henderson, 1896)

Reference: Thompson, 1943

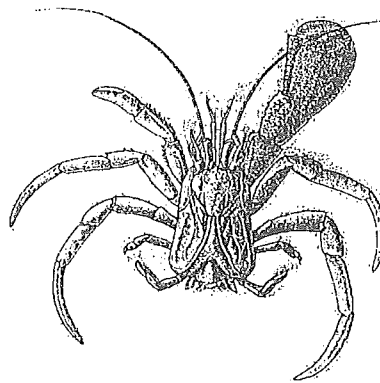


Fig. 9. *Pylopaguropsis magnimanus* (Henderson, 1896); anterior part dorsal view (after Alcock, 1905).

- Gill formula includes fewer than 3 pleurobranchs 12
12. No sexual tube present in male Genus *Pagurus* Fabricius 1775
 Rostrum obtuse, not more produced than lateral angles. Merus and carpus of right P. I produced into a serrate semicircular projection. Dactylus of P. II shorter than propodus *Pagurus kulkarnii* Sankolli, 1961
 References: Sankolli, 1961; Tirmizi and Siddiqui, 1981

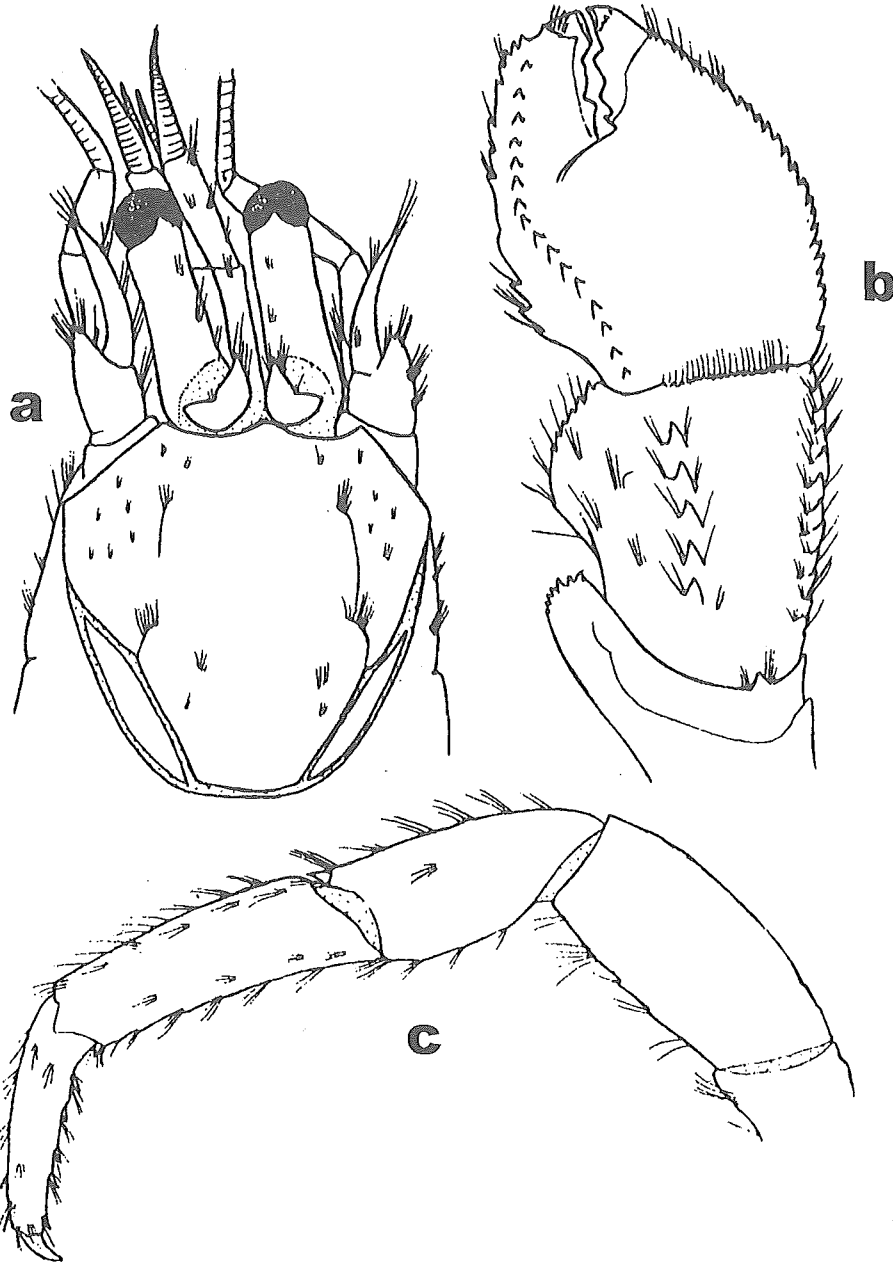


Fig. 10. *Pagurus kulkarnii* Sankolli, 1961; a) shield and cephalic appendages; b) right P. I, outer surface; c) left P. II, lateral face. (after Tirmizi and Siddiqui, 1981).

- Sexual tube present in male. Right anal tube crossing beneath abdomen and then as ending over to left Genus *Cestopagurus* Bouvier, 1897
 A single species: *Cestopagurus coutieri* Bouvier, 1897 (not illustrated)
 Reference: Hogarth, 1988
- 13. Coxal process of right P. V of male produced into a long curved tube
 *Coenobita perlatus* H. Milne-Edwards, 1837
 Reference: Ahmed and Khan, 1971

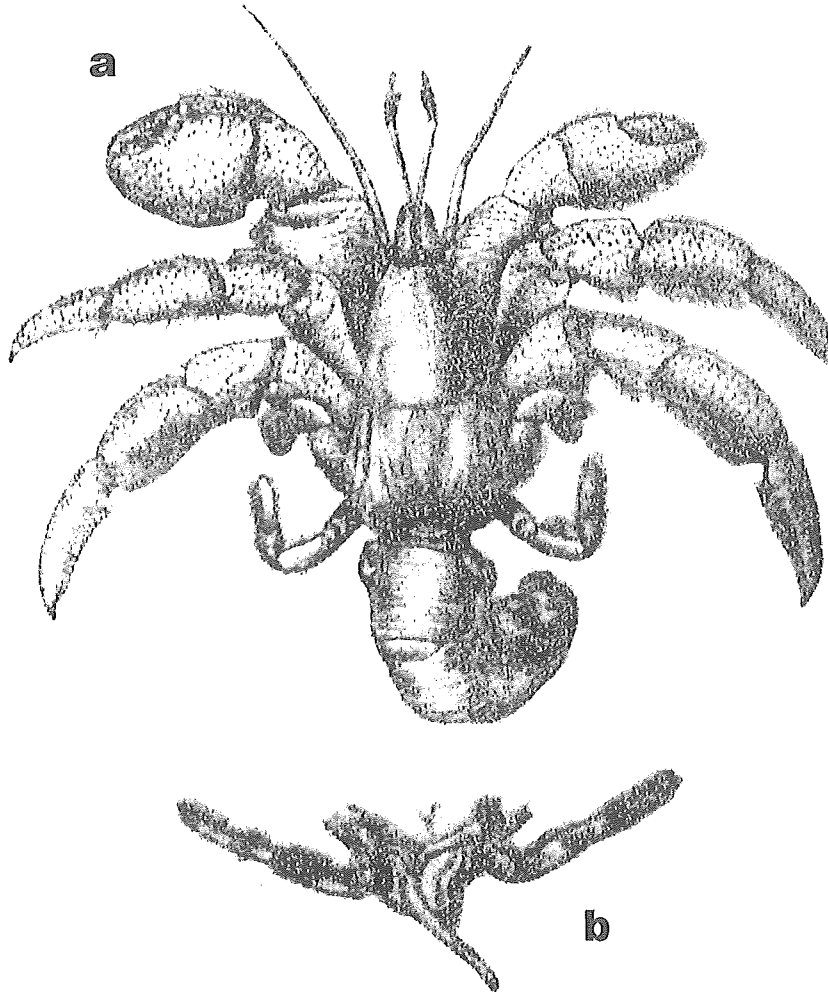


Fig. 11. *Coenobita perlatus* H. Milne-Edwards, 1837; a) entire, dorsal view; b) P.V coxal process (after Alcock, 1905)

- Coxal process of right P.V of male slightly produced than left 14
- 14. Endopod reaching half to exopod of antennular flagellum. Carpus of right P.I without a tuft of setae on ventromesial margin.....
 *Coenobita rugosus* H. Milne Edwards, 1837
 Reference: Ahmed and Khan, 1971

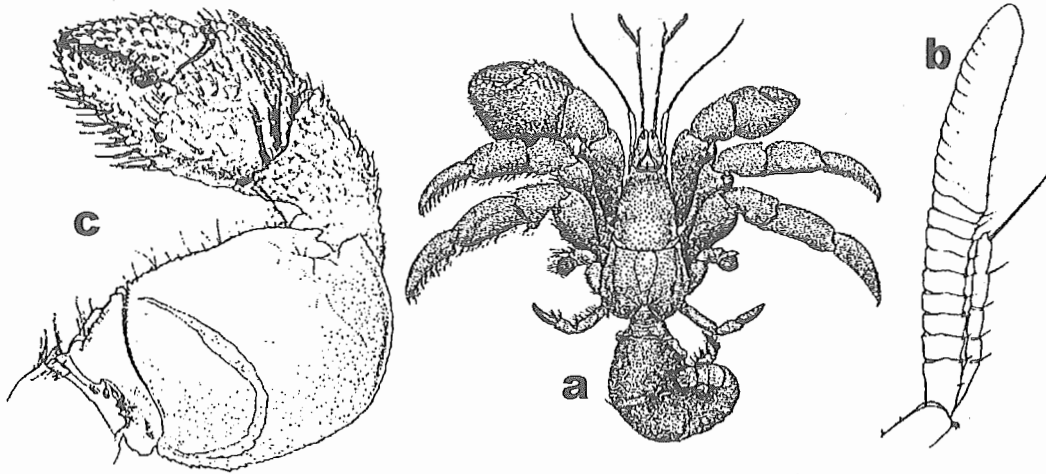


Fig. 12. *Coenobita rugosus* H. Milne Edwards, 1837; a) entire, dorsal view (after Alcock 1905); b) antennular flagellum; c) right P.I, ventromesial view (after Lewinson, 1969)

- Endopod reaching 2/3 to exopod of antennular flagellum. Carpus of right P.I with a tuft of setae on ventromesial margin *Coenobita scaevola* (Forskål, 1775)
Reference: Tirmizi and Siddiqui, 1981

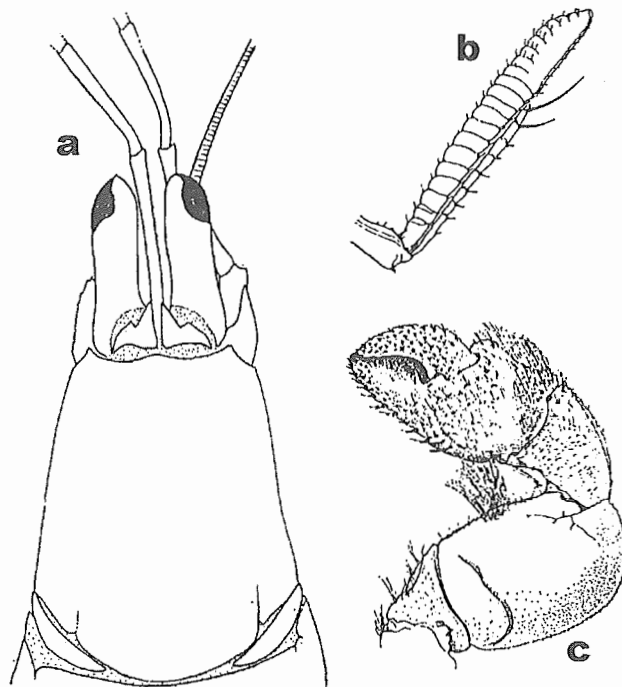


Fig. 13. *Coenobita scaevola* (Forskål, 1775); a) shield, cephalic appendages; b) antennular flagellum (after Tirmizi & Siddiqui, 1981); c) right P.I, ventromesial view (after Lewinson, 1969)

- 15. 14 pairs of gills; no pleurobranch present on somite XIV (thoracomere 8, above P.V) 16
 - 14 pairs of gills; pleurobranches present on somite XIV (thoracomere 8, above P.V) 46

 - 16. Palm and wrist without stridulous ridges; gills 13 pairs 17
 - Palm and wrist ornamented with stridulous ridges; gills 14 pairs Genus *Trizopagurus* Forest, 1952
- Body normal form P.I tuberculated; merus with one tubercle on ventral face.
 A single species *Trizopagurns tenebrarum* (Alcock, 1905)
 Reference: Hogarth, 1988 as *Aniculus tenebrarum*

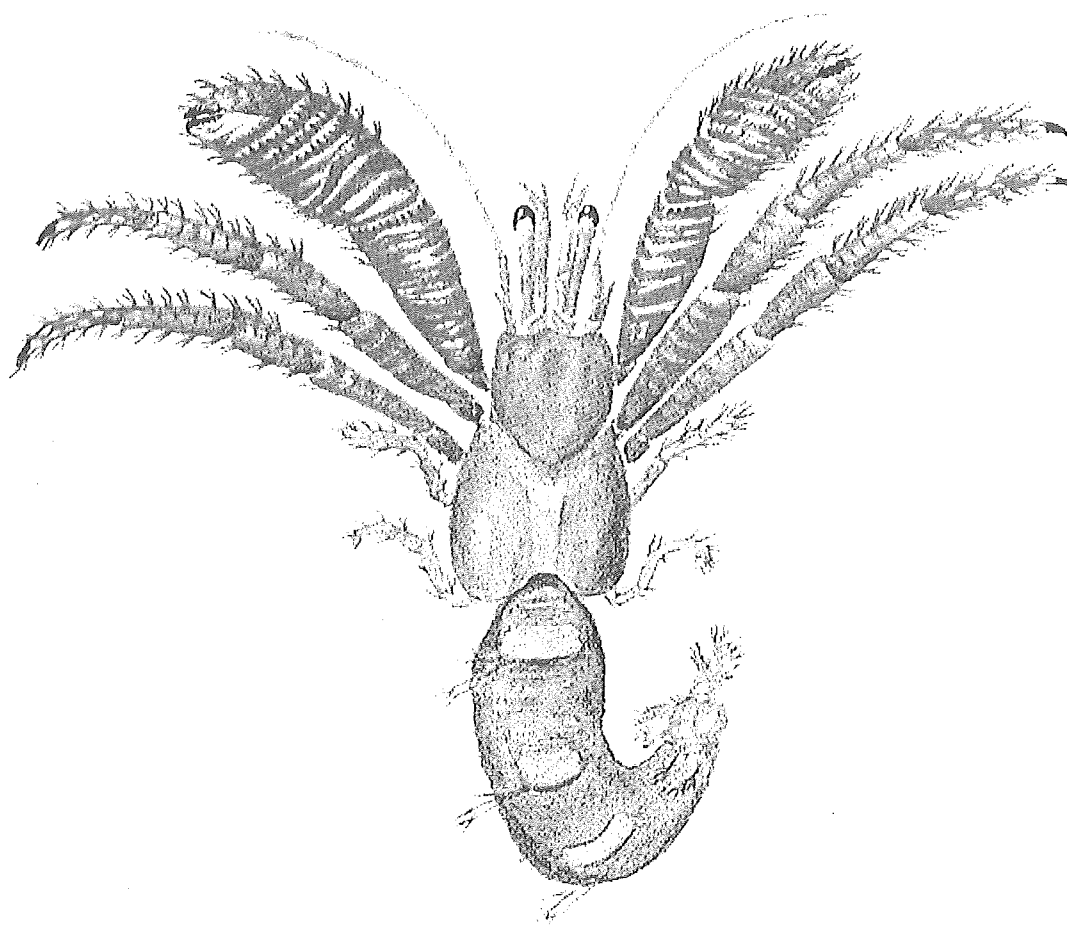


Fig. 14. *Trizopagurus tenebrarum* (Alcock, 1905) entire, dorsal view (after Miyake, 1978)

- 17. Paired pleopods in both sexes (usually 2 pairs in males, 1 pair in females). P. 1 equal or subequal in size; P. IV nonchelate Genus *Paguristes* Dana, 1851 18
- No paired pleopods in either sex; P. IV chelate or subchelate 21

18. Antennal flagellum considerably longer than the carapace.
 *Paguristes balanophilus* Alcock, 1905
 Reference: Alcock, 1905

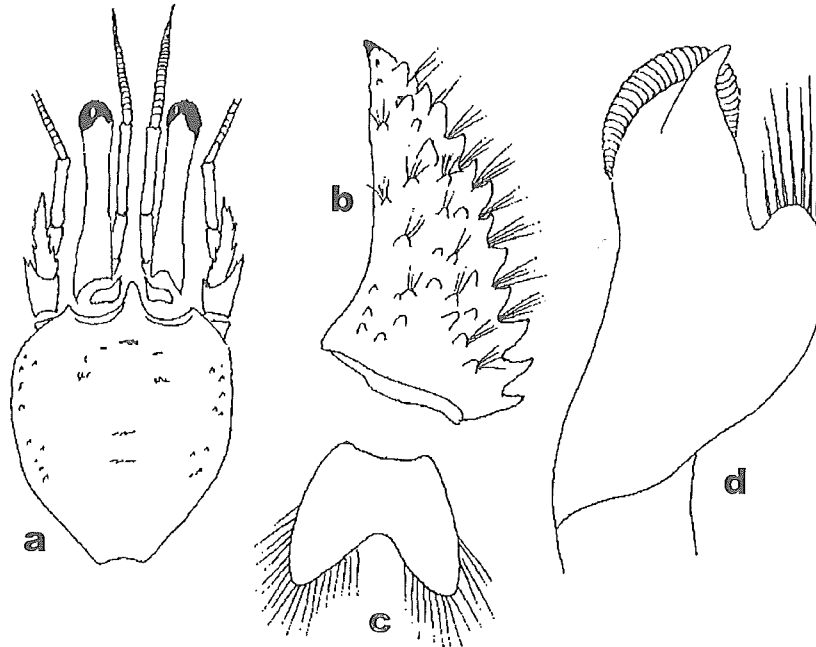


Fig. 15. *Paguristes balanophilus* Alcock, 1905; a) anterior carapace; b) inner surface of movable finger of right P.1; c) telson; d) tip of male pleopod 1. (after Miyake, 1978)

- Antennal flagellum considerably shorter than the carapace 19

19. P.1 nontomentose, *Paguristes pusillus* Henderson, 1896.
 References: Henderson, 1896

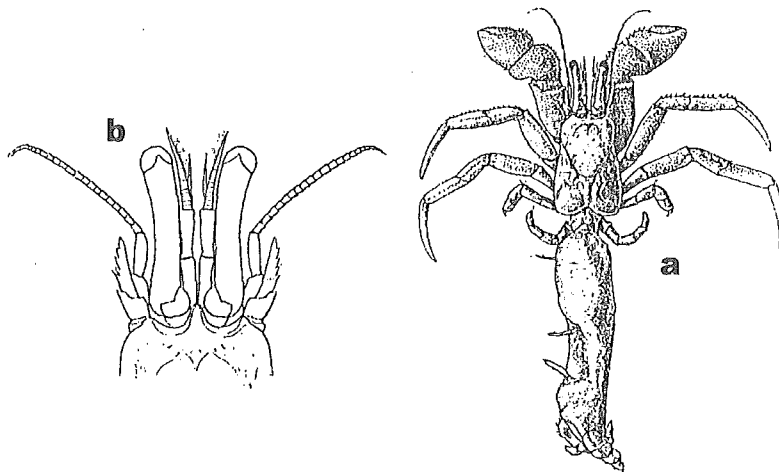


Fig. 16. *Paguristes pusillus* Henderson, 1896; enire, dorsal view; b) anterior region of shield and cephalic appendages (after Henderson, 1895)

- P. 1 with long bristles or with matted setae on carpus and hand, 20
- 20. Eyestalks longer than the antennular peduncles
 *Paguristes hians* Henderson, 1880
 Reference: Hogarth, 1988

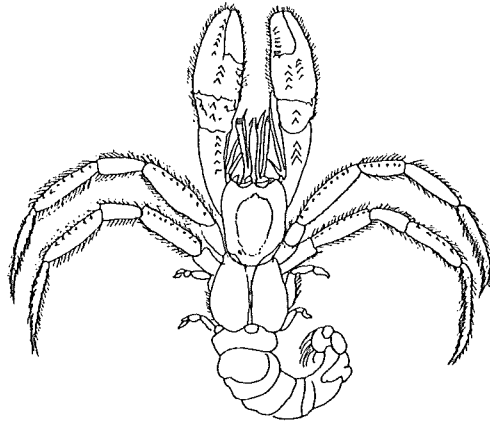


Fig. 17. *Paguristes hians* Henderson, 1880; entire, dorsal view (after Henderson, 1888).

- Eyestalks shorter than the antennular peduncles Genus *Stratiotes*
 Thomson, 1899 A single species *Stratiotes perspicax* (Nobili, 1906)
 Reference: Tirmizi and Siddiqui, 1981; Hogarth, 1988
 as *Paguristes perspicax* Nobili, 1906.

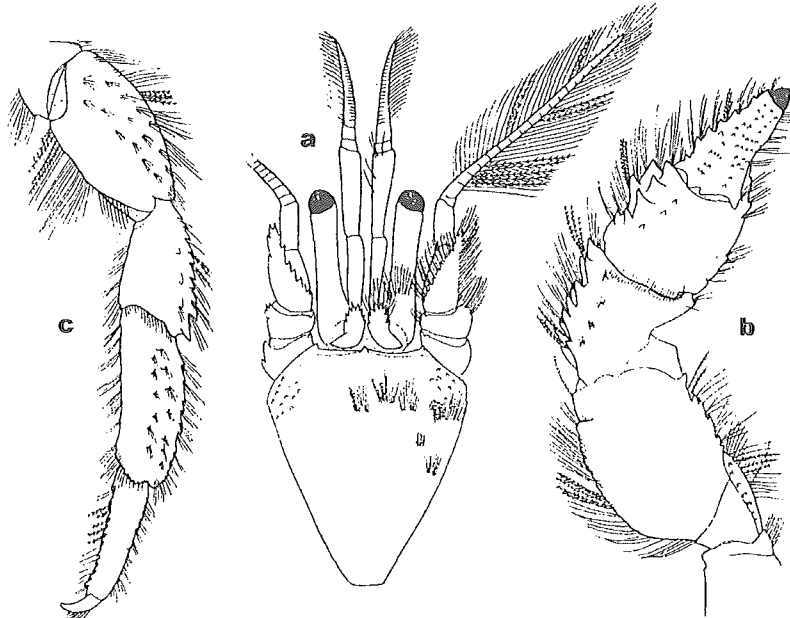


Fig. 18. *Stratiotes perspicax* (Nobili, 1906); a) shield and cephalic appendages; b) left P.1, inner surface; c) left, P.II, inner surface (after Tirmizi and Siddiqui, 1981).

