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DESCRIPTION OF SEVEN NEW SPECIES AND ONE NEW RECORD OF PILUMNINAE : XANTHIDAE : DECAPODA : CRUSTACEA FROM INDIA

By

MAYA DEB

Zoological Survey of India, Calcutta.

ABSTRACT

In the present paper seven new species of the Pilumninae crabs are described. Photographs and text figures of carapace and anterior male pleopods for each specimens, where male specimen present, are included. Their relationships, affinities and differences with the other known allied species are discussed. Some other related species with inadequate description and doubtfully identified are also treated in the paper in detail.

INTRODUCTION

During the course of study of the named and unnamed Pilumninae crab material present and preserved in the collection of Zoological Survey of India, the author came across a number of species of the genera *Pilumnus* and *Parapilumnus* which are so far underscribed and inadequately described. As the publication of a comprehensive report on this material in the form of fauna is likely to take some time, the new forms along with the newly recorded from are being described in the present paper. Type specimens for the new species are deposited in the Zoological Survey of India, Calcutta.

A male young carb from Karachi, described by Alcock (1898 : 198) as a variety is redesignate here as *Pilumnus kempi* after having studied a series of crabs from Port Okha (west coast of India) and from Gulf of Suez.

The description given by Borradaile, 1902 for *Pilumnus rotundus* was based on a very young specimens and it was felt quite inadequate. After observing a large female from Sri Lanka and a small female from Ross Island (Andamans) the species has been redescribed here in detail to facilitate its easy diagnosis.

SYSTEMATIC ACCOUNT

The subfamily Pilumninae of the family Xanthidae, now comprises more than twelve genera and many named species from the temperate and tropical oceans. *Pilumnus* and *Actumnus* comprise largest number of species.

The close resemblance of the species and want of their photograpes and very little knowledge of their systematic characters are main cause of the present state of disorder in them. Except slight differences of carapace nature, in the type of hairyness, granulations and the nature of distal ends of their anterior

male pleopods, these species are very alike each other. The size, shape, dimensions of carapace, nature of granulations, spination, hairiness etc are the discriminating characters now used to separate them. The splitting and grouping of the species into twelve or more genera made by the carcinologists in recent years, has been accepted here as such but there is still some overlapping or confusion. More subdivisions of genera can be made if the features like sharp, microscopic, granules or tubercles or nodules and spine etc are considered.

A list of holdings of Z.S.I., and the species recorded so far from India, has been provided. A key has been prepared for different genera of the subfamily Pilumninae and another for the Indian species of the genera *Pilumnus* and *Parapilumnus*. The species marked with asterix are newly recorded and added to Z.S.I., collection during the present study.

Key to the Indian genera of subfamily Piluminnae

1. Carapace slightly broader than long, convex, regions well lobulated, covered with thin or dense tomentum and granules. Posterolateral sides concave or not. Front one third of carapace in width and separated from the inner supraorbital corner.

   Actumnus Dana 1851

2. Anteriorly very broad carapace, triangular in shape, very convex, regions not at all demarcated. No indications of antero-lateral tooth present, carapace and appendages tomentose and sharp, minutely gramular on upper surfaces. Orbits dorsal, entirely closed cavity, and wide apart. Front $\frac{3}{4}$ of width of carapce, six lobed. Anterolateral sides rounded and minutely granular only, no indications of teeth; posterolateral sides deeply concave for accomodating last pair of legs.

   Dacryopilumus Nobili 1906

3. Carapace quadrilateral in shape, moderately convex, surface granular, tomentose. Orbits very small and present on underside of carapace, outline of the crab is quite entire except small spinules present on anterolateral sides. Regions not difined. Front narrow, triangular, hollowed and grooved medially. Anterolateral sides evenly rounded and minutely spiny.

   Caecopilumnus Borradaile 1902

4. Carapace quadrate to transversely ovate, little convex, regions demarcated, orbits normal, antero-lateral sides armed with three trnncated, broad, prominent teeth except the outer orbital angle. Frontal lobes separated from inner supra-orbital angle. Rows of hairs present on frontal edge and clusters of hairs on anterior half of carapace.

   Nanopilumuus Takeda 1974

5. Carapace small, slightly broader than long, thick, hexagonal, surface, hairy, roughened with fine granules, regions faintly marked, Anterolateral sides may not or may be armed with three or four low, small, spinules, including the outer orbital angle. Front less than half of carapace and not separated from the inner supra orbital angle.

   Maldivia Borradaile 1902

6. Carapace broadly oval, convex, regions not well defined, surface smooth, glabrous. Anterolateral sides of carapace armed with three, shallow teeth including the outer orbital angle. Front $\frac{1}{3}$ of width of carapace, two truncated lobes but no outer lobule is marked.

   Glabropilumnus Balss 1933

7. Carapace little broader than long, subcircular in shape, thick, convex, regions faintly marked, surface minutely granular and hairy. Antero lateral sides of carapace armed with small, white coloured 3-7, 8 tubereles, instead of teeth. Front $\frac{1}{3}$ or narrower, outer angle of frontal lobes not marked and not separated.

   Globopilumnus Balss 1933

8. Carapaee little broader than long, convex, roughly hexagonal in shape regions ill defined scantily tomentose, granular near the epibranchial regions, these granules are arranged in rows. Antero lateral sides armed with four teeth, including outer orbital angle.
Pilumnopeus A.M. Edw 1863

9. Usually small or medium sized crab, carapace subcricular, deep, not much broader than long, surface covered with transverse rows or tufts of hairs and tomentum, surface granules are less marked. Anterolateral sides usually with 3-4 teeth. Frontal lebes without any distinct outer lobules & not separated from the inner supra orbital corner.
Parapilumnus Kossman 1877

10. Carapace transversely oval, square or subquadrilateral, tomentose, thin or thick, swollen or not, deep hairy, surface sharply or plainly granular, rough, setose, regions faintly marked or plainly demarcated. Anterolateral sides shorter than posterolateral and usually armed with spines or conical teeth. Outer angle of two frontal lobes indipendent, dentiform, or spiniform and well separated from the inner supra orbital angle by a notch.
Pilumnus Leach 1815

11. Carapace rather thin, square in shape or subquadrilateral, surface smooth or sharply granular, hairy, regions faintly demarcated or not, the carapace and appendages covered with long, silky, soft hairs and tomentum. Front $\frac{1}{3}$ of greatest width of carapace, bilobed, deflexed, convex, outer corner of the lobes not marked off. Antero lateral sides slightly curved and armed with 2-3 spines or teeth or low lobes.
Heteropilumnus deMan 1895

12. Carapace just like Pilumnus, the original name of the present genus. The main diagnostic generic features which differentiate it from *Pilumnus* are, the male abdomen is slender, the last segment is much longer than the preceeding one. Distally the anterior male plepod is a straight process not 'S' like curved, tip not curved or gradually tapered.
Bathypilumnus Ng. and Tan 1984.

Pilumnus Leach

Pilumnus Leach 1814 : 21 ; Alcock 1898 : 190 ; Rathbun 1923 : 108 ; Balss 1938 : 10 ; Barnard 1950 : 262 ; Sakai 1939 : 535 ; Takeda and Miyake 1968 : 7.

Carapace and appendages are generally covered with hairs. Carapace is generally not much broader than long or transversely oval or subcircular in shape ; regions outlined or not. Surface hairy, granular or not, convex or flat. Antero lateral sides usually shorter than posterolateral and with four teeth or spines including outer orbital corner. Front usually narrow, bilobed, outer angle of each lobe forms an independent lobule separated on both sides. Orbits have one or two notches on upper and one on lower border ; the lower inner orbital angle is commonly sharp and prominent. The eye sialks are moderately long & narrow. The antennules fold transversely ; basal antenna joint is touching the front or not. The chelipeds are unequal specially in adult male or not. Fingers are short and pointed at the tips. The abdomen of the male is seven segmented ; anterior male pleopod 'S' like, curved, narrow tubular process.

Remarks : Large number of species were assigned to this genus previously, but for the sake of convenience they have been split into more than 12 genera. In the present paper 7 new species have been described and added to the existing list of Indian species.