Not treated: *Paguristes abbreviatus* Dechance, 1963 which is very close to *P. perspicax* Nobili, 1906 (Hogarth, 1988).

21. Tips of fingers of P.1 conical and calcareous 22
 - Tips of fingers of P.1 spooned and corneous Genus *Clibanarius* Dana, 1852 ...36
22. Antennal flagellum setose. Finger tips of P.1 pointed Genus *Diogenes* Dana, 1852 23
 - Antennal flagellum bare. Finger tips of P.1 hoofshaped Genus *Calcinus* Dana, 1852 43
23. Intercalary rostriform process well-developed and marginally armed with spinules 24
 - Intercalary rostriform process well-developed, reduced, vestigial or absent, but not marginally armed with spinules 29
24. Antennal acicles distinctly bifurcate 25
 - Antennal acicles weakly, if at all bifurcated 27
25. Carapace longer than broad. Left hand of P.1 when fully extended not inclined inwards26
 - Carapace broader than long. Left hand of P.I even when fully extended, strongly inclined inwards *Diogenes miles* (Fabricius, 1787)

Reference: Alcock, 1905

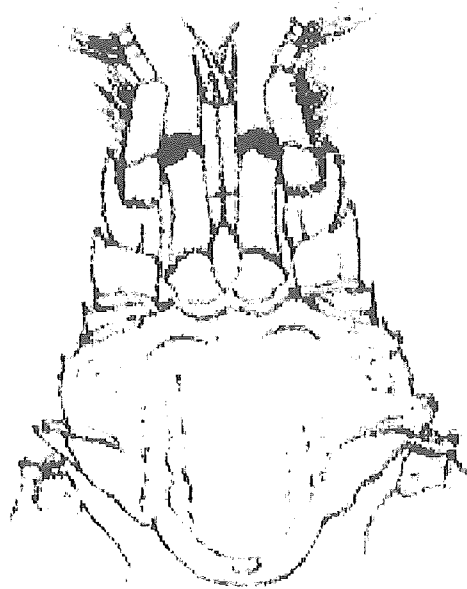


Fig. 19. *Diogenes miles* (Fabricius, 1787); shield and cephalic appendages (after Alcock, 1905).

26. Propodus of left P. II with a row of prominent spines on lateral view; outer surface of palm of left P. I with irregular unarmed or weakly spinulose area near upper margin *Diogenes alias* McLaughlin and Holthuis, 2001
 References: Siddiqui and Kazmi, 2003



Fig. 20. *Diogenes alias* McLaughlin and Holthuis 2001; a) entire, dorsal view; b) left P.I chela and carpus, outer surface; c) left P. II, lateral face (modified from Siddiqui et al., 2004)

- Propodus of left P. II without row of prominent spines on lateral face, outer surface of palm of left P. I with covering of spinulose tubercles or small spines near upper margin *Diogenes dubius* (Herbst, 1804)

References: Siddiqui and Kazmi, 2003

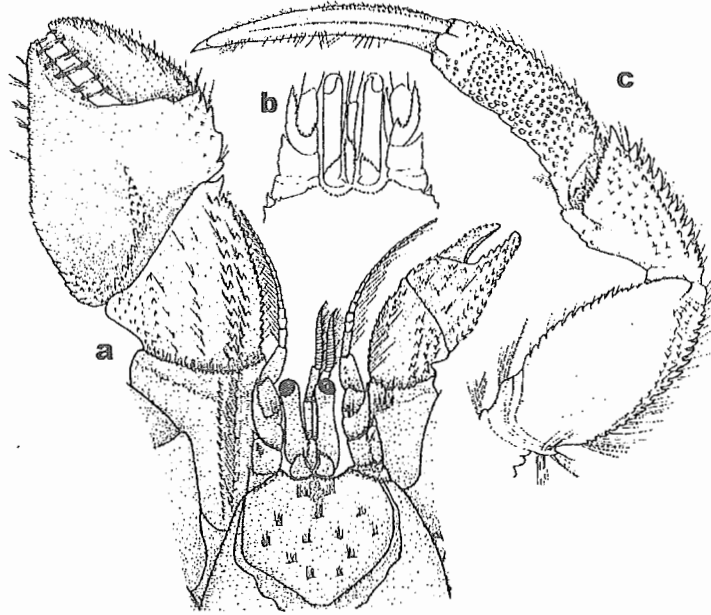


Fig. 21. *Diogenes dubius* (Herbst, 1804); a) shield, cephalic appendages and P.I; b) shield, anterior part and cephalic appendages; c) left P. II, lateral face; (modified from Siddiqui *et al.*, 2004)

- 27. Carpus of left P. I with lower outer face subsulcate
 *Diogenes violaceus* Henderson, 1893

References: Ahmed and Khan, 1971; Siddiqui *et al.*, 2004

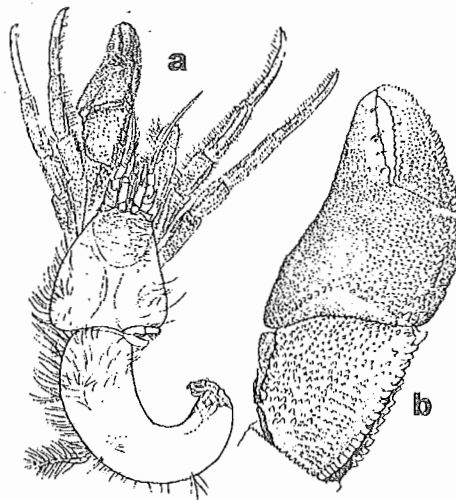


Fig. 22. *Diogenes violaceus* Henderson, 1893; a) entire, dorsal view; b) left P.I, chela and carpus (setation omitted) (modified from Siddiqui *et al.*, 2004)

- Carpus of left P. I with lower outer face not subsulcate 28
- 28. Antennal acicles with outer process reaching beyond proximal half or sometimes beyond distal margin of fourth peduncular segment; outer surface of palm of left P. I convex *Diogenes custos* (Fabricius, 1798)
Reference: Tirmizi and Siddiqui, 1981, 1982 as *Diogenes ?affinis*

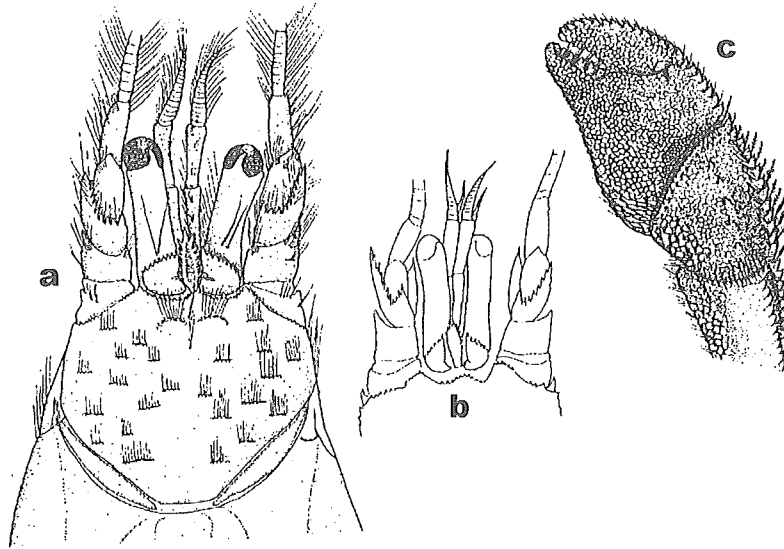


Fig. 23. *Diogenes custos* (Fabricius, 1798); a-b) shield and cephalic appendages; c) P.I, outer surface (setation mostly omitted) (modified from Siddiqui *et al.*, 2004)

- Antennal acicles with outer process not reaching beyond proximal half of fourth peduncular segment; outer surface of palm of left P. I flattened
..... *Diogenes planimanus* Henderson, 1893
Reference: Tirmizi and Siddiqui, 1981

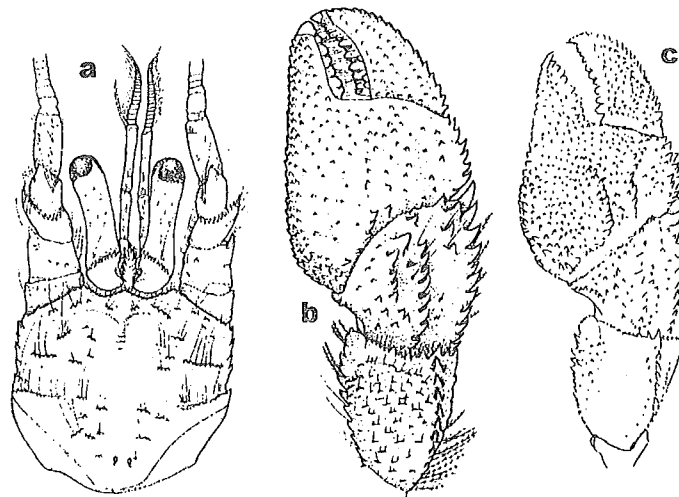


Fig. 24. *Diogenes planimanus* Henderson, 1893; a) shield and cephalic appendages; b,c) P.I, outer surface (modified from Siddiqui, *et al.*, 2004)

29. Rostriform process simple and well-developed 30
 - Rostriform process reduced or absent *Diogenes persicus* (Nobili 1905)
 Reference: Siddiqui *et al.*, 2004

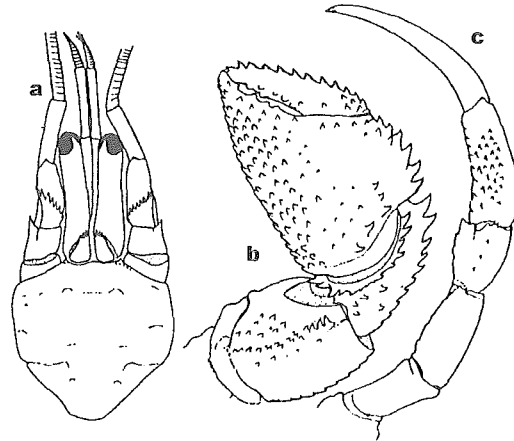


Fig. 25. *Diogenes persicus* (Nobili, 1905); a) shield and cephalic appendages; b) left P.I, outer face; c) left P.II, lateral face (setae omitted) (after Tirmizi and Siddiqui, 1981).

30. Antennal acicles elongate, triangular or subtriangular 31
 - Antennal acicles short, subquadrate
 *Diogenes tirmiziae* Siddiqui and McLaughlin 2003
 Reference: Siddiqui and McLaughlin, 2003

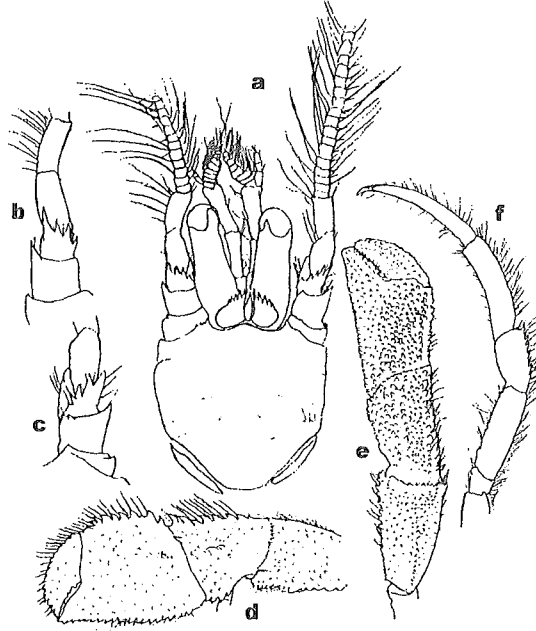


Fig. 26. *Diogenes tirmiziae* Siddiqui and McLaughlin, 2003; a) shield and cephalic appendages; b) right + antennal peduncle and acicle; c) left antennal peduncle and acicle; d,e) left P.I, outer surface; f) left P.II, lateral face (setae mostly omitted) (modified from Siddiqui and McLaughlin, 2003)

- 31. Palm of left P. 1 with proximal row of large spines or tubercles paralleling distal margin of carpus 32
- Palm of left P. 1 without proximal row of large spines or tubercles paralleling distal margin of carpus 33

- 32. Mesial margin of merus of left P. 1 with spines 34
- Mesial margin of merus of left P. 1 without spines
 *Diogenes rectimanus* Miers, 1884

Reference: Thompson, 1943

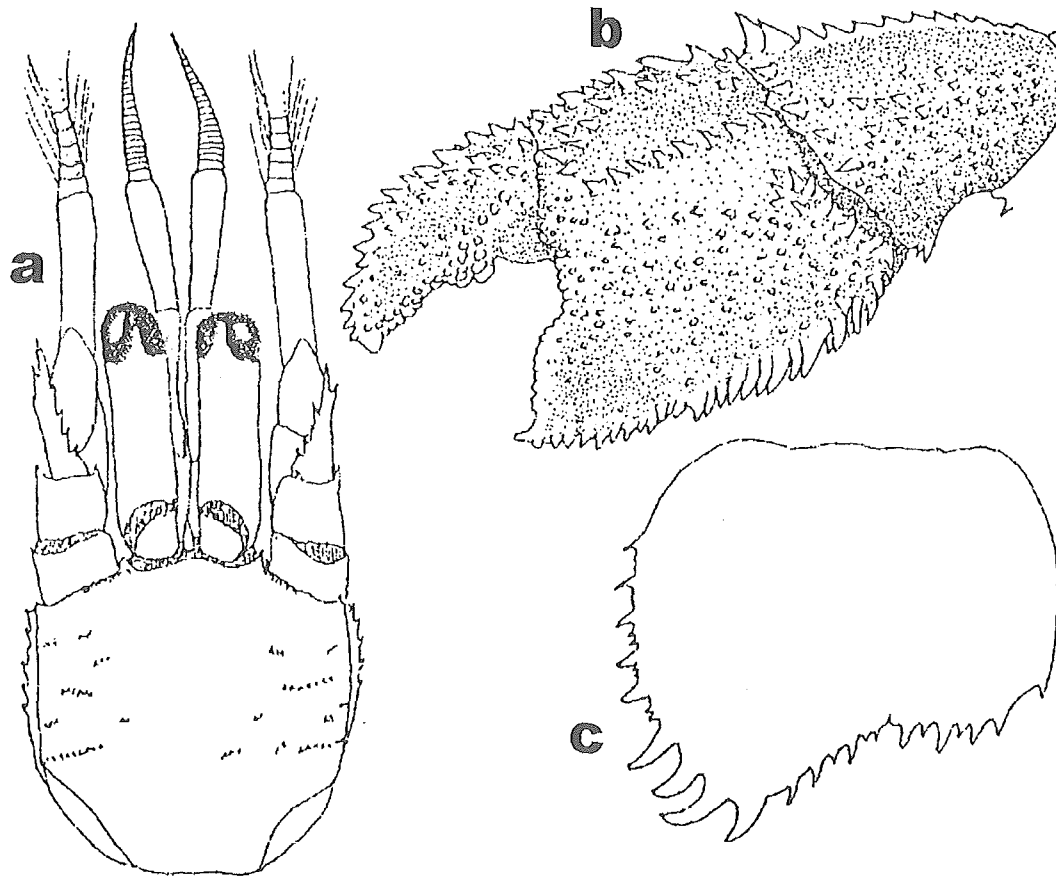


Fig. 27. *Diogenes rectimanus* Miers, 1884; a) carapace and cephalic appendages (after Alcock, 1905); b) left P.I, outer surface; c) telson (after McLaughlin, 2002)

- 33. Palm of left chela of P. 1 with continuation of proximal row of tubercles or spines as longitudinal granular, tubercular or spinose ridge in upper 0.25 of upper outer surface *Diogenes fasciatus* Rahayu and Forest, 1995

Reference: Siddiqui *et al.*, 2004

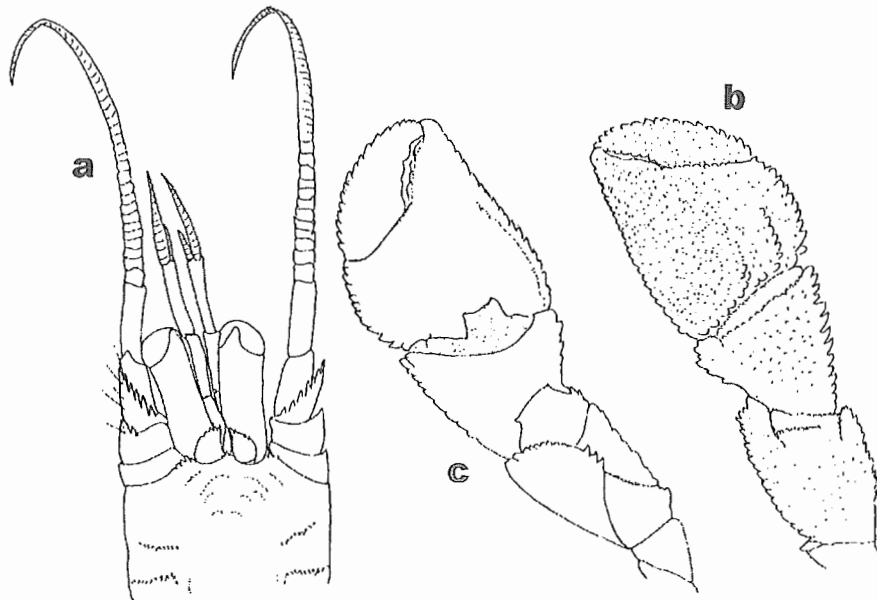


Fig. 28. *Diogenes fasciatus* Rahayu and Forest, 1995; a) shield and cephalic appendages; b) left P.I, outer surface; b') same left P.I, inner surface (modified from Siddiqui *et al*, 2004)

- Palm of left chela of P. 1 with continuation of proximal row of spines or tubercles as longitudinal granular, tubercular or spinose ridge in midline of upper outer surface
 *Diogenes lophochir* Morgan, 1989

Reference: Siddiqui *et al.*, 2004

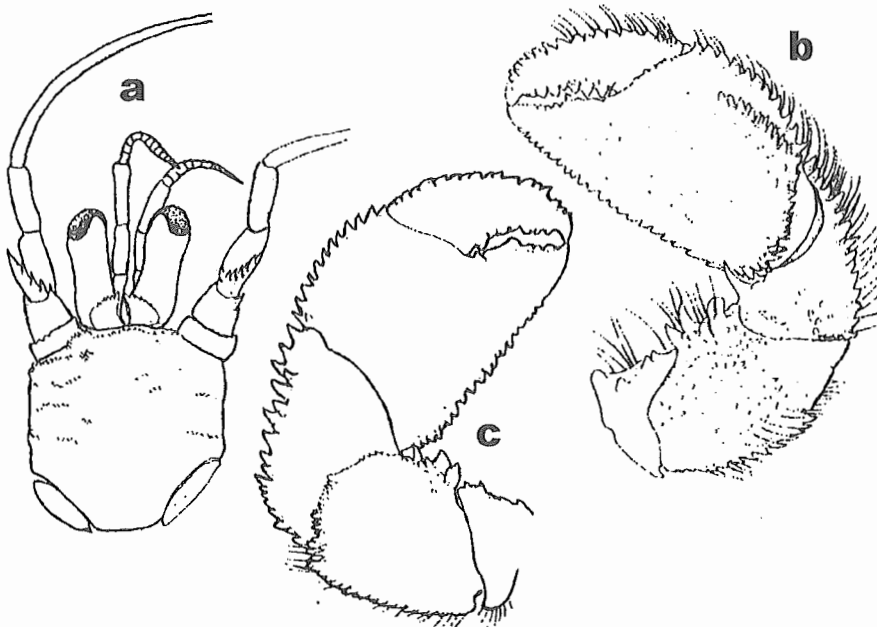


Fig. 29. *Diogenes lophochir* Morgan, 1989; a) shield and cephalic appendages; b) left P.I, outer surface; b') same inner surface; (modified from Siddiqui *et al.*, 2004)

34. Dorsal surfaces of carpi of P. II each with row of spines 35
 - Dorsal surfaces of carpi of P. II each with distal spine and perhaps 1 or 2 additional
 spines in posterior half *Diogenes klaasi* Rahayu and Forest 1995
 Reference: Siddiqui *et al.*, 2004

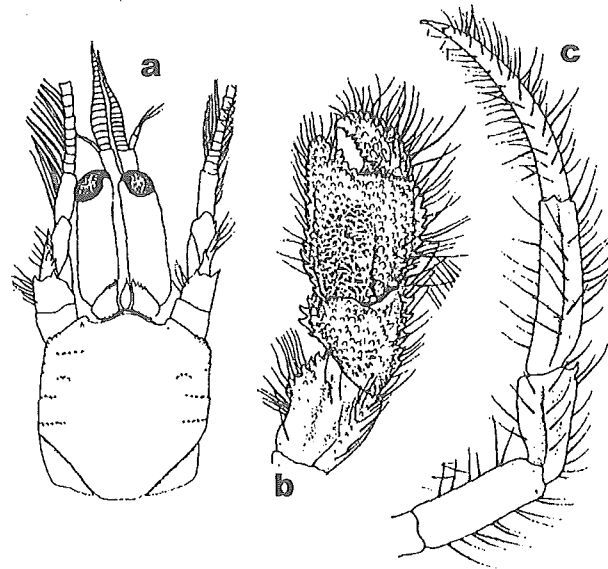


Fig. 30. *Diogenes klaasi* Rahayu and Forest, 1995; a) shield and cephalic appendages; b) left P.I, outer surface; c) left P.II, lateral face (modified from Siddiqui *et al.*, 2004)

35. Antennal peduncles with dorsodistal spine on fourth segment; dorsal margins of
 carpi of each P. II with a row of large and very prominent spines
 *Diogenes karwarensis* Nayak and Neelakantan, 1989
 Reference: Siddiqui *et al.*, 2004