Key to the Indian species of Pilumnus

A. Carapace little or more broader than the length—

1. Entire crab covered with thick coat of hairs ... C
2. Entire crab covered with thin coat of fine hairs ... E

	3. Entire crab is bare, almost no hairs present ...	B
B. 1.	Carapace square shaped, with 3 accuminate ant. lat. teeth ...	D
	2. Carapace subquadrilateral with 3 spine tipped ant. lat. teeth ...	*cursor*
C 1.	Hairs soft, dirty brown, long, surface sculpture not visible ...	*vespertilio*
	2. Hairs stiff, golden yellow, bristle like sculpture not visible. ...	*kempi*
	3. Hairs stiff, yellowish ; small, deep crab, surface rough ...	*minutus*
	4. Hairs stiff, yellowish ; large, deep crab, surface tubercular ...	*ceylonicus*
D. 1.	lower distal half of larger palm smooth, upper edges of merii of legs spinous ...	*longicornis*
	2. Outer side of both palms sharply granular, Upper edges of merii of legs with one median and one distal spinules ...	*woodmasoni*
E. 1.	Convex, deep, broadly oval crab ...	F
	2. Convex, deep, hexagonal crab ...	G
	3. Convex, deep, globose, subcircular crab ...	H
F. 1.	Regions not difined, 3 ant, lat. spines ; wrists and hands spiny ...	*routundus*
	2. Regions well difined, 3 ant. lat. accuminate teeth, tubercular surface and appendages ...	*karachiensis*
	3. Regions well defined, 3 low, rounded teeth, granular chelae ...	*alcocki*
	4. Regions faintly defined, 3 accuminate teeth, minutely granular surface, chelae tubercular ...	*investigatoris*
	5. Regions faintly defined, 3 accuminate teeth, sharply granular all over ...	*scabriusculus*
G. 1.	Regions faintly marked, smooth, hairy, 3 ant. lat. spine ...	*maldivensis*
H. 1.	Regions well marked, granular, accuminate ant. lat. teeth, chelae with conical granules ...	*caerulescens*
	2. Regions well marked, spinous, hairy ; ant. lal. spines erect ; long spines on both the chelae, lower edge of larger palm bare ...	*dorsipes*

Subfamily **Pilumninae**

Genus (1) **Actumnus** Dana, 1851

Actumnus arbutum Alcock 1898
A. asper (Ruppell) 1830
A. dorsipes (Stimpson) 1858
A. fissifrons Alcock 1898
A. margaroides Mcgilchrist 1905
A. obesus Dana 1852
A. setifer (De Haan) 1833
A. tessellatus Alcock 1898
A. tomentosus Dana 1852
A. verrucosus Henderson 1893
A. tuberculata Mac Gil. 1905

Genus 2. **Caecopilumnus** Borradaile
C. hirsutus Borradaile 1902

Genus 3. **Dacryopilumnus** Nobili 1906
**D. rathbunae* Balss 1932

Genus 4. **Glabropilumnus** Balss 1932
G. disper (Dana) 1853
laevis (Dana) 1887

Genus 5. **Globopilumnus** Balss 1933
G. elegans (De Man) 1887-88
G. globosus (Dana) 1852

Genus 6. **Maldivia** Borradaile 1902
M. symbiotica Borradaile 1902
M. triunguiculata (Borradaile) 1902

Genus 7. **Nanopilumnus** Takeda 1974
**N. rouxii* (Balss) 1933
**N. barbatus* (A.M. Edw.) 1873a
**N. heterodon* (Sakai) 1934

Genus 8. **Parapilumnus** Kossmann 1877
P. guinotae n. sp.
P. trispinosus Sakai 1939
P. indicus n. sp.

Genus 9. **Pilumnus** Leach 1985
P. alcocki Borradaile 1902
P. cærulescens A. M. Edw. 1873a
P. cursor A. M. Edw. 1873a

P. longicornis Hilgendorf 1878
P. andersoni de Man 1988
P. maldivensis Borradaile 1902
P. minutus (De Haan) 1835
**P. rotundus* Borradaile 1902
P. dorsipes, Stimson 1858
P. scabrisculus Adams & White 1848
P. sinensis Gordon 1930
P. vespertilio (Fabricius) 1798
P. woodworthi Rathbun 1902
P. investigatoris n. sp.
P. *ceylonicus* n. sp.
P. karachiensis n. sp.
P. kempi n. sp.
P. woodmasoni n. sp.

Genus 10. **Pilumnopeus** A. M. Edw. 1863
?= Heteropanope Stimpson 1858
P. indicus (de Man. 1888).
P. eucratoides (Stimson 1858).
P. leavis (Dana 1852).

Genus 11. **Heteropanope** Stimpson 1858
?= Eurycarcinus A.M. Edward 1867
E. grandidieri A.M. Edw. 1867
E. orientalis A.M. Edw. 1867
**E. maculatus* (A.M. Edw. 1867)

Genus 12. **Heteropilumnus** De Man 1195
**H. ciliatus* (Stimson 1858)
H. anguistifrons (Alcock 1902)
H. beaumontii (Alcock 1900)
H. integra (Miers 1886)
H. quadrispinosa Zehntner 1894
H. setosa (A. M. Edw. 1873)

Pilumnus ceylonicus sp. nov.

(Plate XIII, fig. 1)

Holotype : female, from pearl Bank, Sri Lanka, collected by T. Southwell, in Jan.-Feb. 1911 ; W-24 mm, L-18 mm ZSI. Reg, No. C3732/2.

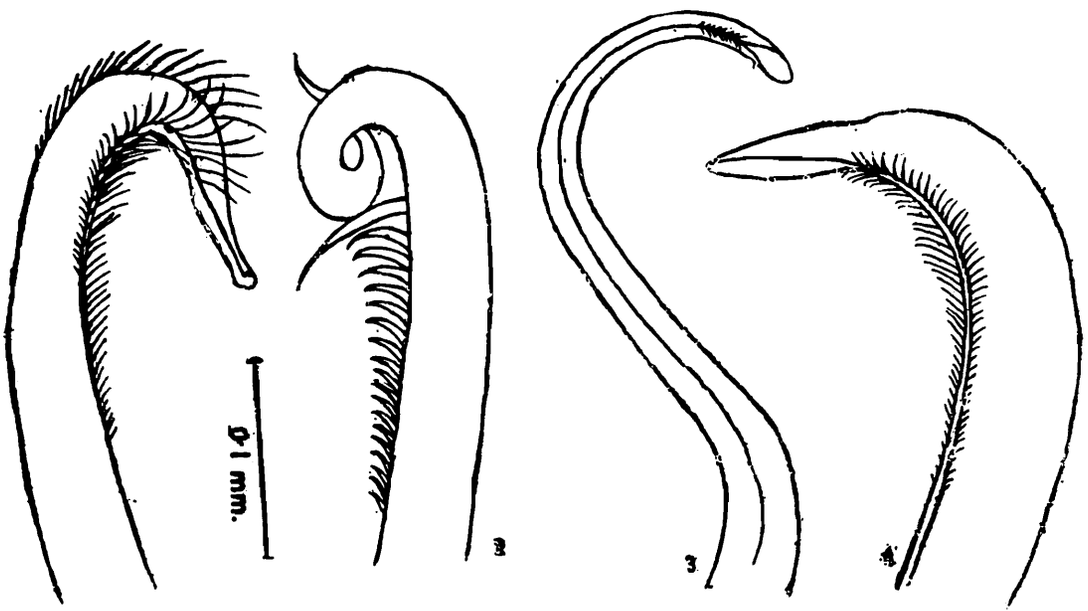
Carapace and the appendages thickly covered with both short and long, silky, golden yellow hairs and granules. Carapace not very board, roughly hexagonal in shape, more convex longitudinally than from side to side. Only the Meso and protogastric regions well demarcated and areolated. Anterolateral sides of carapace shorter than the posterolateral, and armed with three strong, errect, straight, white, sharp spines, except the outer orbital one which is tubercular. The first anterolateral spine smallest and last spine largest. A small subhepatic, blunt spine present. Inner frontal lobe prominent, deflexed, square shaped, free edge minutely granular or crenulate ; outer lobule distinct and well separated on both sides. Orbital edge crenulate, cut, with two dorsal notches and one gap just below the outer orbital corner. The side walls of the crab below the epibranchial region i.e. pterygostomian areas are finely granular. Chelipeds markedly unequal in female, all the edges of arm are granular, one sharp spine present on the upper distal edge. Inner corner of wrist bidentate ; outer surfaces of wrists and both the palms are entirely covered with scattered granules and thick, yellow, silky hairs, both short and long. The blunt, rounded, stout granules on the larger palm are less in number and arranged roughly in scattered way on rows and extended on the base of both the fingers upto a little distance. The granules on smaller hand are much more in number and sharper in nature. Fingers are white in colour and dactylus is very curved, like a birds beak. Leg joints thickly hairy, upper subdistal corner of all the merii of legs armed with a prominent, sharp, spine ; upper surface of the merus of only the last pair of legs and lower edges of all the merii of four pair of legs are granular, rough.