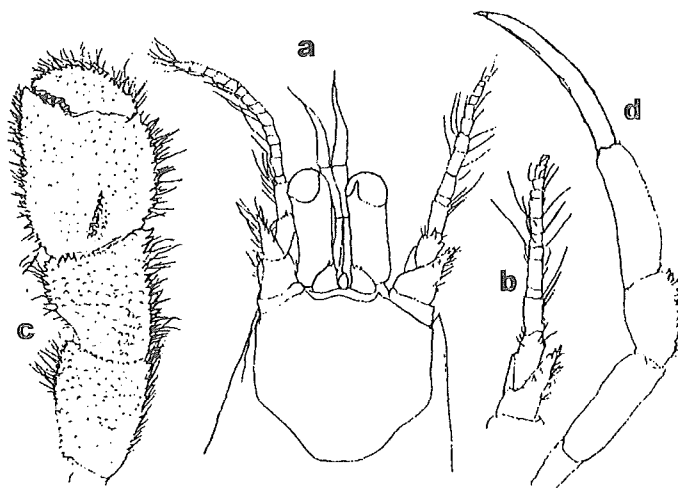


Fig. 31. *Diogenes karwarensis* Nayak and Neelakantan, 1989; a) shield and cephalic appendages; b) right antennal peduncle and acicle; c) left P.I, outer surface; d) left P.II, lateral face (modified from Siddiqui *et al.*, 2004)

- Antennal peduncles without dorsodistal spine on fourth segment; dorsal margin of carpus of P. II with a row of small and obscured spines

..... *Diogenes avarus* Heller, 1865

Reference: Tirmizi and Siddiqui, 1982

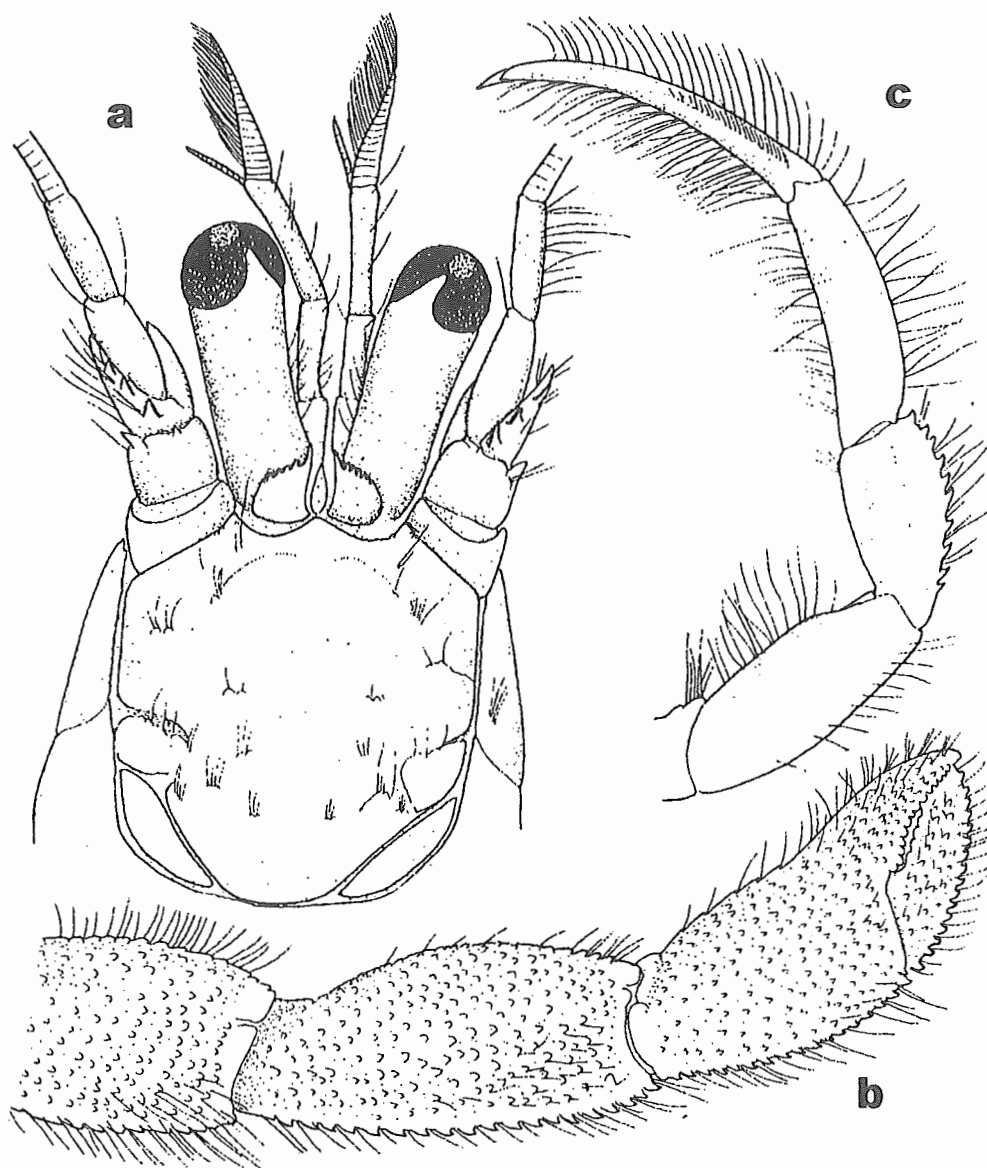


Fig. 32. *Diogenes avarus* Heller, 1865; a) shield and cephalic appendages; b) left P.I, outer face; c) left P.II, lateral face (modified from Siddiqui *et al.*, 2004)

- 36. Ocular peduncles much shorter than antennular peduncles 37
- Ocular peduncles almost equal to antennular peduncles 40
- 37. Dactylus (including claw) of P. III decidedly longer than propodus 39
- Dactylus (including claw) of P. III just equal to propodus 38

38. Ocular peduncles and P.I-P.IV without longitudinal coloured stripes
 *Clibanarius arethusa* De Man, 1888
 References: Ahmed and Khan, 1971; Tirmizi and Siddiqui, 1981

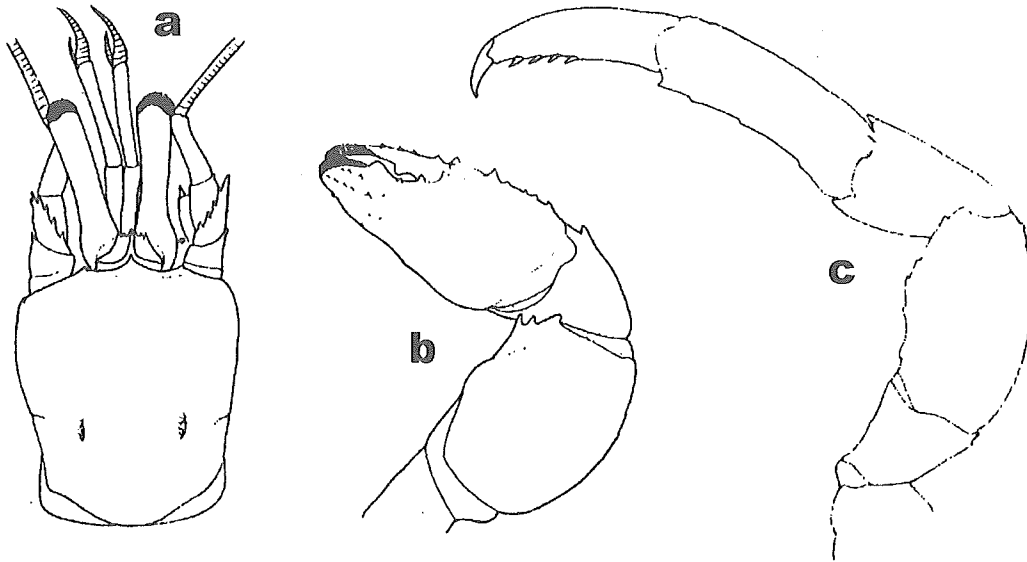


Fig. 33. *Clibanarius arethusa* De Man, 1888; a) shield and cephalic appendages; b) left P.I, outer surface; c) P.III, lateral face (after Tirmizi and Siddiqui, 1981).

- Ocular peduncles and P.I-P.IV with white patches and bands
 *Clibanarius nathi* Chopra and Das, 1940
 Reference: Chopra and Das, 1940

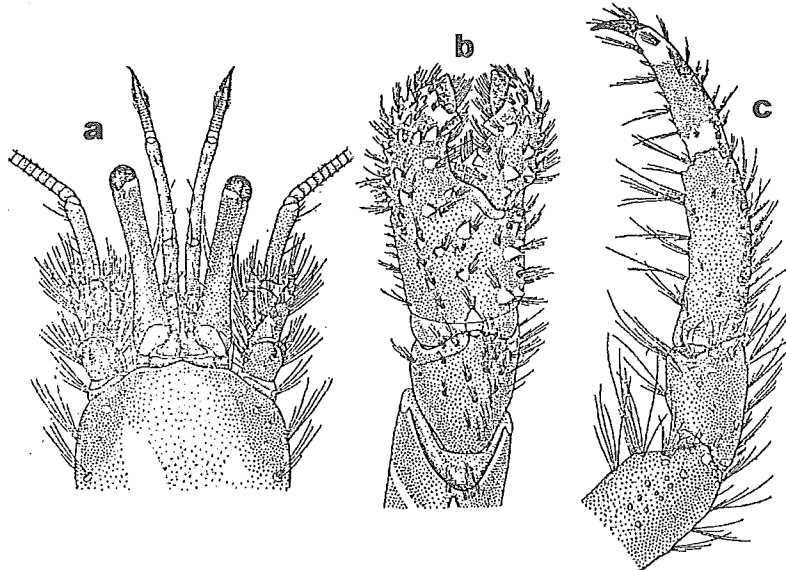


Fig. 34. *Clibanarius nathi* Chopra and Das, 1940; a) shield and cephalic appendages; b) left P.I, outer surface; c) left P.III, lateral face (after Chopra and Das, 1941)

39. Mesial lower margin of merus of P.I serrulate *Clibanarius clibanarius* (Herbst, 1791).

References: Ahmed and Khan; Tirmizi and Siddiqui, 1981

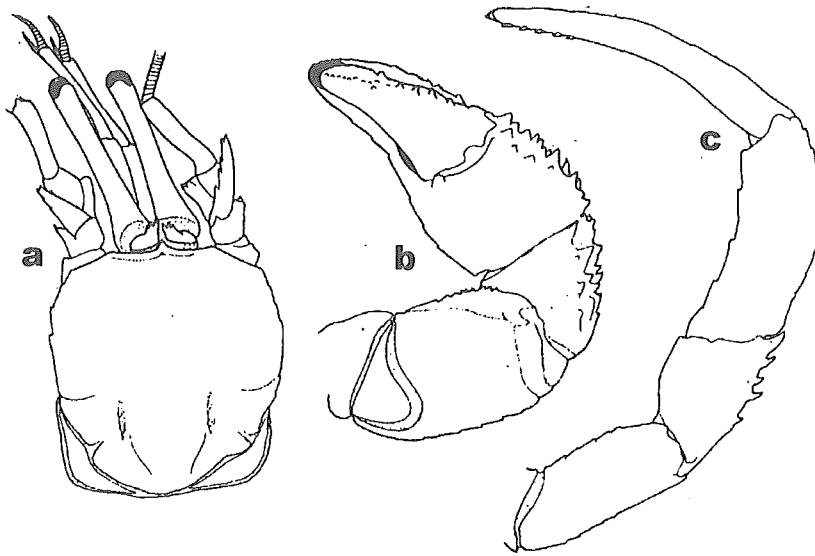


Fig. 35. *Clibanarius clibanarius* (Herbst, 1791); a) shield and cephalic appendages; b) left P.I, outer surface; left P.III lateral face. (after Tirmizi and Siddiqui, 1981)

- Mesial lower margin of merus of P.I with one strong tooth *Clibanarius infraspinus* (Hilgendorf, 1869).

References: Ahmed and Khan, 1971; Tirmizi and Siddiqui, 1981

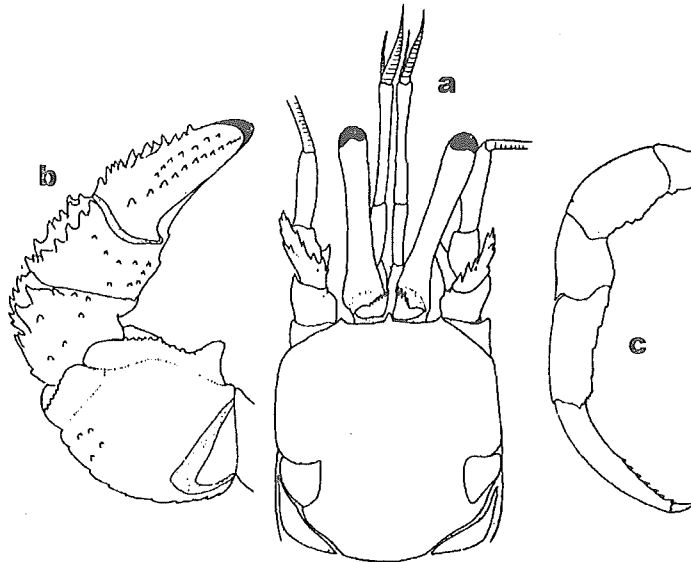


Fig. 36. *Clibanarius infraspinus* (Hilgendorf, 1869); a) shield and cephalic appendages; b) left P.I, outer surface; c) left P.III, lateral face (after Tirmizi and Siddiqui, 1981).

- 40. Propodus of left P.III remarkably flattened, upper border sharply defined 41
- Propodus of left P.III not flattened, upper border not sharply defined 42
- 41. Red longitudinal stripes on thoracic appendages *Clibanarius signatus*
Heller, 1861

References: Tirmizi and Siddiqui, 1981

Not treated: *Clibanarius aequabilis* Dana, 1852 misidentification (Ahmed and Khan 1971), very similar to *Clibanarius signatus*.

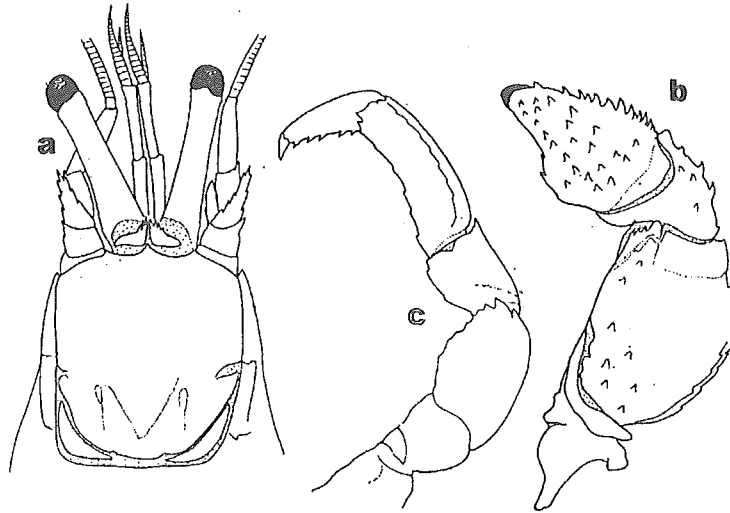


Fig. 37. *Clibanarius signatus* Heller, 1861; a) shield and cephalic appendages; b) left P.I, outer surface; c) left P.III, lateral face (after Tirmizi and Siddiqui, 1981)

- White bands on thoracic appendages *Clibanarius virescens* (Krauss, 1843)

Reference: Tirmizi and Siddiqui, 1981

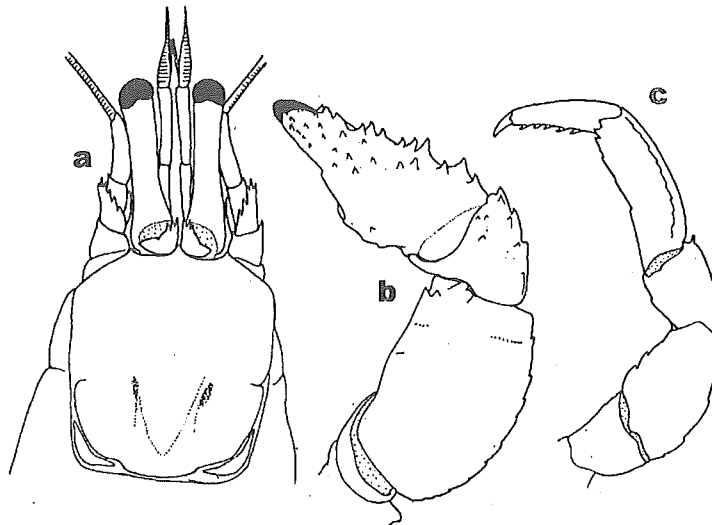


Fig. 38. *Clibanarius virescens* (Krauss, 1843); a) shield and cephalic appendages; b) left P.I, outer surface; c) left P.III, lateral face (after Tirmizi and Siddiqui, 1981)

42. Eyestalks much longer than anterior border of carapace
 *Clibanarius padavensis* de Man, 1888
 Not treated: *Clibanarius longitarsus* De Haan, 1849 very close to *Clibanarius padavensis* (Alcock, 1905: 43).

References: Ahmed and Khan, 1971; Tirmizi and Siddiqui, 1981

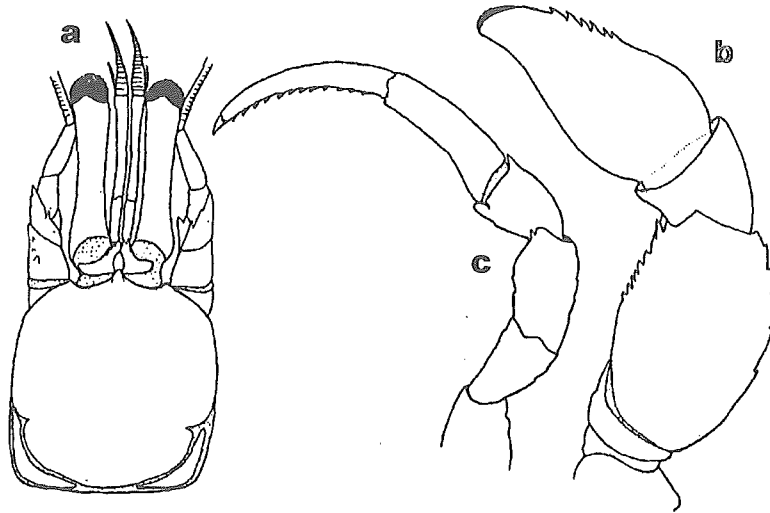


Fig. 39. *Clibanarius padavensis* DeMan, 1888; a) shield and cephalic appendages; b) left P.I, outer surface; c) P.III lateral face (after Tirmizi and Siddiqui, 1981)

- Eyestalks equal in length to anterior border of carapace
 *Clibanarius striolatus* Dana, 1852.
 Reference: Alcock, 1905

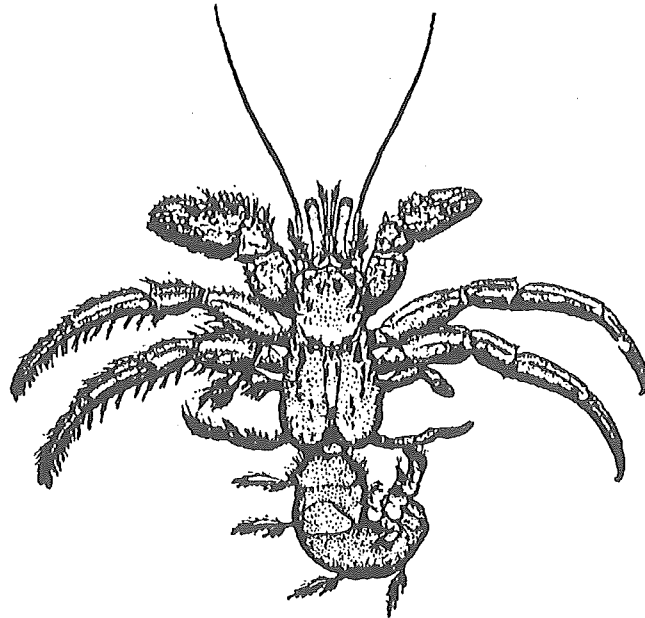


Fig. 40. *Clibanarius striolatus* Dana, 1852; entire, dorsal view (after Miyake, 1978)

43. Left eyestalk longer than right 44
 - Both eyestalks about to equal in length, ground colour dark violet
 *Calcinus rosaceus* Heller, 1861
 Reference: Hogarth, 1988

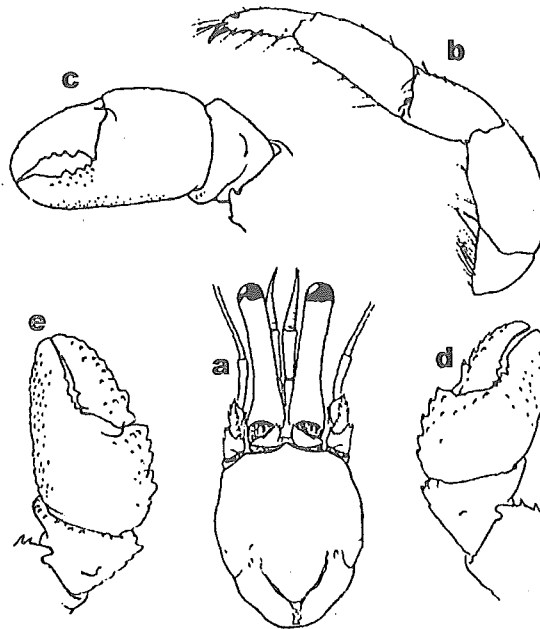


Fig. 41. *Calcinus rosaceus* Heller, 1861; a) shield and cephalic appendages; b) left P.III, lateral face; c) left P.I (♀) outer surface; d) right P.I (♀) outer surface; e) left P.I (♂), outer surface (after Forest, 1956)

44. Merus, carpus and propodus of P.II and P.III each with alternating broad coloured cross bands of red, blue and white *Calcinus elegans* (H. Milne Edwards, 1836)
 References: Alcock, 1905; Thompson, 1943; Siddiqui, present study.