Remarks: The *P. ceylonicus* Deb, is closes to *P. orbitospinis* Rathbun 1911, but the surface of carapace of former is sharply granular under the thick, hairy coat and not smooth like the later. Lower, inner orbital corner of *ceylonicus* is rounded and not spine like as in the *orbitospinis*, *P. bleckeri* Miers 1880 and *P. parableckeri* Ng. & Tan 1984 in general appearance. It can however easily be distinguished from these by (1) presence of long and short, thick, golden yellow, silky fur (2) Sharp granular surface (3) three antero lateral spines & fingers which are white in colour (4) by being larger in size (5) Outer surfaces of both the wrists & chelae being fully covered with hairs and tubercles, (6) smaller chelae more tubercular. Only the merii of all the legs have a spine on upper distal corner, which are absent in *P. bleekeri* but present both in carpus and merus of *P. parableekeri*.

2. **Pilumnus investigatoris** sp. nov.
(Pl. XII, fig. 4)

Holotype : One female from Camorta Is. Nicobar ; Sta. 468 collected by the research vessel "Investigator" during 1912-1913. W.-20 mm, L-14 mm, ZSI. Regd. No. C3733/2.

Carapace broadly oval, thick convex in both the directions, surface of carapace smooth to the naked eye but minutely granular and thinly hairy near the frontal and epibranchial regions. Only the gastric and cardiac regions are faintly defined. Anterolateral sides armed with three spines, other than the outer orbital angle and the last spine larger in size. One distinct subhepatic, tubercle present. Frontal lobes much produced, deflexed downwards, inner lobes finely crenulate and straighter on their free frontal edges. Outer lobules spine like and well separated on both sides. Entire oribital edge finely granular and cut with



Figs. 1-4. 1. Anterior male pleopod of *Pilumuus karachiensis* Deb, 2. same of *P. woodmasoni* Deb, 3. same of *Parapilumnus indicus* Deb, 4. same of *Pilumnus kempi* Deb.

two dorsal notches. One gap present just below the outer orbital spine. Inner, infra orbital corner spinate. Anterior edge of merus of external maxilliped concave. Chelipeds unequal in female, all the three edges of arm of chelae dentate and armed with two subdistal, prominent, stout spines, present only on the upper edge. Inner corner of wrist bluntly dentate, outer surfaces sharply tubercular and hairy. Similar type of hairs and tubercles present on the entire outer surfaces of smaller palm and on upper proximal half of larger palm ; lower distal corner of larger palm smooth and bare. Fingers pointed at the tips and brown in colour. Leg joints stout, not much longer, upper surfaces hairy and granular. Preserved specimen in spirit, light brown in colour.

Remarks : The general formation of carapace, chelipeds and legs of the *Pilumnus Investigatoris* Deb is closely related to *P. parapilumnoides* Takeda and Miyake 1970, in which the frontal lobes are rounded, its, outer frontal lobules are triangular and indistinctly separated from supra orbital angle by a shallow depression. However the present species differs from it in having the frontal lobes rather square cut in shape, free frontal edge crenulate, outer lobule spine like and distinctly separated from the inner supra orbital edge and the front rather narrower. The anterolateral teeth of carapace in the present species are increasing in size from before backwards, a subhepatic tubercle present, greater part, i.e. 3/4 of the larger chelae is sharply granular on outer surface. The specimen on which the species is established is a female and hence the pleopod cannot be compared.

3. **Pilumnus kempi** sp. nov.

(Pl. XII, fig. 1)

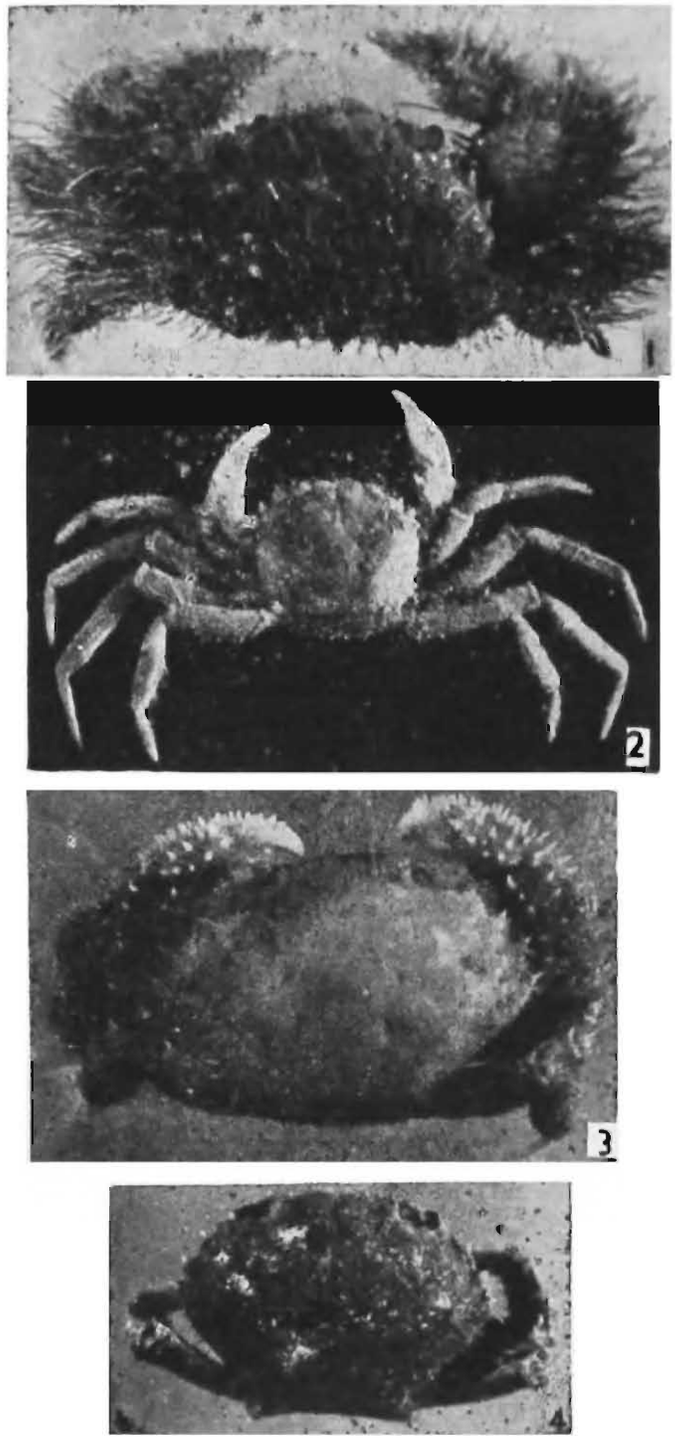
Pilumnus vespertilio var. Alcock 1898 : 198.

Material examined : Holotype male, Z.S.I. Reg. No. C 4781/1 Width-35 mm, Length-24 mm, Port Okha, Coll, H. C. Roy, dt. 21-1.1953 ; Paratypes 2 males and 2 females, Z.S.I. Reg. No. C 4781/I ; female with eggs, measures Width-23 mm, Length-17 mm, other details as Holotype.