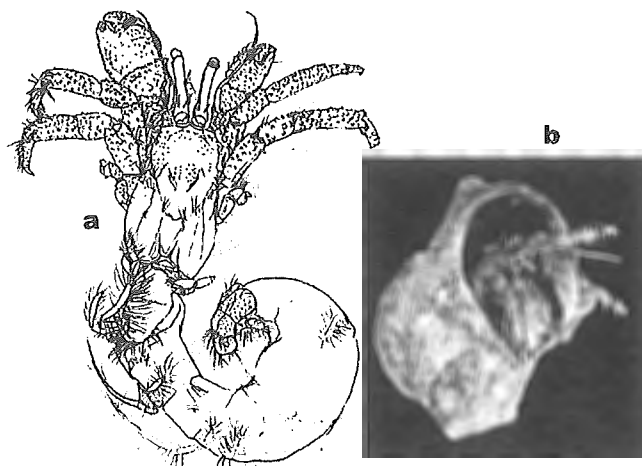


Fig. 42. *Calcinus elegans* (H. Milne Edwards, 1836); a) entire, dorsal view; b) animal in shell (after Siddiqui, unpublished)

- Merus, carpus and propodus of P.II and P.III without coloured bands 45
- 45. Dactylus of P.II and P.III with coloured bands proximally only
..... *Calcinus latents* (Randall, 1839).

Reference: Tirmizi and Siddiqui 1981

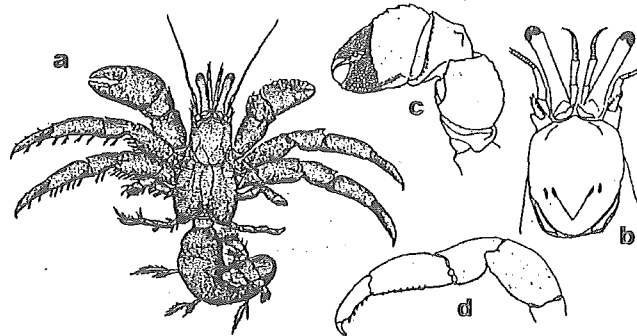


Fig. 43. *Calcinus latents* (Randall, 1839); a) entire, dorsal view; (after Miyake, 1956); b) shield and cephalic appendages; c) left P.I, outer surface; d) left P.III, lateral face (after Tirmizi and Siddiqui, 1981)

- Dactylus of P.II and P.III without coloured bands proximally, but with 2 submedian coloured spots *Calcinus tropidomanus* Lewinsohn, 1981.

Reference: Hogarth, 1988

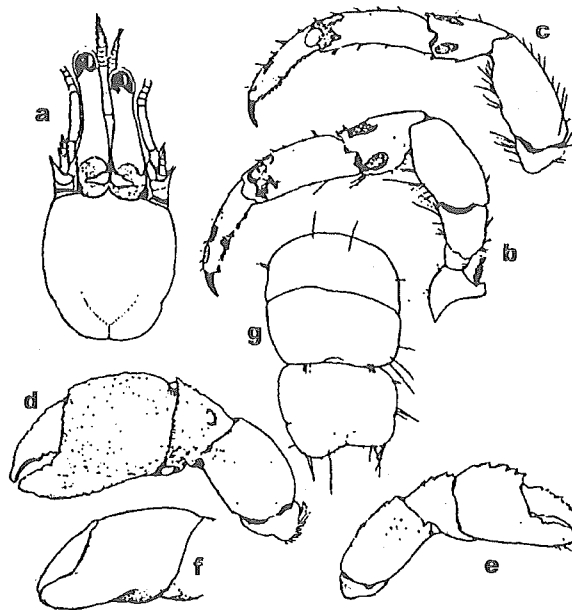


Fig. 44. *Calcinus tropidomanus* Lewinsohn, 1981; a) shield and cephalic appendages; b) left P.II; c) left P.III, lateral face; d, e) left P.I, outer surface; f) right P.I, outer surface; g) telson and last abdominal segment (after Lewinsohn, 1981)

Not treated: *Calcinus herbsti* de Man, 1888 and *Calcinus gaimardi* (Milne Edwards, 1848)

Reference: Thomas, 1989

- 46. Endopod of maxillule without well-developed external lobe 48
- Endopod of maxillule with well-developed external lobe; P.I equal or left larger, carpus and palm with transverse striae bordered with fine setae dactyli of P.II-P.V equal to or longer than propodi Genus *Ciliopagurus* Forest, 1995.

- 47. Ocular acicles with 3-4 terminal spines *Ciliopagurus strigatus* (Herbst, 1804)

Reference: Poupin, 2001



Fig. 45. *Ciliopagurus strigatus* (Herbst, 1804) entire, dorsal view (after Poupin, 2001)

- Ocular acicles with single terminal spine (sometime with 1-2 additional spinules) *Ciliopagurus krempfi* (Forest, 1952)
- Reference: Thomas, 1989



Fig. 46. *Ciliopagurus krempfi* (Forest, 1952); entire, dorsal view (after Poupin, 2001)

48. Rostrum triangular; ocular acicles each with prominent triangular or subtriangular acicular projection. P.I and P.II-P.V with ring-tike transverse striae, female with well developed brood pouch Genus *Aniculus* Dana, 1852
 Eye stalks shorter than anterior border of carapace; P.I-P.V remarkably hirsute
 A single species: *Aniculus erythreus* Forest, 1984
 Reference: Hogarth, 1988

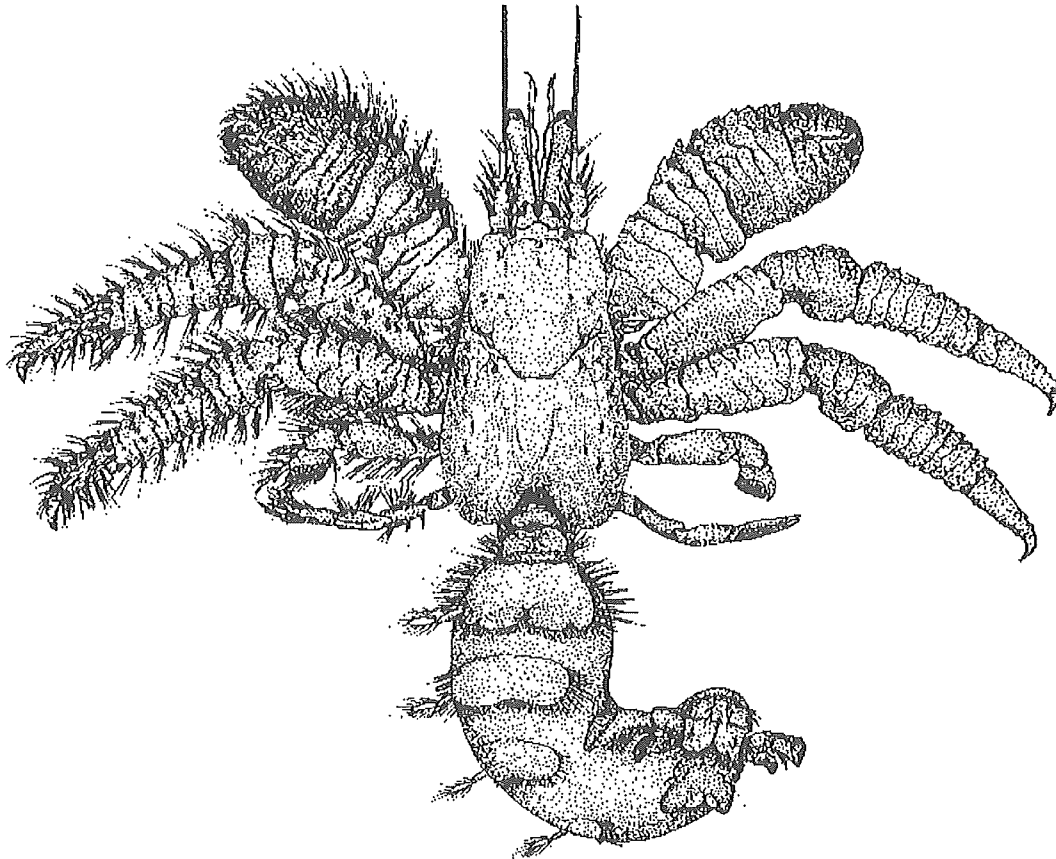


Fig. 47. *Aniculus erythreus* (Forest, 1984); entire, dorsal view (after Miyake, 1987)

- Rostrum broadly rounded or obsolete; ocular acicles each with subrectangular or subquadrate acicular projection. P.I and P.II-P.V most often without ring-like transverse striae; female without brood pouch Genus *Dardanus* Paulson, 1875 49
49. Left P. I much larger than right; P.II-P.V thickly hairy 50
 - Left P. I not much larger than right; P.II-P.V less hairy 51
50. Fixed finger of left P.I; sinuous, mesial lower distal angle of merus simple lateral face of propodus and dactylus of left P.III with regular, transverse squamiform markings *Dardanus setifer* (H. Milne-Edwards, 1836).
 Reference: Tirmizi and Siddiqui, 1981

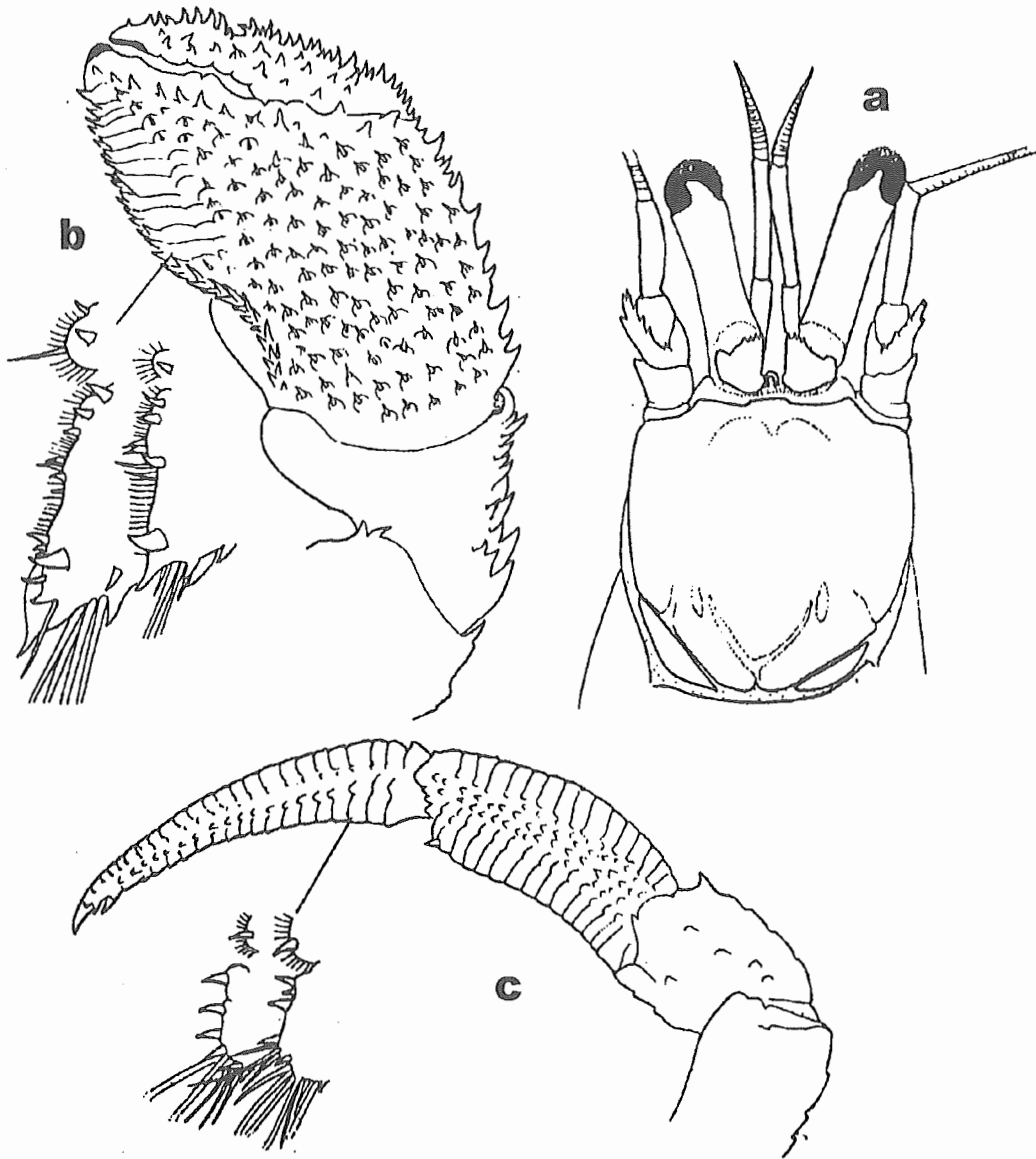


Fig. 48. *Dardanus setifer* (H. Milne-Edwards, 1836); a) shield and cephalic appendages; b) left P.I; c) left P.III lateral face (after Tirmizi and Siddiqui, 1981)

- Fixed finger of left P.I; straight, mesial lower distal angle of merus strongly serrate lateral face of propodus and dactylus of left P.III without squamiform markings
 *Dardanus vulnerans* (Thallwitz, 1892):

Reference: Tirmizi and Siddiqui, 1981

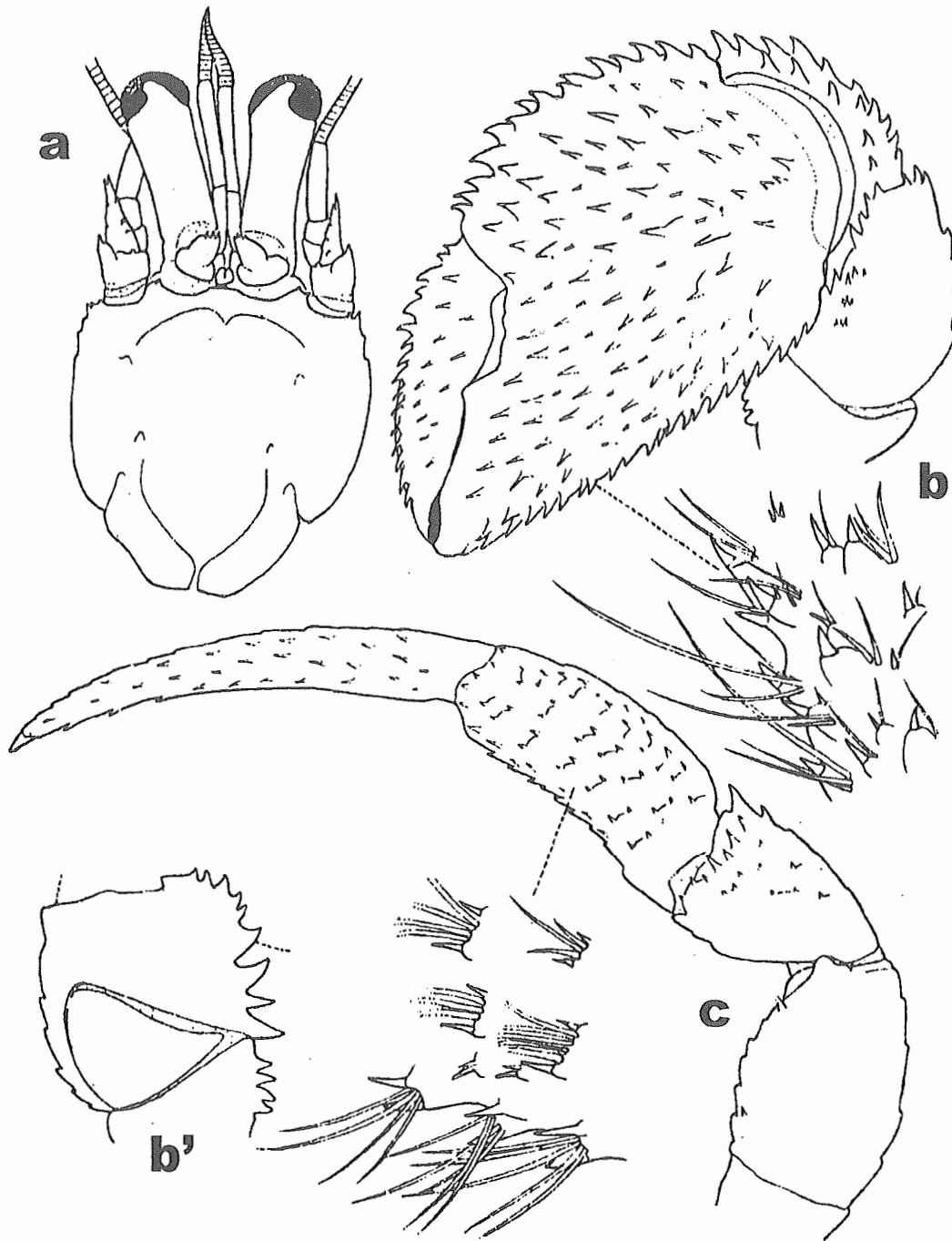


Fig. 49. *Dardanus vulnerans* (Thallwitz, 1892); a) carapace and cephalic appendages; b) left P.I, outer surface; b') merus of left P.I, inner surface; c) left P.III, lateral face (after Tirmizi and Siddiqui, 1981)

51. Eyestalks much shorter than antennular peduncles 52
 - Eyestalks not much less shorter than antennular peduncles 53
52. Dorsolateral margin of propodus of left P. III well defined, subcristiform
 *Dardanus tinctor* (Forskål, 1775).
 References: Alcock, 1905 as *Pagurus varipes* Heller, 1861; Hogarth, 1988

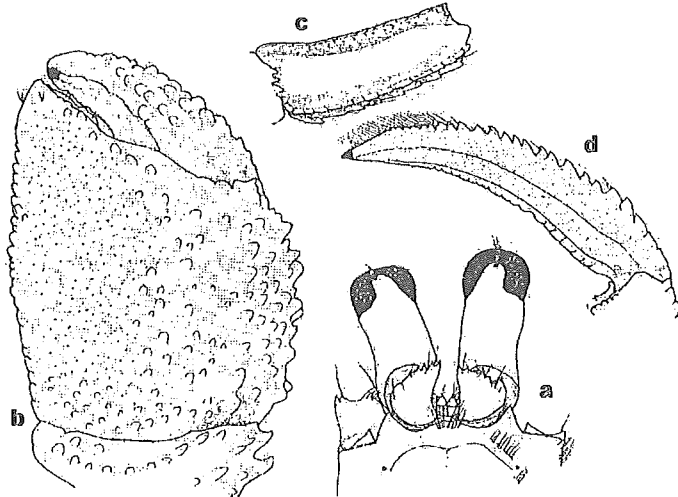


Fig. 50. *Dardanus tinctor* (Forskål, 1775); a) anterior part of shield and cephalic appendage; b) P.I, chela; outer surface; c,d) left P.III propodus and dactylus (after Kazmi *et al*, in press)

- Dorsolateral margin of propodus of left P. III hardly defined. Upper outer surface of left chela with 2 or 3 raised longitudinal rows of granules, lower part smooth
 *Dardanus pedunculatus* (Herbst, 1804)
 References: Alcock, 1905 as *Pagurus asper* De Haan, 1849; Hogarth, 1988

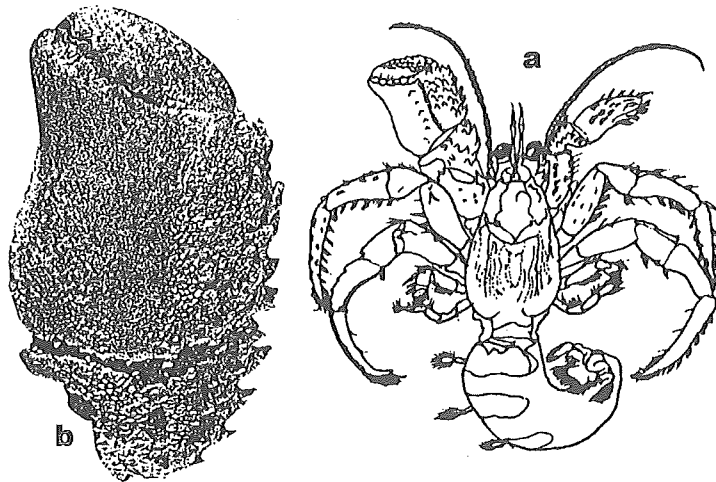


Fig. 51. *Dardanus pedunculatus* (Herbst, 1804); a) entire, dorsal view (after Miyake, 1978); b) left P.I, carpus and chela (after Lewinsohn, 1969)

53. Carapace and P.I-P.V purplish brown *Dardanus lagopodes* (Forskål, 1775).
Reference: Hogarth, 1988

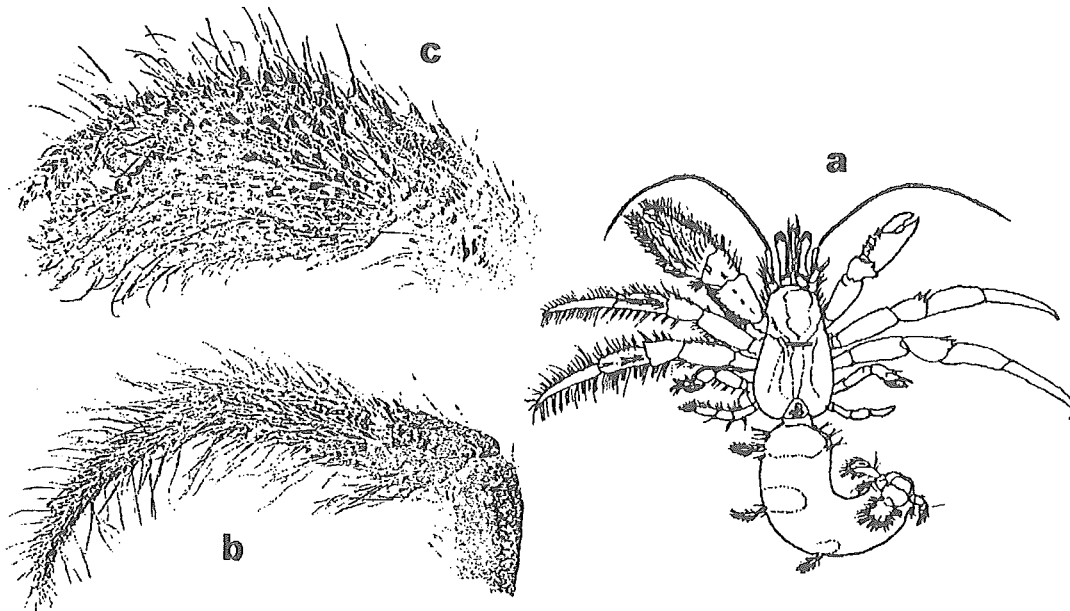


Fig. 52. *Dardanus lagopodes* (Forskål, 1775); a) entire, dorsal view (after Miyake, 1978); b) left P.I, outer surface; c) left P.III, lateral face (after Lewinsohn, 1969)

- Carapace and P.I-P.V brownish red *Dardanus megistos* (Herbst, 1804)
Reference: Hogarth, 1988

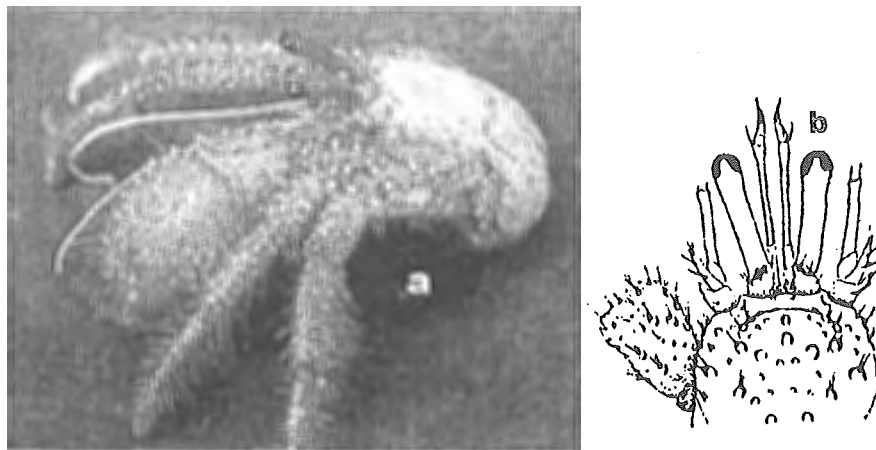


Fig. 53. *Dardanus megistos* (Herbst, 1804); a) entire, partly dorsal view (after Poupin, 1996); b) shield and cephalic appendages (after Barnard, 1950)

54. Carapace somewhat oval in shape, rather broad. Front without prominent, sharply pointed rostrum. Abdomen folded closely against the underside of thorax. Crab-like in appearance. P.I chelate with well-developed fingers. Antennule concealed. Peduncle of antenna directed backward. Maxp. III with ischium broad.
..... Family Porcellanidae Haworth, 1825 55

- Carapace elongate. Front with prominent, sharply pointed rostrum (except *Hapalotyx*). Abdomen folded upon itself, not folded against underside of thorax. Antennule exposed. Peduncle of antenna directed forward. Maxp. III with ischium narrow. 70
- 55. Basal segment of antenna short, not strongly produced forward to meet anterior margin of carapace, movable segments with free access to orbit 56
- Basal segment of antenna produced forward and broadly in contact with anterior margin of carapace, movable segments removed from orbit 61
- 56. Posterior portion of side walls of carapace consisting of one or more pieces separated by membranous interspaces. P.I usually distinctly unequal, thick, robust. Front not prominent, usually transversely sinuate or rounded in dorsal view
..... Genus *Pachycheles* Stimpson, 1858 57
- Posterior portion of side walls of carapace without separate pieces. P. I subequal, usually not robust. Front triangular or trilobate, usually rather prominent
..... Genus *Petrolisthes* Stimpson, 1858 58
- 57. Carapace and P.I devoid of setae. P.II-P.V with non-plumose setae
..... *Pachycheles natalensis* (Krauss, 1843)
References: Mustaquim, 1972; Tirmizi *et al*, 1982

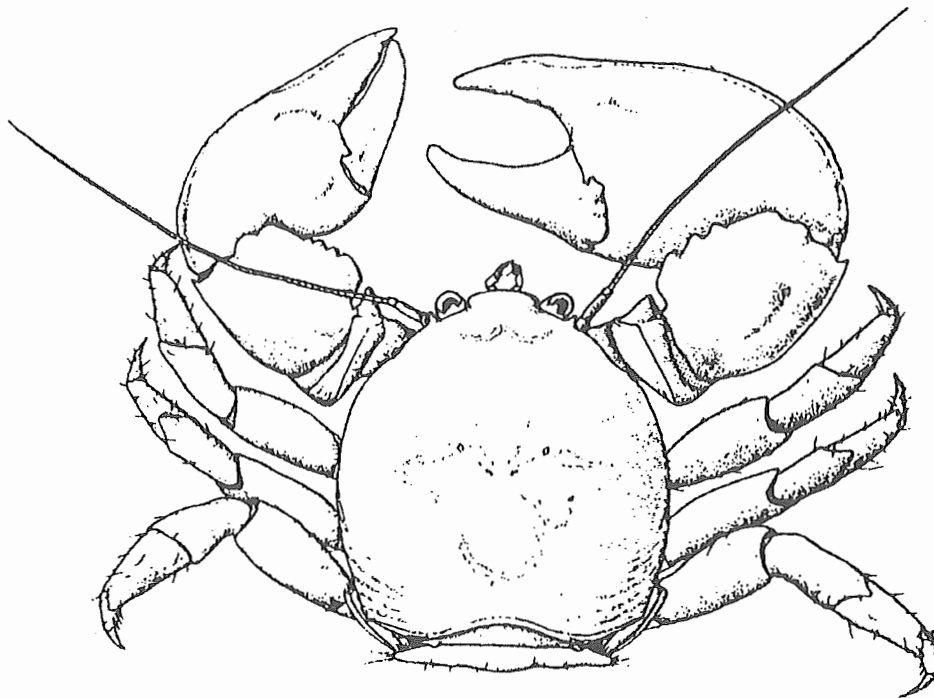


Fig. 54. *Pachycheles natalensis* (Krauss, 1843); entire, dorsal view (after Tirmizi *et al.*, 1989)

- Carapace hairless except with a distinct tuft of setae on front, comprising of short plumose setae and long non-plumose setae. P. 1 thickly covered with short plumose setae and long non-plumose setae.
 *Pachycheles tomentosus* Henderson, 1893.
 References: Henderson, 1893; Mustaquim, 1972

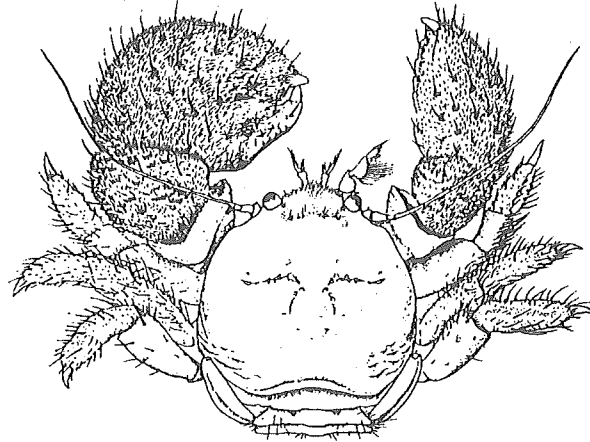


Fig. 55. *Pachycheles tomentosus* Henderson, 1893; entire, dorsal view (after Tirmizi et al, 1989)

- 58. Epibranchial spine present; (occasionally lacking in *Petrolisthes lamarckii* and *Petrolisthes virgatus*). Carpus of P. 1 with row of spines on lateral margin 59
- Epibranchial spine absent. Carpus of P. 1 unarmed laterally except few spines at distolateral end 60
- 59. Carapace with transverse striae. Ocular seta present
 *Petrolisthes boscii* (Audouin, 1826).
 References: Miers, 1884 as *Petrolisthes rugosus*; Mustaquim, 1972

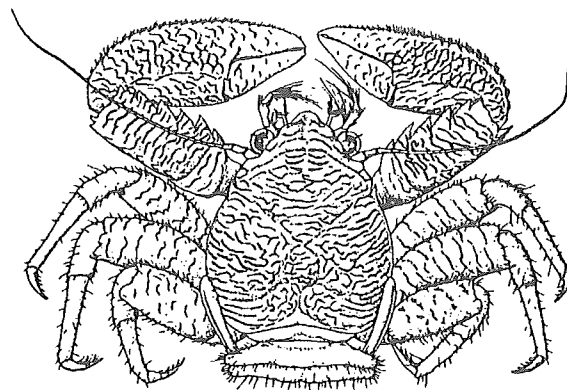


Fig. 56. *Petrolisthes boscii* (Audouin, 1826); entire, dorsal view (after Tirmizi et al., 1989)

- Carapace uniformly pubescent *Petrolisthes virgatus* Paulson, 1875.
References: Southwell, 1909; Hogarth, 1988

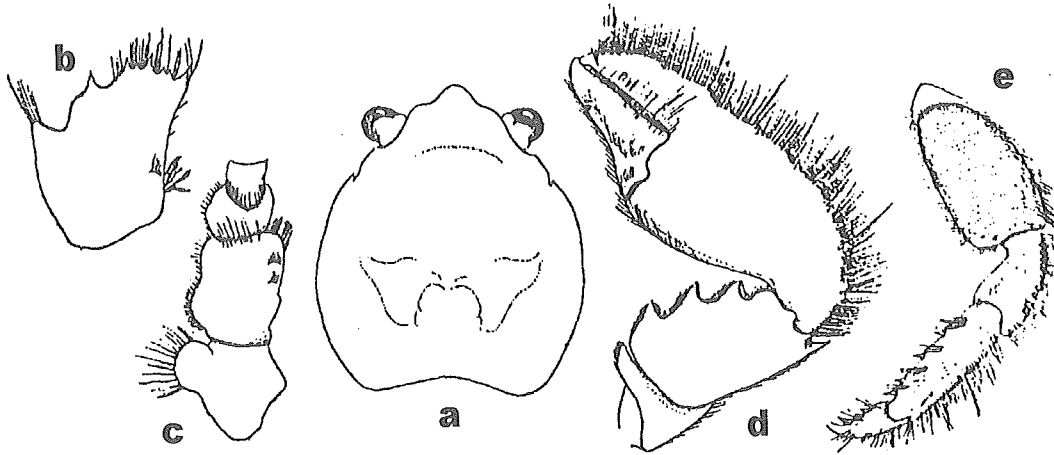


Fig. 57. *Petrolisthes virgatus* Paulson, 1875; a) carapace and eyes (pubescence not shown); b) basal antennular segment; c) antennal peduncle; d) right P.I, outer surface; e) right P.III, lateral face (after Lewinson, 1969)

- Carapace without transverse striae. Ocular seta absent
..... *Petrolisthes lamarckii* (Leach, 1820)
References: Mustaqim, 1972; Tirmizi *et al.*, 1982

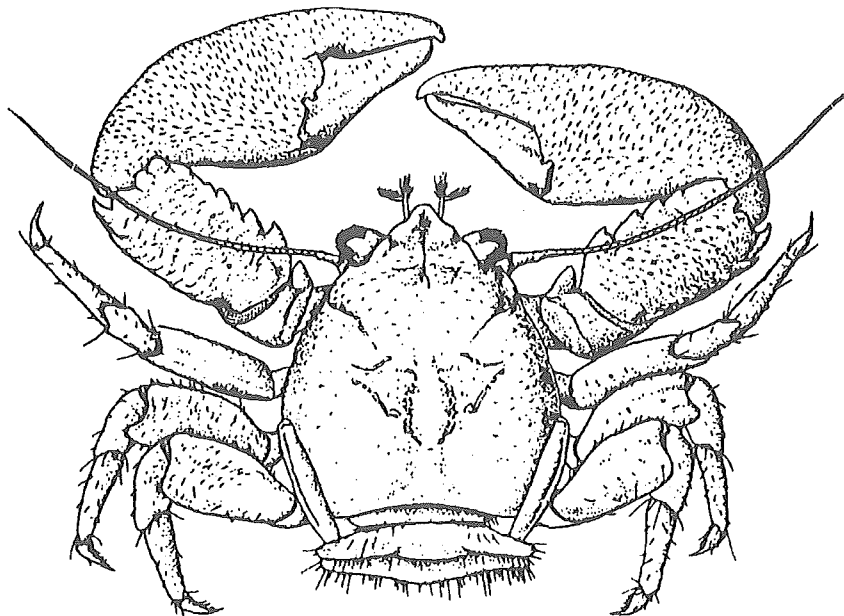


Fig. 58. *Petrolisthes lamarckii* (Leach, 1820); entire, dorsal view (after Tirmizi *et al.*, 1989)

60. Carapace and P. 1 with tubercles *Petrolisthes ornatus* (Paulson, 1875)
 References: Mustaquim, 1972; Tirmizi *et al.*, 1982

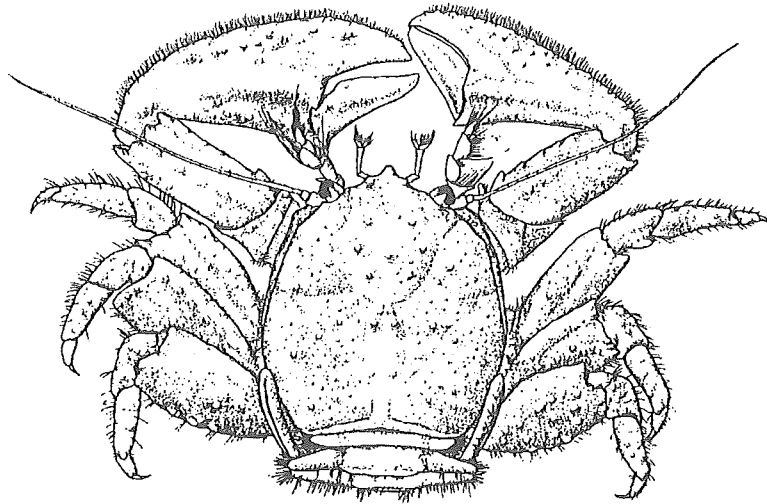


Fig. 59. *Petrolisthes ornatus* (Paulson, 1875); entire, dorsal view (after Tirmizi *et al.*, 1989)

- Carapace and P. 1 without tubercles 61
61. P.I long and narrow. Mesial margin of carpus, with a proximal tooth and 2 low lobes
 *Petrolisthes leptocheles* (Heller, 1861)
 Reference: Tirmizi *et al.*, 1981

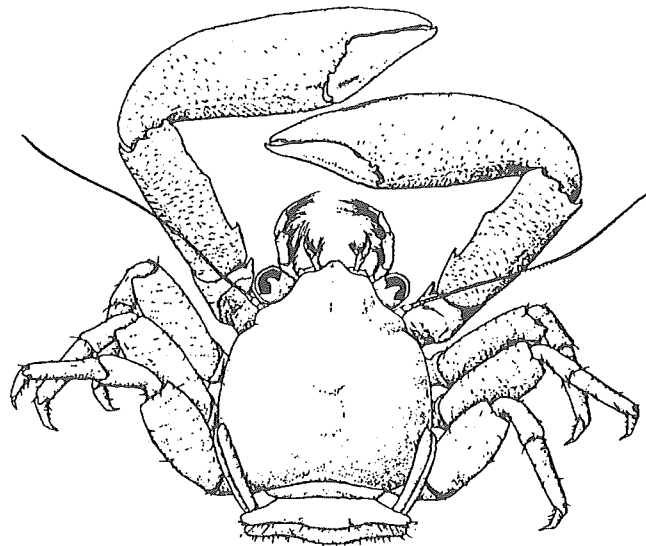


Fig. 60. *Petrolisthes leptocheles* (Heller, 1861); entire, dorsal view (after Tirmizi, *et al.*, 1989)

- P.I moderate, mesial margin of carpus with 3-5 teeth
 *Petrolisthes rufescens* (Heller, 1861)
 References: Mustaquim, 1972; Tirmizi *et al.*, 1982

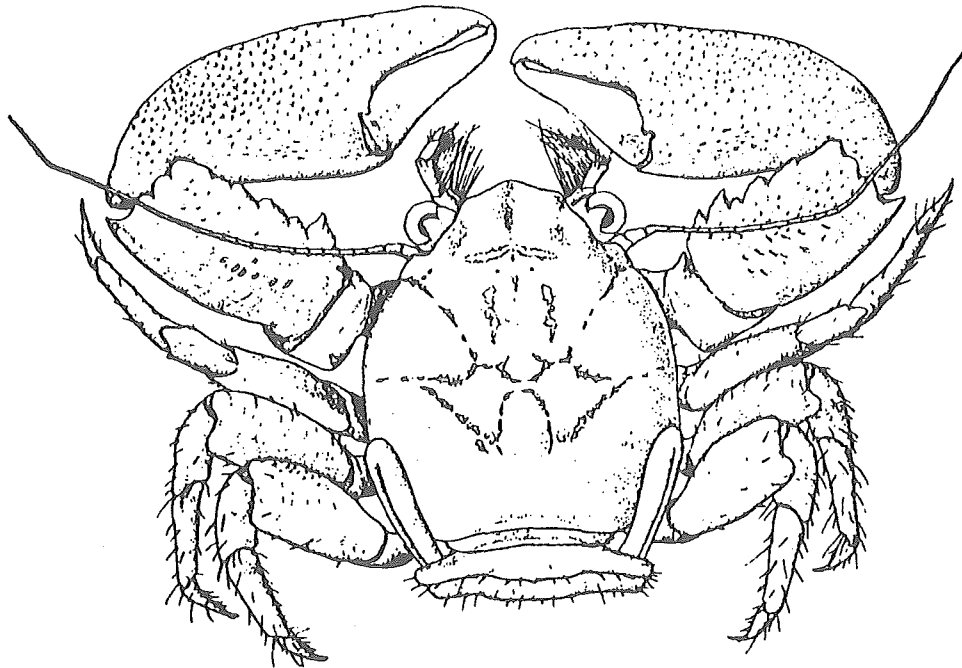


Fig. 61. *Petrolisthes rufescens* (Heller, 1861); entire, dorsal view (after Tirmizi *et al.*, 1989)

- 62. Dactylus of P.II-P.IV ending in two or more large, strong, fixed claws
 Genus *Polyonyx* Stimpson, 1858 64
- Dactylus of P.II-P.IV ending in a single claw 65
- Dactylus of P.II-P.IV, almost straight with apex acute
 Genus *Raphidopus* Stimpson, 1858 63

- 63. Carapace flatter and narrower, regions well-defined, posterolateral margins with 2-3 spines
 *Raphidopus ciliatus* Stimpson, 1858
 References: Haig, 1981; Tirmizi and Ghani, 1994

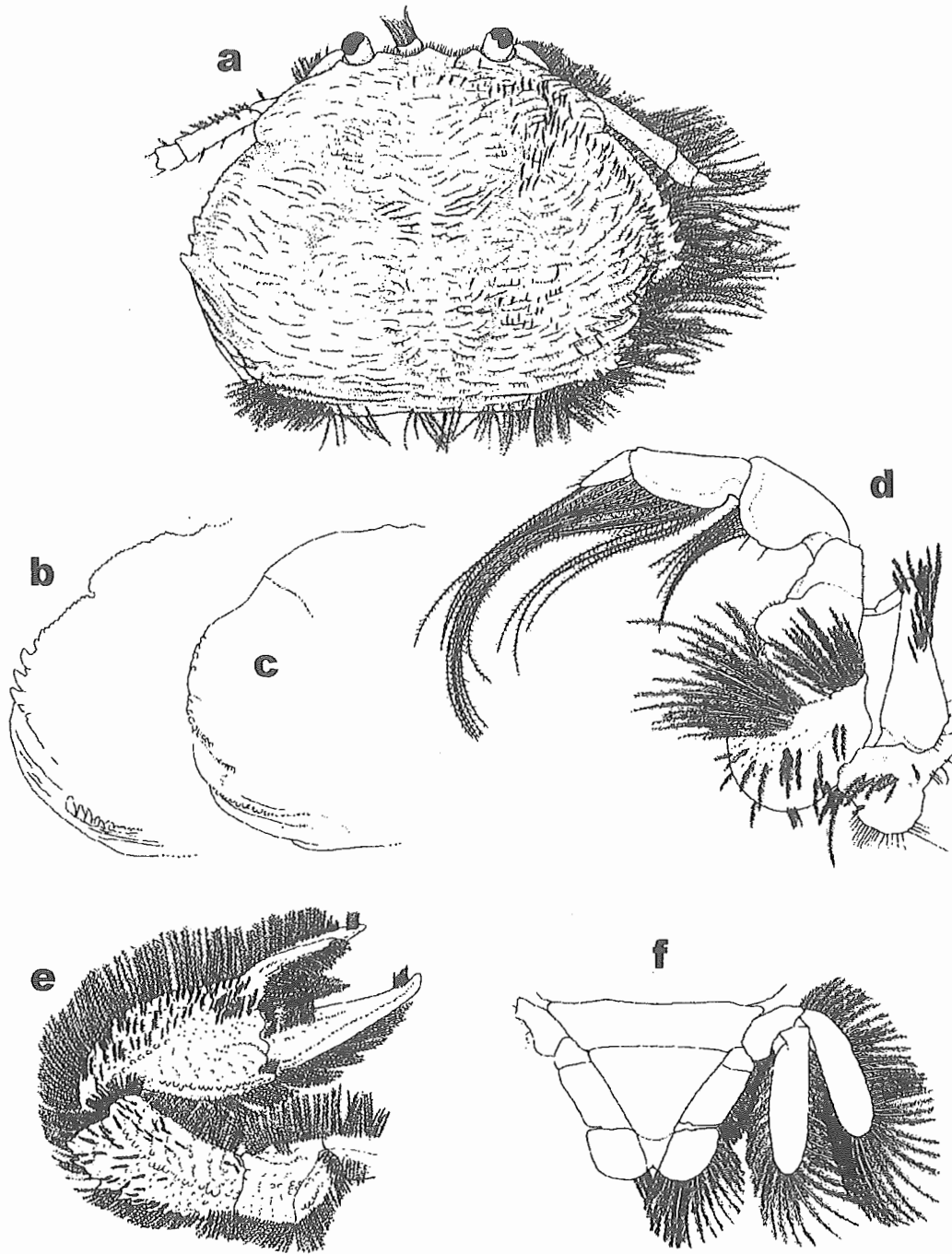


Fig. 62. *Raphidopus ciliatus* Stimpson, 1858; a-c) carapace and cephalic appendage; d) Maxp. III; e) left P.I, outer surface; f) telson (after Tirmizi and Ghani, 1994)

- Carapace convex from side to side and from before backwards, regions ill defined and almost smooth *Raphidopus indicus* Henderson, 1893
Reference: Paul *et al.*, 1977

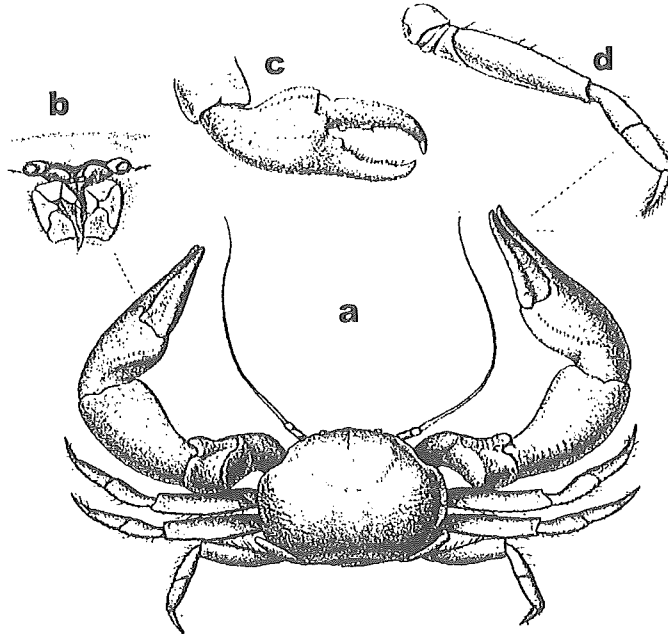


Fig. 63. *Raphidopus indicus* Henderson, 1893; a) entire, dorsal view; b) frontal region; c) left chela of P.I; d) right P.V, lateral face (after Henderson, 1893)

- 64. Front without a fringe of setae on its edge. P.I with blunt tubercles and tubercular ridges on all segments. Ventral claw of P.III shorter than dorsal claw
..... *Polyonyx hendersoni* Southwell, 1909
Reference: Tirmizi *et al.*, 1982

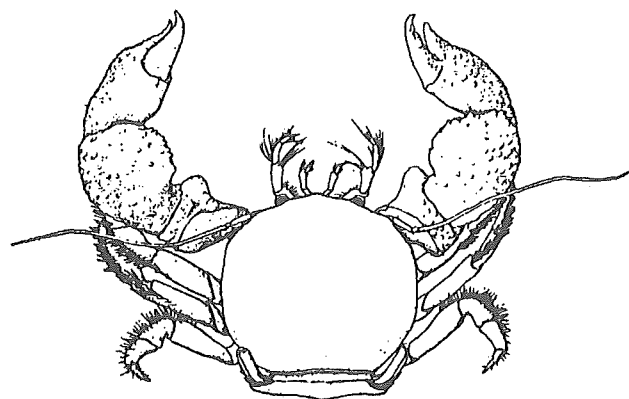


Fig. 64. *Polyonyx hendersoni* Southwell, 1909; entire, dorsal view (after Tirmizi *et al.*, 1982)

- Front with a fringe of setae on its edge. P. 1 somewhat rugose; ventral claw of P.III longer than dorsal claw *Polyonyx loimicola* Sankolli, 1965
References: Sankolli, 1965; Tirmizi *et al.*, 1989

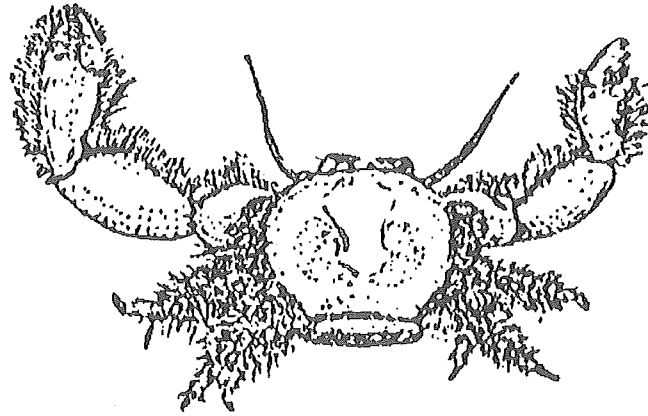


Fig. 65. *Polyonyx loimicola* Sankolli, 1965; entire, dorsal view (after Sankolli, 1965)

- Front P. 1 extremely hairy, with sharp tubercles and tubercular ridges specially on propodus and carpus *Polyonyx splendidus* Sankolli, 1963
References: Sankolli, 1963

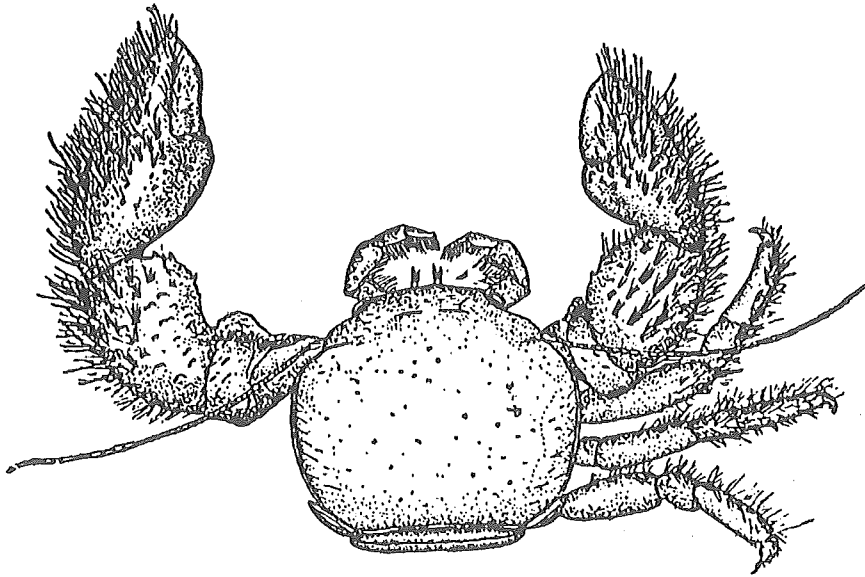


Fig. 66. *Polyonyx splendidus* Sankolli, 1963; entire, dorsal view (after Sankolli, 1963)

- 65. One P. 1 distinctly larger than the other, particularly in males. Fingers of one or both P. 1 twisted out of plan with palm Genus *Pisidia* Leach, 1820 66
- P. 1 subequal or one distinctly larger. Fingers usually not twisted 67

66. Manus with two longitudinal rows of spines on outer face
 *Pisidia gordonii* (Johnson, 1970)
 Reference: Tirmizi *et al.*, 1989

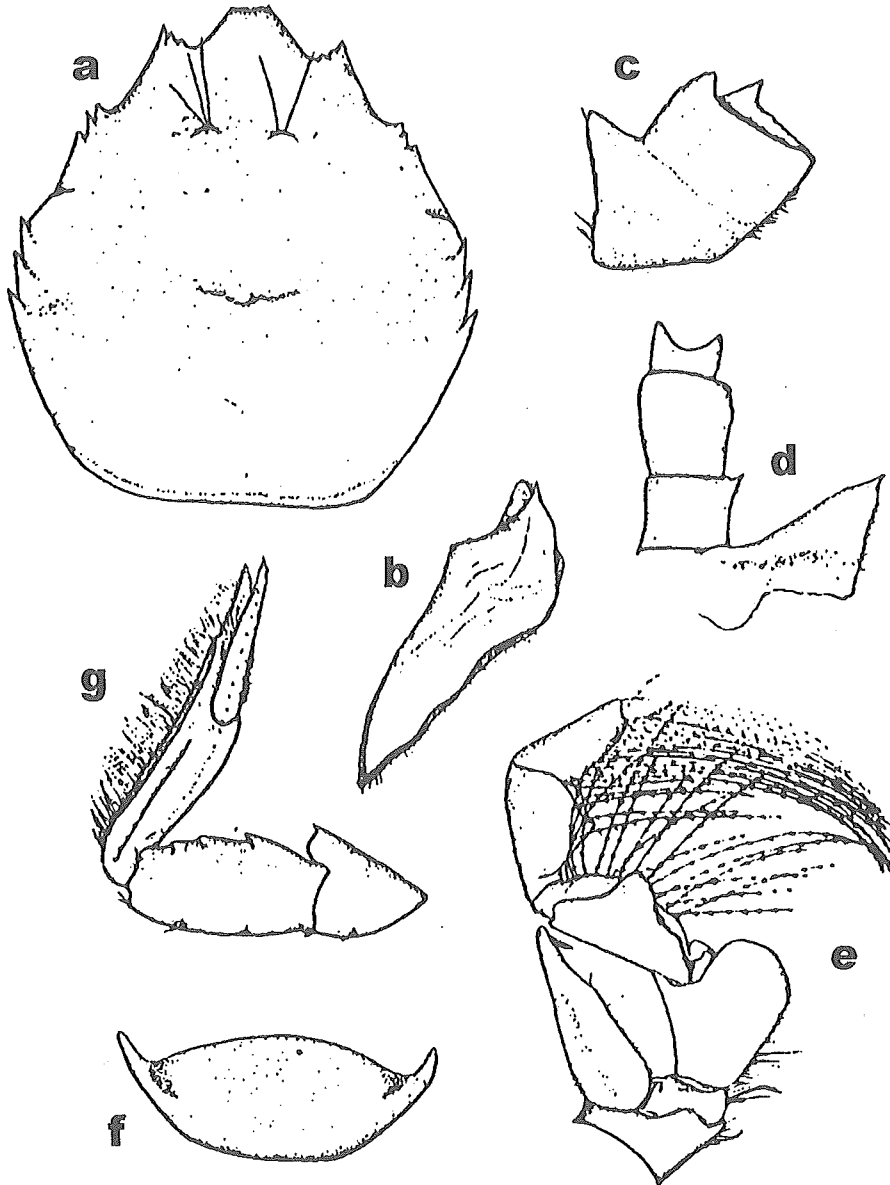


Fig. 67. *Pisidia gordonii* (Johnson, 1970); a) carapace, dorsal view; b) side wall of carapace; c) first peduncular joint of antennule; d) proximal portion of antenna; e) maxp. III; f) sternum of maxp. III; g) left P.I (after Tirmizi *et al.*, 1989)

- Manus without longitudinal rows of spines on outer face 67

67. Lateral margin of carapace with three small sharp teeth; margins of frontal lobe minutely serrated. Mesial margin of carpus of P. 1 armed with 2 larger and 5 or 6

smaller teeth, posterolateral margin armed with one tooth near its middle, manus with setae *Pisidia spinulifrons* (Miers, 1879).
Reference: Sankolli, 1966

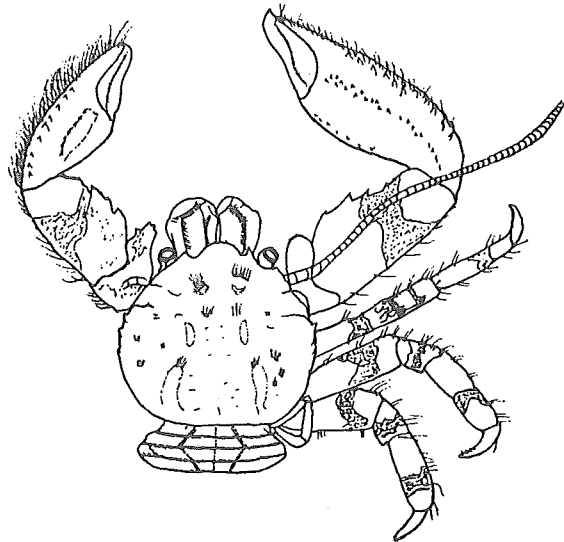


Fig. 68. *Pisidia spinulifrons* (Miers, 1879) entire, dorsal view (after Sankolli, 1966)

- Lateral margin of carapace with 2 or 3 spines, margins of frontal lobes without serration. Mesial margin of carpus of P. 1 without any tooth; manus without setae *Pisidia dehaanii* (Krauss, 1843)
References: Tirmizi *et al*, 1982, 1989

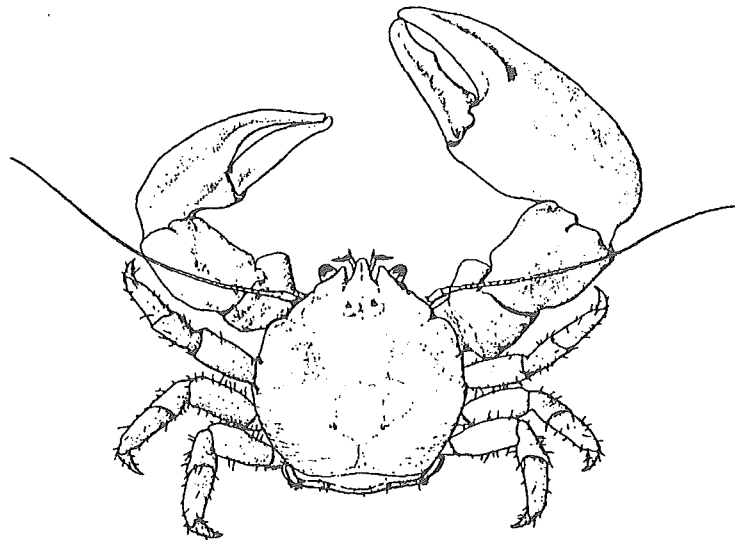


Fig. 69. *Pisidia dehaanii* (Krauss, 1843); entire, dorsal view (after Tirmizi *et al.*, 1982)

- Lateral margin of carapace with 3 spines, margins of frontal lobes with plumose setae. Mesial margin of carpus of P. 1 with two prominent teeth 68

68. Manus with a row of tubercles near outer face *Pisidia delagoae* (Barnard, 1955).

References: Tirmizi *et al*, 1982, 1989

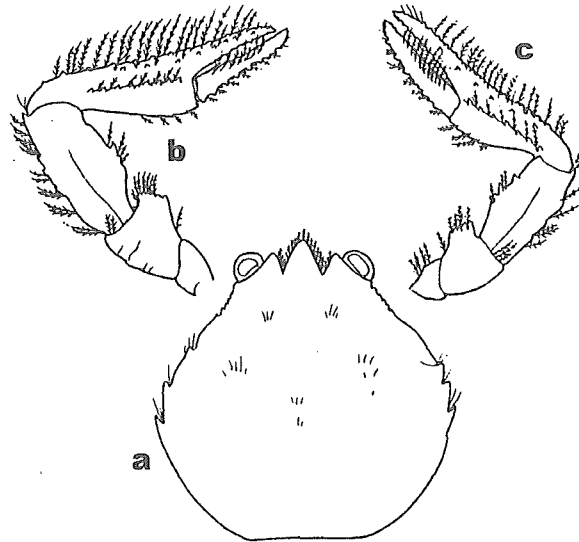


Fig. 70. *Pisidia delagoae* (Barnard, 1955); a) carapace, dorsal view; b) left P.I, outer surface; c) right P.I, outer surface (after Tirmizi *et al.*, 1982)

- Manus without any spine or tubercle, only serrations present on the outer face *Pisidia inaequalis* (Heller, 1861)

Reference: Hogarth, 1988

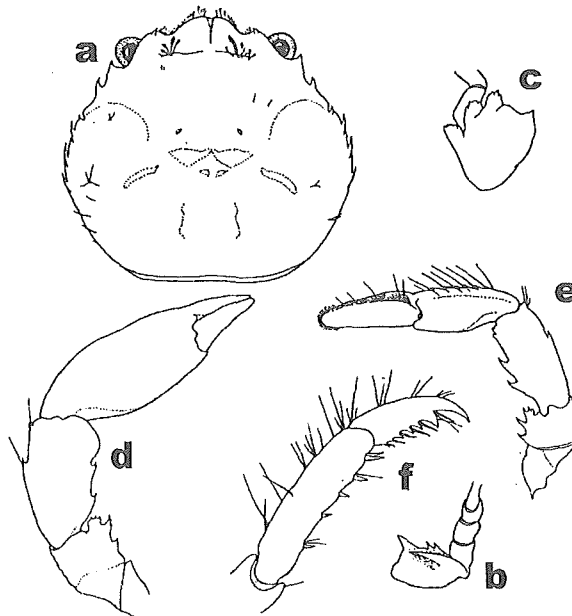


Fig. 71. *Pisidia inaequalis* (Heller, 1861); a) carapace and eyes, dorsal view; b) anterior part of antennule; c) anterior part of antenna; d) left P.I outer surface; e-j) chelae of P.I; k) propodus and dactylus of right P.III; g) right P.I outer surface (after Lewinson, 1969)

69. Carapace strongly convex front to back, dorsal surface smooth or somewhat roughened, regions clearly marked. Front horizontal or somewhat deflexed, appearing broadly triangular or rounded in dorsal view

..... Genus *Ancylocheles* Haig, 1978.

P.I rather hairy, upper surface not sculptured with ridges and tubercles but with distinct rugae, inner margin of carpus with 2 serrated edged teeth.

A single species: *Ancylocheles gravelei* (Sankolli, 1963)

Reference: Sankolli, 1963



Fig. 72. *Ancylocheles gravelei* (Sankolli, 1963); carapace and eyes with left P.I, dorsal view (after Sankolli, 1963)

- Carapace with dorsal surface smooth unarmed, convex. Front horizontal, strongly tridentate or trilobate in dorsal view

..... Genus *Porcellana* Lamarck, 1801.

A single species: *Porcellana persica* Haig, 1966

Reference: Haig, 1966

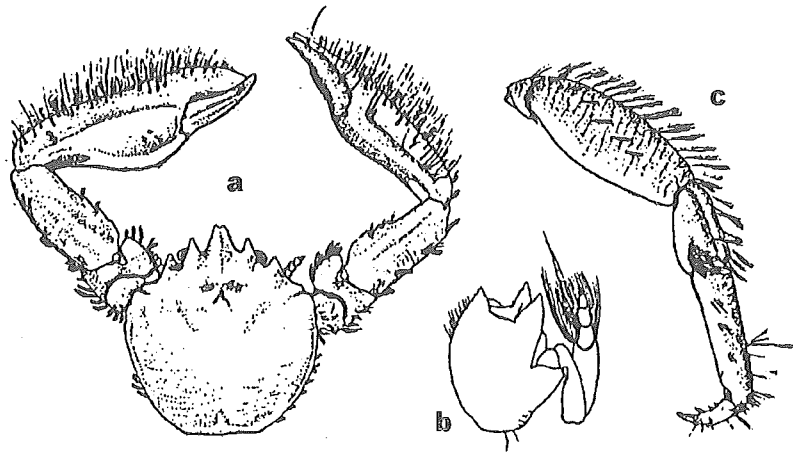


Fig. 73. *Porcellana persica* Haig, 1966; a) carapace with both P.I, dorsal view; b) right antennule; c) right P.II, lateral face (after Haig, 1966)

- Carapace nearly as long as broad, rounded, dorsal surface strongly areolate and sometimes spinulate regions distinctly marked. Front broad, deflected near tip
 Genus *Enosteoides* Johnson, 1970.
 A single species: *Enosteoides ornatus* (Stimpson, 1858)
 Reference: Tirmizi *et al.*, 1989

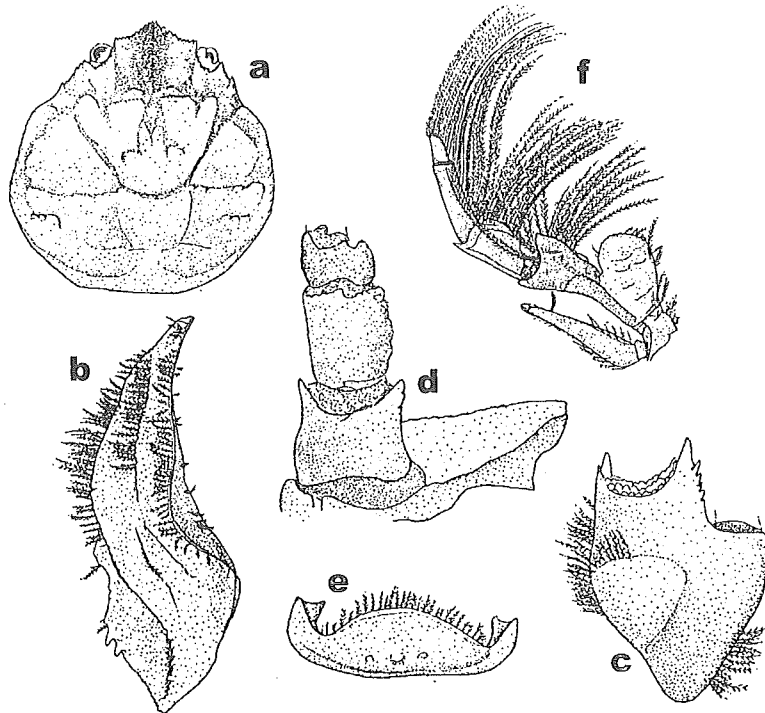


Fig. 74. *Enosteoides ornatus* (Stimpson, 1858); a) carapace and eyes, dorsal view; b) side wall of carapace; c) proximal part of antennule; d) proximal part of antenna e) maxp. III; f) sternum of maxp. III (after Tirmizi *et al.*, 1989); right P.I, outer face; right P.II, lateral face (after Haig, 1992)

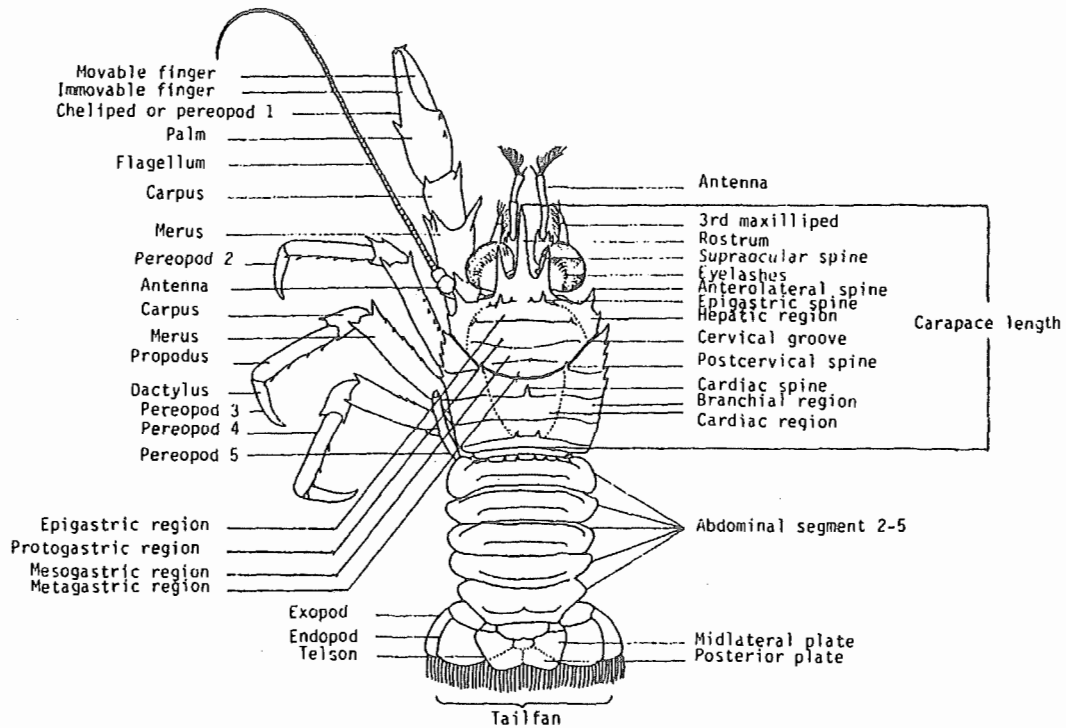


Fig. 75. Schematic diagram of a galatheid (modified from Baba *et al*, 1986)

- 70. Telson transversely fissured, folded beneath preceding abdominal segment. Cutting edge of mandible serrated Family Chirostylidae Ortmann, 1892 71
- Telson not folded beneath preceding abdominal segment. Cutting edge of mandible entire Family Galatheidae Samouelle, 1819 76

- 71. Two pairs of supraocular spines. Mandible smooth or feebly dentate on incisor margin Genus *Eumunida* Smith, 1883.
 A single species: *Eumunida funambulus* Gordan, 1930
 Reference: Baba, 1988

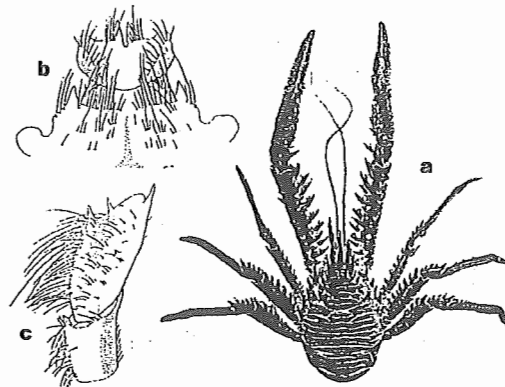


Fig. 76. *Eumunida funambulus* Gordan, 1930; a) entire, dorsal view; b) anterior part of sternal segments; c) part of endopod of left maxp. III, dorsal view

- No supraocular spines; mandible strongly dentate on incisor margin 72
- 72. PI-P.V usually spinose and slender 73
- PI-P.V not extremely spinose, shorter or moderate length
..... Genus *Uroptychus* Henderson, 1888 74
- 73. Rostrum absent Genus *Chirostylus* Ortmann, 1892
A single species: *Chirostylus micheleae* Tirmizi and Khan, 1979
Reference: Tirmizi and Khan, 1979

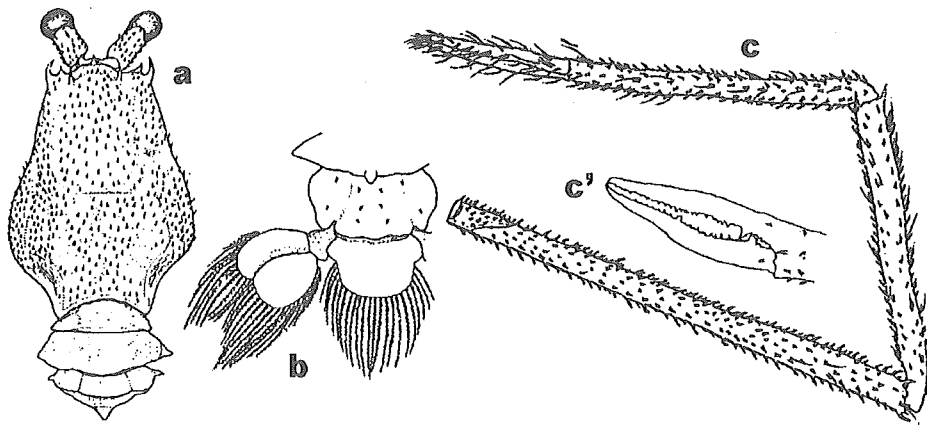


Fig. 77. *Chirostylus micheleae* Tirmizi and Khan, 1979; a) carapace, eyes and abdomen; b) telson and uropod; c) left P.I outer surface; c') same chela, outer surface (after Tirmizi and Khan, 1979)

- Rostrum present and spiniform Genus *Gastroptychus* Caullery, 1896.
P.I very slender. Fifth tergum with two transverse rows of spines.
A single species: *Gastroptychus hendersoni* (Alcock and Anderson, 1899).
= *Chirostylus hendersoni* Alcock and Anderson, Ref. to change Baba *et al*, 1986.
References: Tirmizi, 1964

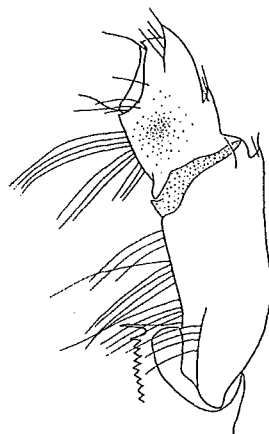


Fig. 78. *Gastroptychus hendersoni* (Alcock and Anderson, 1899). Median part of maxp. III (after Tirmizi, 1964)

74. Carapace almost smooth, no granules or spinules. Gastric area with a pair of spines
 *Uroptychus nigricapillis* Alcock, 1901
 Reference: Tirmizi, 1964

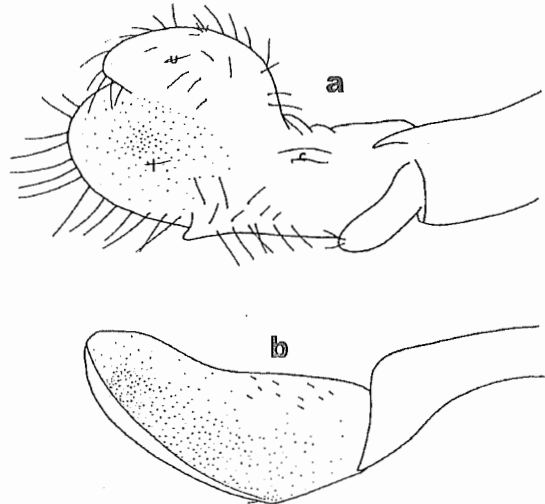


Fig. 79. *Uroptychus nigricapillis* Alcock, 1901; (♂) a) left Pl. I, dorsal view; b) left Pl. II, ventral view (after Tirmizi, 1964)

- Carapace and P. I covered with granules or spinules 75

75. Carapace and P. 1 covered with granules. No gastric spines, P. 1 stout, three and a half times as long as carapace *Uroptychus brachydactylus* Tirmizi, 1964
 Reference: Tirmizi, 1964

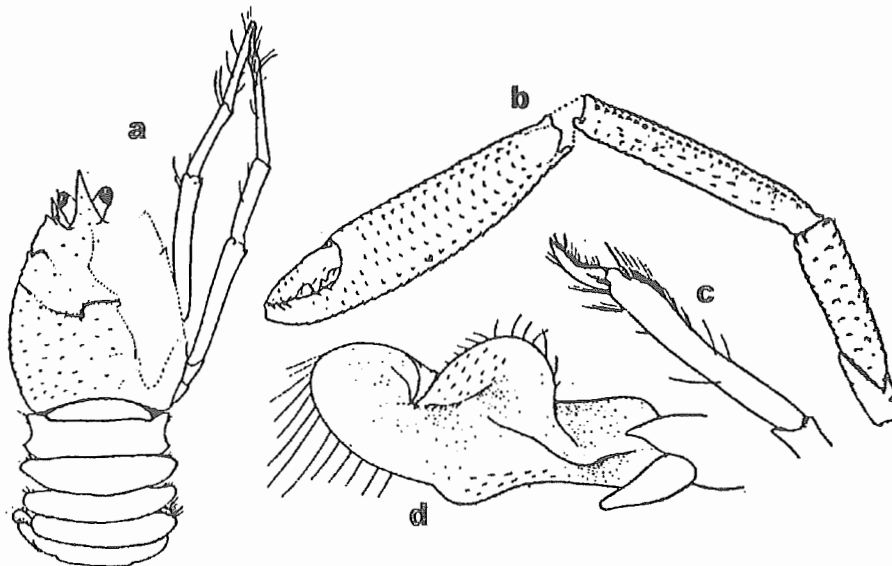


Fig. 80. *Uroptychus brachydactylus* Tirmizi, 1964; a) entire, (partially) dorsal view; b) right P. I outer surface; c) right P. III, propodus and dactylus, lateral face; d) distal part of left Pl. II, ventral view (after Tirmizi, 1964)

- Carapace and P. 1 covered with spinules *Uroptychus spinimanus* Tirmizi, 1964
References: Tirmizi, 1964

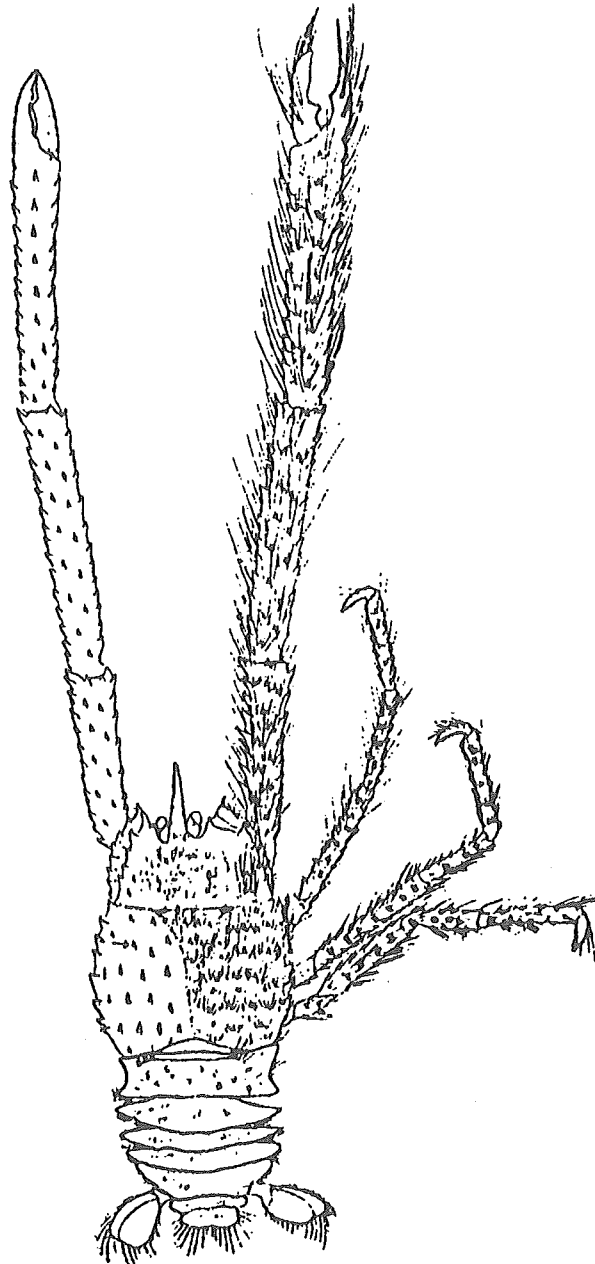


Fig. 81. *Uroptychus spinimanus* Tirmizi, 1964; entire, (partially) dorsal view (after Tirmizi, 1964)

- 76. Eyes usually well-developed; exopod of Maxp. 1 with flagellum
..... Subfamily Galatheinae Ortmann, 1892 77
- Eyes usually reduced; exopod of Maxp. I without flagellum
..... Subfamily Munidopsinae Ortmann, 1892

A single genus *Munidopsis* Whiteaves, 1874 80

77. Endopod of uropod extremely wide Genus *Lauriea* Baba, 1971.

A single species: *Lauriea gardineri* (Laurie, 1926)

Reference: Tirmizi, 1966

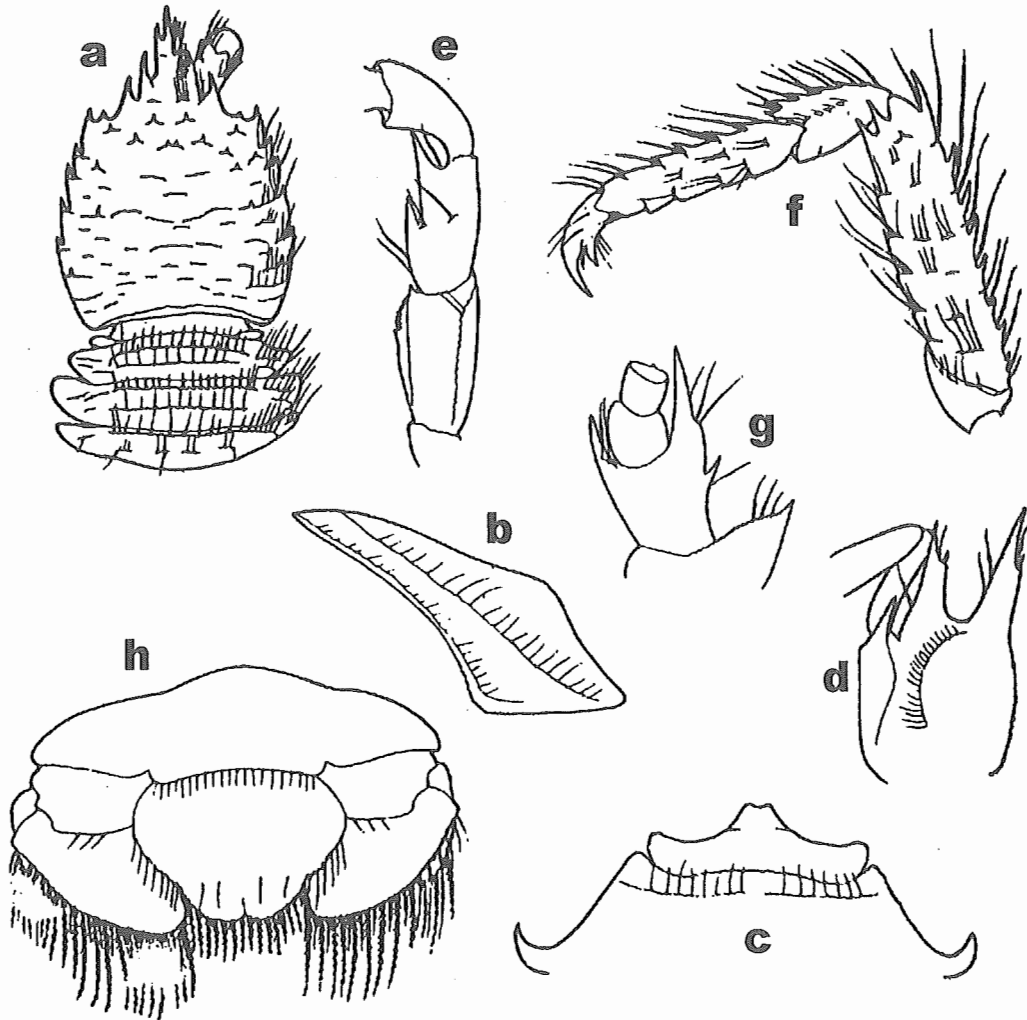


Fig. 82. *Lauriea gardineri* (Laurie, 1926); a) carapace with right eye and abdomen, dorsal view; b) right pterygostomian, flap; c) anterior part of sternal segments; d) basal segment or right antennule; e) part of endopod of left maxp. III, ventral view; f) left P.II; g) right antennular peduncle, ventral view; h) last abdomen segment, telson and uropods, dorsal view (after Tirmizi and Javed, 1993)

- Endopod of uropod normal, about as long as wide 78

78. Rostrum leaflet-like with tiny distolateral and distinct basilateral teeth

..... Genus *Phylladorhynchus* Baba, 1969

A single species: *Phylladorhynchus serrirostris* (Melin, 1939)

References: Tirmizi and Javed, 1980



Fig. 83. *Phylladorhynchus serrirostris* (Melin, 1939); a) carapace with right eye and abdomen, dorsal view; b) right pterygostomial flap; c) anterior part of sternal segment; d) basal segment of right antennule; e) right antennal peduncle; f) ischium and merus of right Maxp.III; g) right Pl.I (after Tirmizi and Javed, 1980)

- Rostrum with 3-5 distinct spines 79

79. Rostrum with 3 lateral teeth including supraorbital spine on each side. Second segment of antennal peduncle lacking distomedian spine. Third thoracic sternum strongly produced anteriorly, nearly triangular

..... Genus *Coralligalathea* Baba and Javed, 1974

A single species: *Coralligalathea humilis* (Nobili, 1905)

Reference: Lewinsohn, 1965

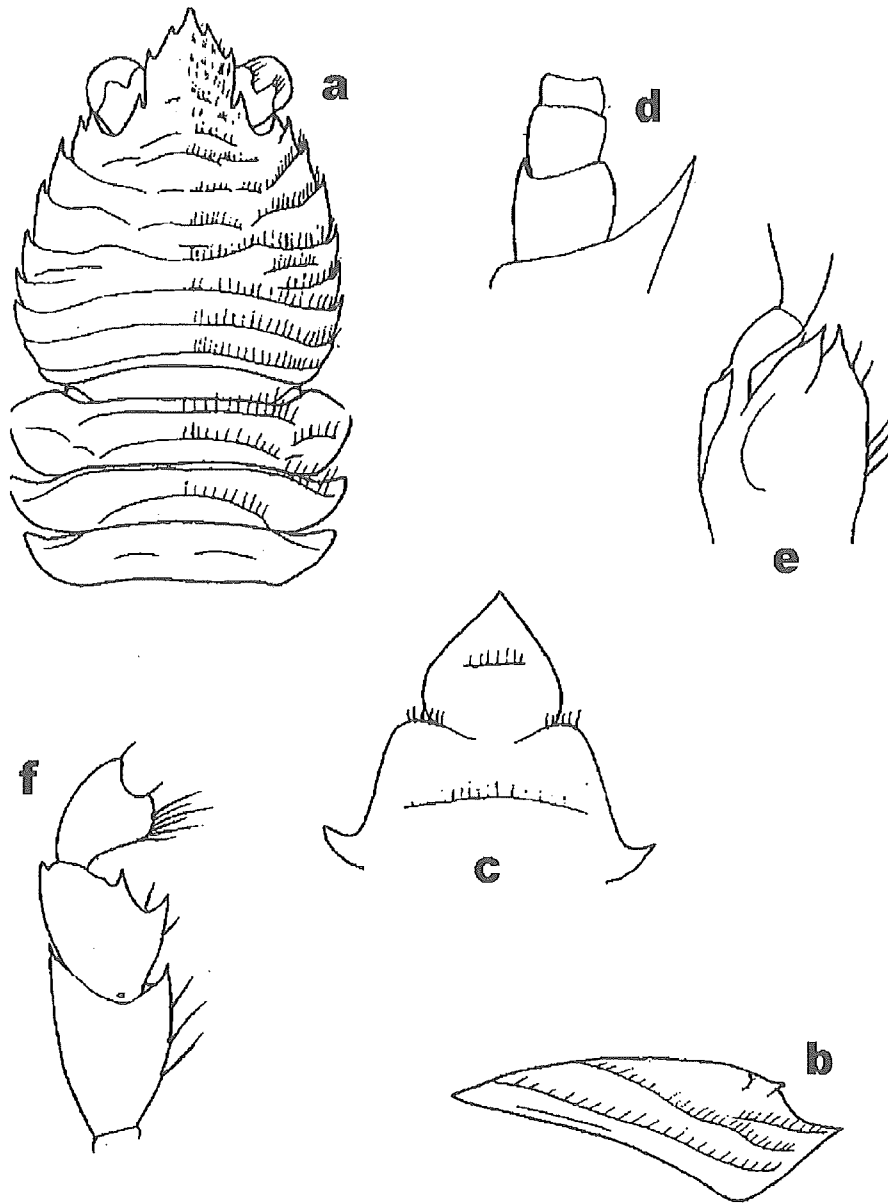


Fig. 84. *Coralligalathea humilis* (Nobili, 1905); a) carapace with eyes and abdomen, dorsal view; b) right pterygoslomian flap; c) anterior part of sternal segments; d) right antennal peduncle, ventral view; e) basal segment of right antennule, dorsal view; f) part of endopod of right maxp. III, ventral view (after Tirmizi and Javed, 1993)

- Rostrum with 4 lateral teeth including supraorbital spine on each side; second segment of antennal peduncle with an outer and an inner distal marginal spine. Third thoracic sternum relatively short and narrow, anterior margin distinctly or indistinctly bilobed Genus *Galathea* Fabricius, 1793 84
- 80. Epipods present on P.I-P.V 81
- Epipods absent from all pereopods 82
- 81. Epipods present on P.II or P.I only *Munidopsis dasypus* Alcock, 1894
Reference: Tirmizi, 1966

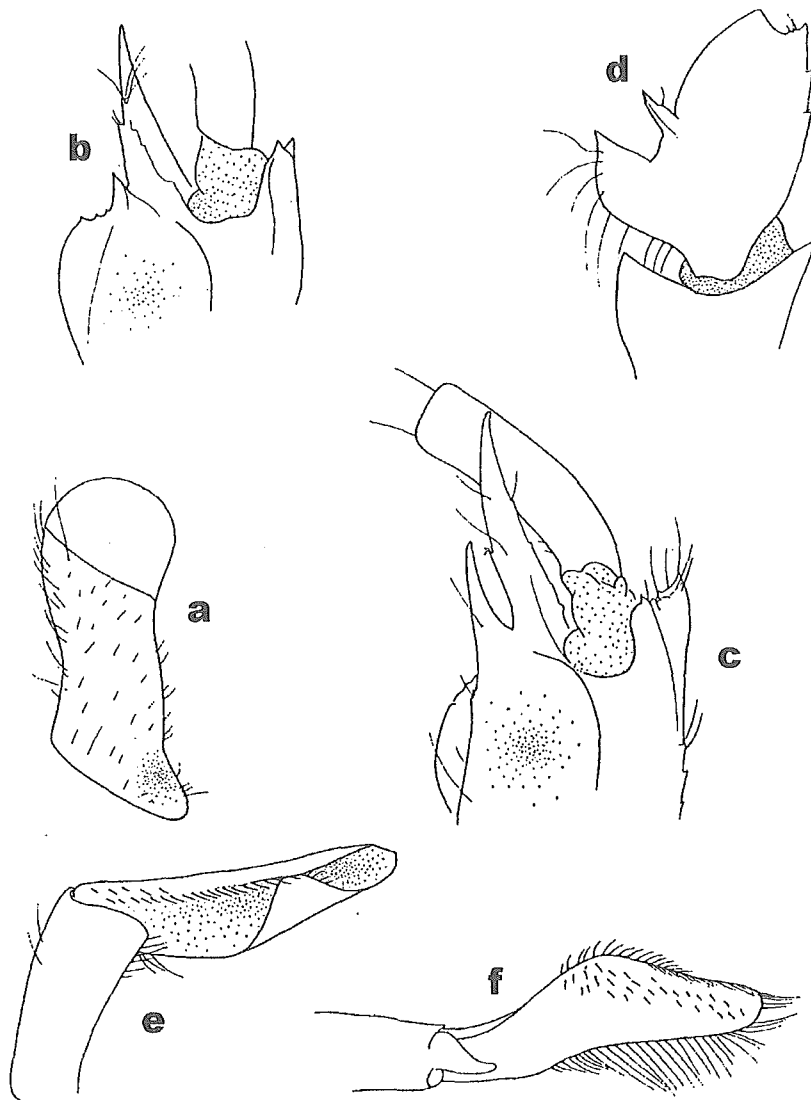


Fig. 85. *Munidopsis dasypus* Alcock, 1894; a) right eye of ♀, lateral view; b) part of left antennule ♂, dorsal view; c) same of ♀; d) middle part of left maxp. III of ♀; e) right pl. I of ♂, dorsal view; f) distal part of right pl. II of ♂, ventral view (after Tirmizi, 1966)

Epipods present on P.I to P.III. Carapace covered with setose scale like tubercles
 *Munidopsis rostrata* (A. Milne Edwards, 1880).

= *Galacantha rostrata* A. Milne Edwards,

References: Tirmizi, 1966. Reference to change: Baba 1988

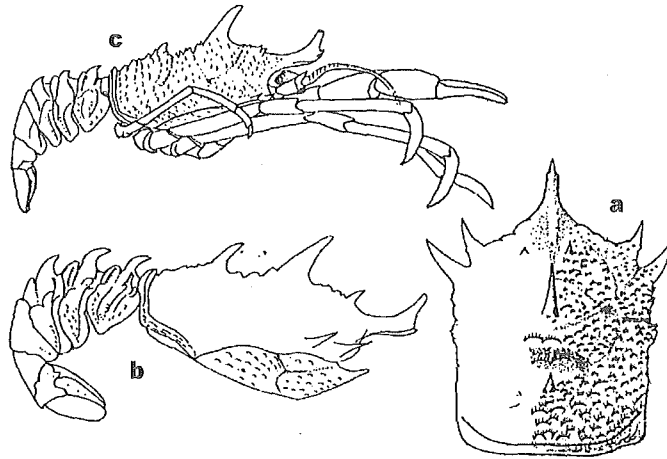


Fig. 86. *Munidopsis rostrata* A. Milne Edwards, 1880; a) carapace of ♀, dorsal view; b) same, lateral view of ♀; c) same, lateral view of ♂ (after Tirmizi, 1966)

82. Entire posterior border of carapace armed *Munidopsis scobina* Alcock, 1894

References: Tirmizi, 1966

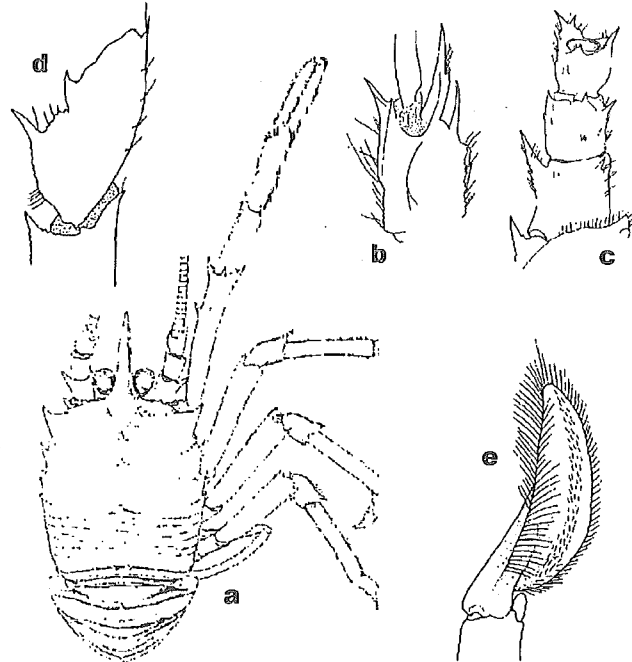


Fig. 87. *Munidopsis scobina* Alcock, 1894; a) entire (partially), dorsal view; b) right antennule, dorsal view; c) right antennal peduncle, ventral view; d) middle part of left maxp. III; e) distal part of left second pleopod of male, ventral view (after Tirmizi, 1966)

- Posterior border of carapace unarmed or with a few median spines 83
- 83. Basal antennular segment with two outer terminal spine
 *Munidopsis trifida tomentosa* Benedict, 1902.
 References: Benedict, 1902; Tirmizi, 1966

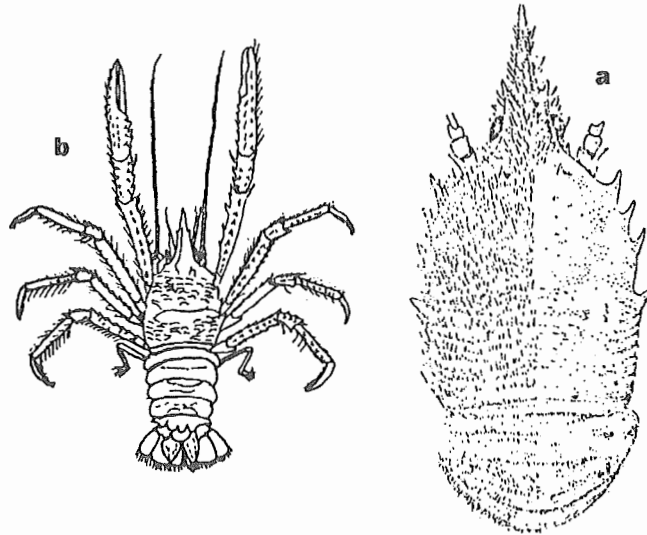


Fig. 88. *Munidopsis trifida tomentosa* Benedict, 1902; a) carapace, eyes, antennae abdomen, dorsal view; b) entire, dorsal view (after Baba, 1988)

- Basal antennular segment with two outer and one inner distal spine
 *Munidopsis stylirostris* Wood-Mason, 1891
 Reference: Alcock and Anderson, 1899

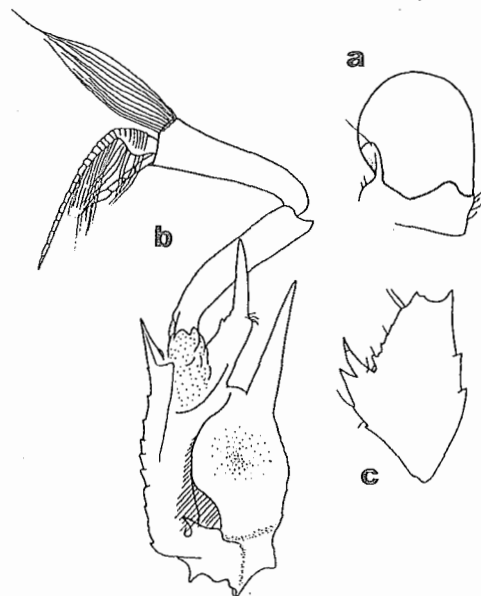


Fig. 89. *Munidopsis stylirostris* Wood-Mason, 1891; a) right eye; b) right antennule, dorsal view; c) merus of left maxp. III (after Tirmizi, 1966)

84. Anterior gastric spines present 85
 - Anterior gastric spines absent *Galathea omanensis* Tirmizi and Javed, 1993.
 References: Tirmizi and Javed, 1993

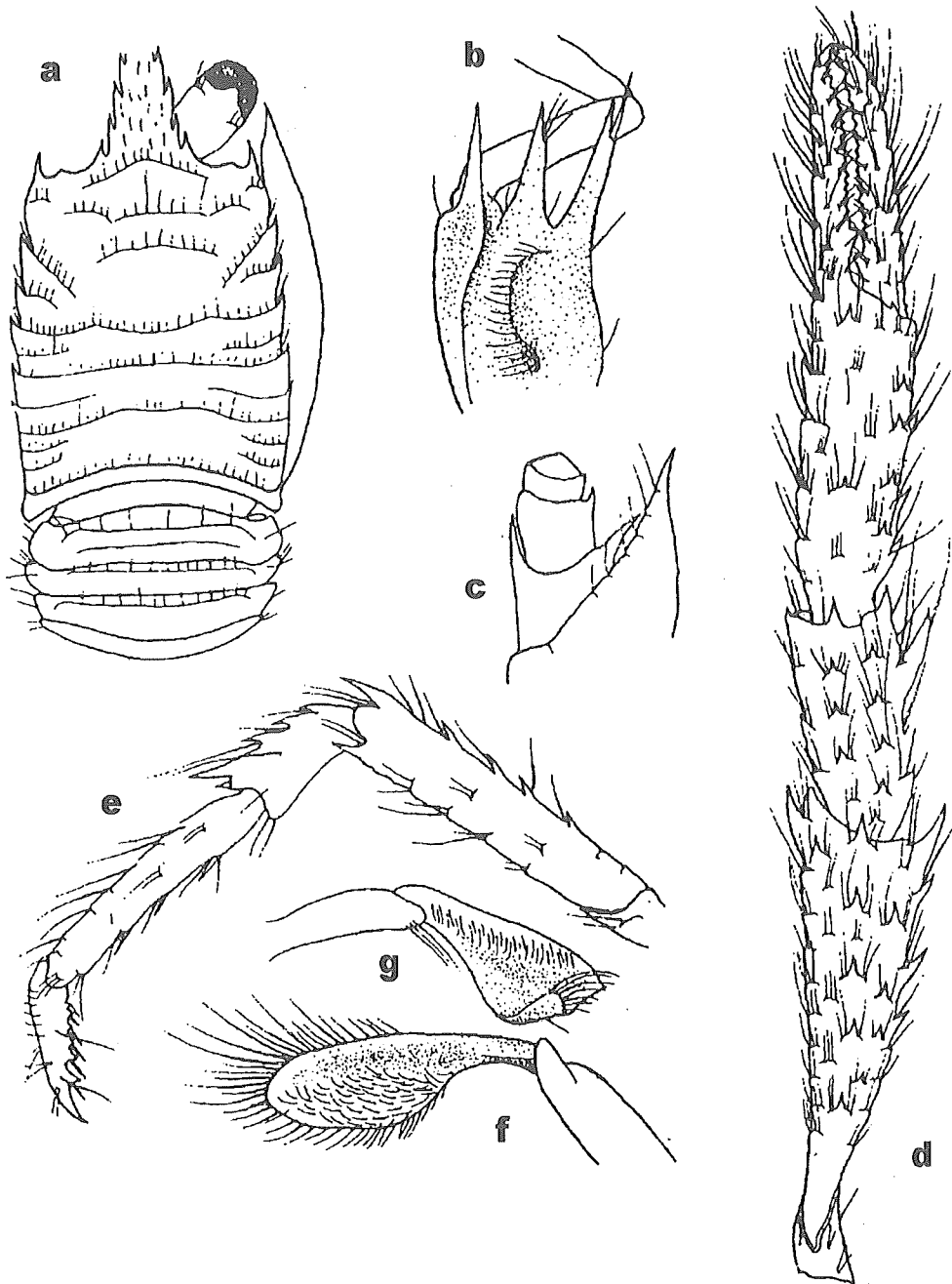


Fig. 90. *Galathea omanensis* Tirmizi and Javed, 1993; a) carapace, right eye; b) basal segment of right antennule, dorsal view; c) part of right antennal peduncle, ventral view; d) left P.I, outer surface e) left P.II, lateral face; f) right Pl. I; g) right Pl. II (after Tirmizi and Javed, 1993)

85. Basal antennal spine outreaching spine of following segment
- *Galathea balssi* Miyake and Baba, 1964.
 =? *G. whiteleggei* Tirmizi, 1966.
 = *albatrossae* Baba, 1988.
 Ref: to change: Haig, 1973;
 Baba, 1988 respectively.

References: Tirmizi, 1966

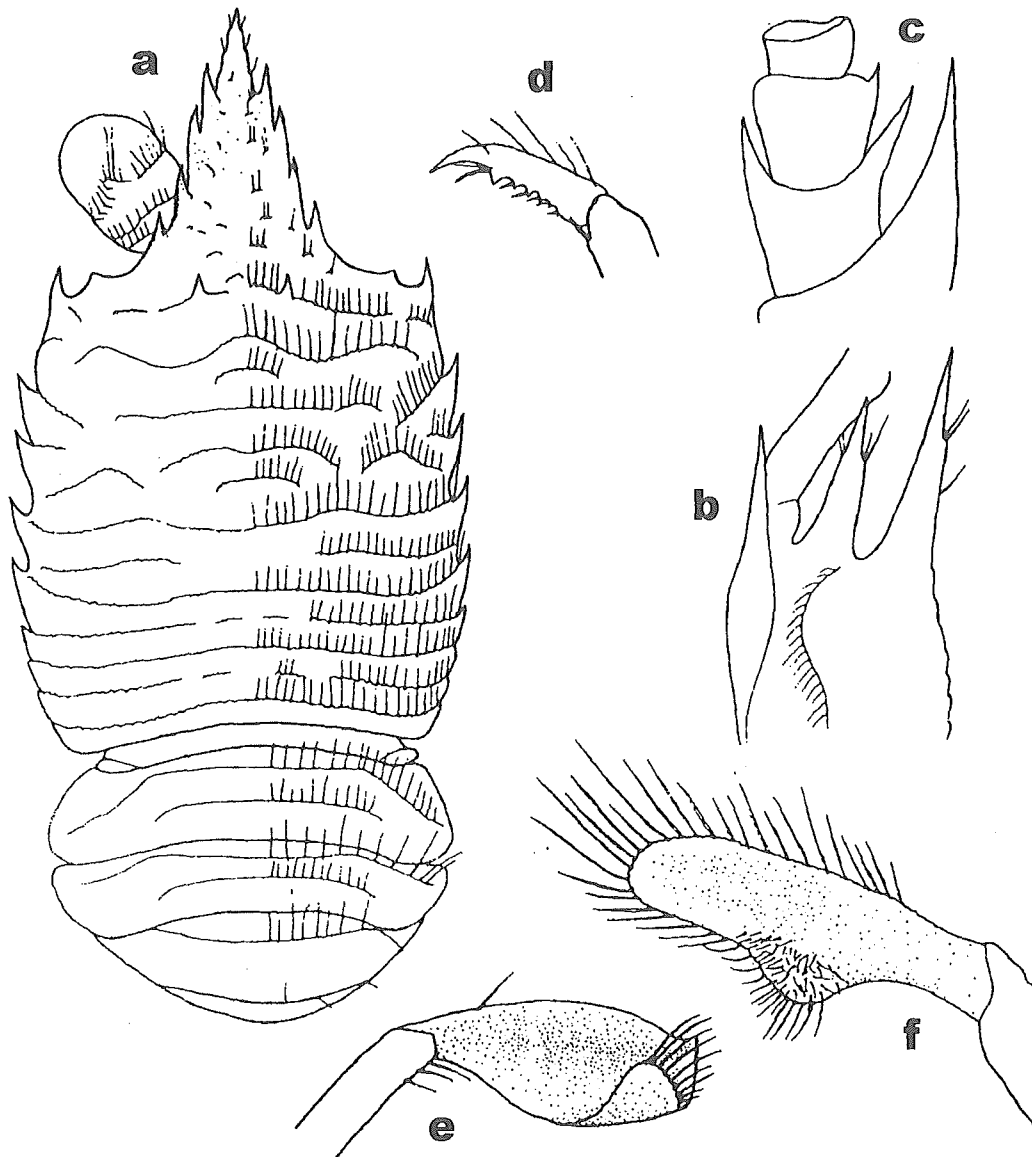


Fig. 91. *Galathea balssi* Miyake and Baba, 1964, a-d ♀ and e,f, ♂; a) carapace, left eye and abdomen, dorsal view; b) basal segment of right antennule; dorsal view; c) right antennal peduncle, ventral view; d) part of propodus and dactylus of a P.; e) right Pl. I; f) left Pl. II (after Tirmizi and Javed, 1993)

- Basal antennal spine not outreaching spine of following segment 86

86. Anterior margin of pterygostomian flap unarmed *Galathea keiji*
Tirmizi and Javed, 1993.

References: Tirmizi and Javed, 1993

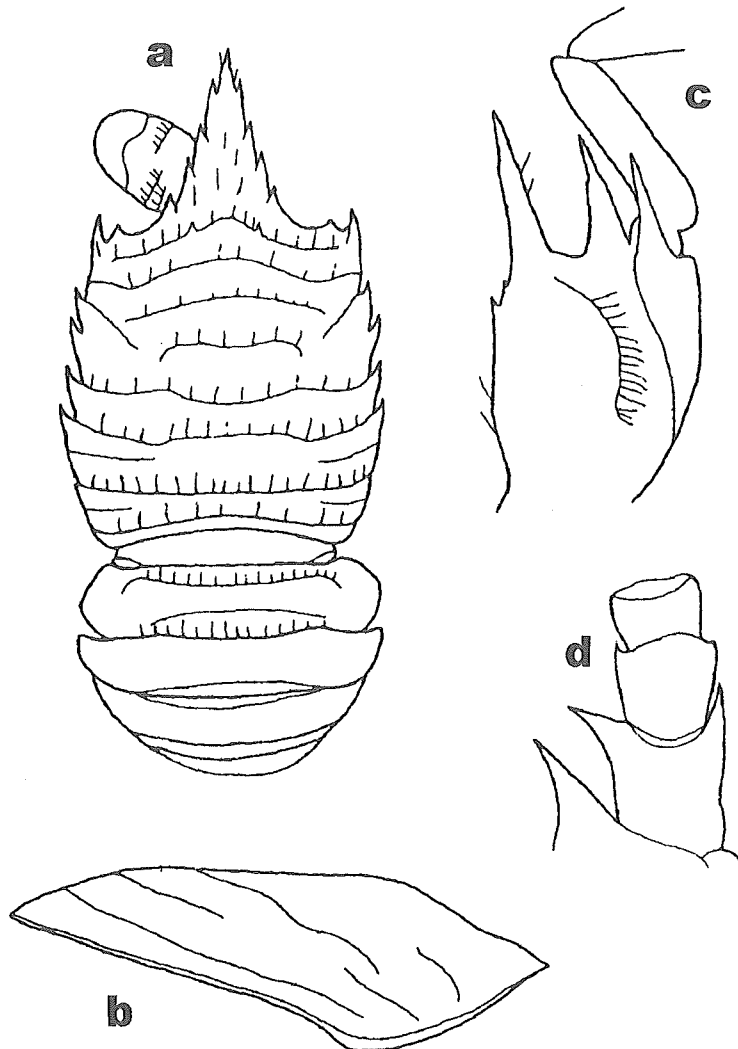


Fig. 92. *Galathea keiji* Tirmizi and Javed, 1993 ♀; a) carapace, left eye and abdomen dorsal view; b) right pterygostomian flap; c) basal segment of left antennule, dorsal view; d) left antennal peduncle, ventral view (after Tirmizi and Javed, 1993)

- Anterior margin of pterygostomian flap armed *Galathea orientalis*
Stimpson, 1858.

Reference: Tirmizi, 1966

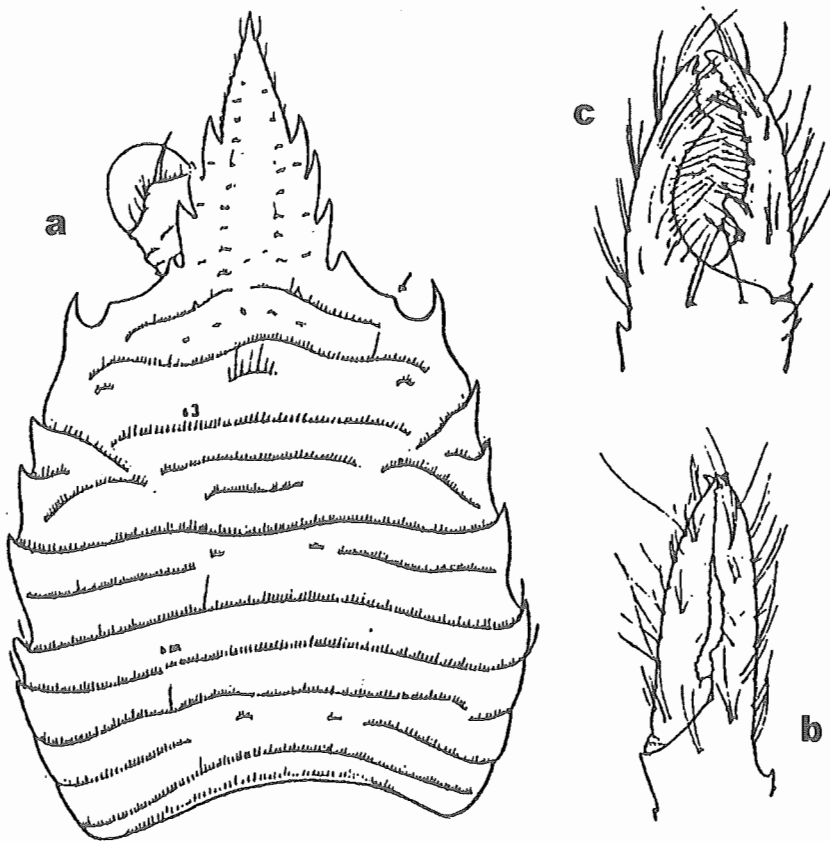


Fig. 93. *Galathea orientalis* Stimpson, 1858 ♂; a) carapace and left eye; b) left chela of larg ♂ outer surface; c) right chela of small ♂ outer surface (after Tirmizi, 1966)

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