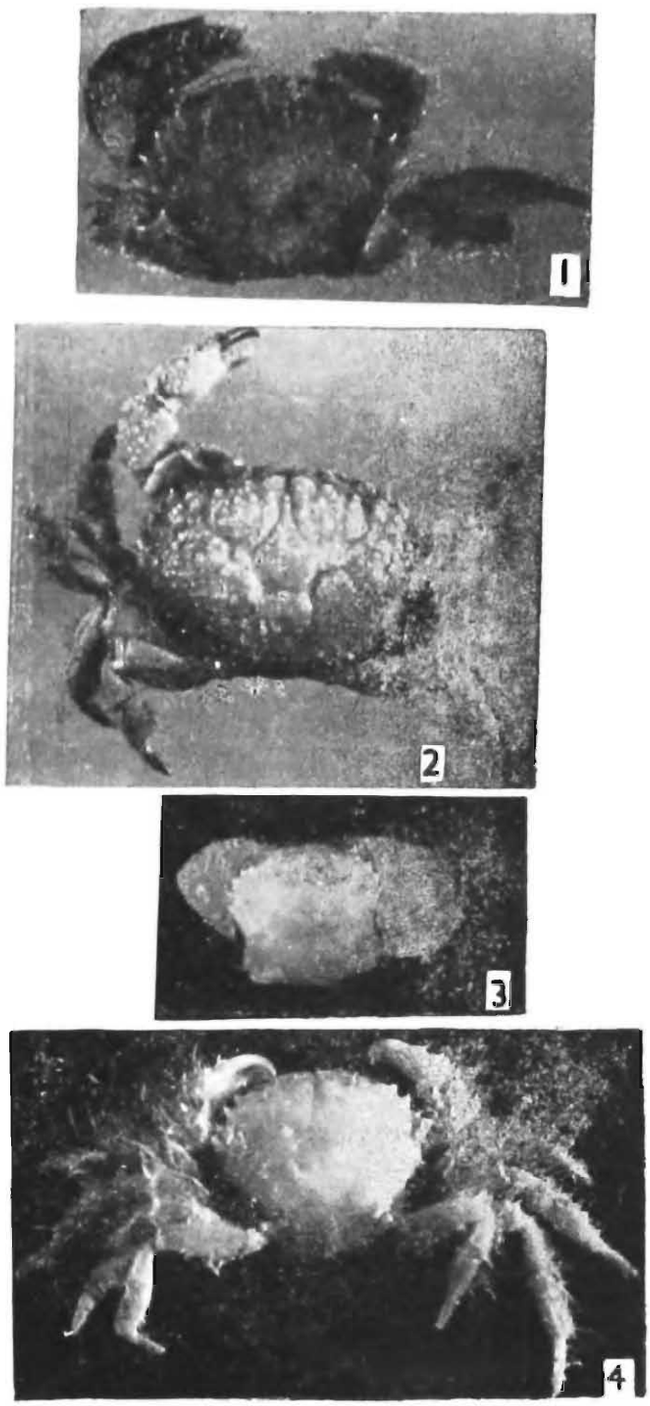
4 males and 4 females from Dwaraka, Regd. No. C4775/I ; 3 males from Pirotan Is., Port Okha, C4776/I ; One male from Porbandar, C 4778/I ; 3 males, 2 females from Port Okha, C 4779/I : 3 subadult females from Port Okha, C 4780/I ; One female adult Loc. ?, C 1806/I ; One subadult male from Karachi, C 3736/2 ; One male and one female from sta. 669, from corals of Andamans, C 2024/2 ; One female from Gulf of Suez, C 2023/2 ; One female from Tor, Siaitic peninsul C 2022/2.

Description of male-Carapace is moderately convex in both the directions. The entire upper and outer surfaces of carapace and the appendages covered thickly and uniformly with long, golden yellow, stiff, bristle like hairs and short, soft, thick hairs of similar colour. Surface sculpture of carapace rough granular and concealed under the thick coat of hairs. Shape of crab roughly hexagonal or some what transverse, three fourth as long as wide. Regional areoles not visible through the thick, hairy coat, but well outlined and areolated on denuded carapace. Sharp granules present only on branchial and epibranchial regions only.

Front about one third of the greatest width of carapace, deflexed downwards, cut



Figs. 1-4. 1. *Pilumnus kempi* sp. nov., 2. *P. woodmasoni* sp. nov. 3. *P. rotundus* Borradaile 4. *P. investigatories* sp. nov.



Figs. 1-4. 1. *Pilumnus ceylonicus* sp. nov. 2. *P. karaachiensis* sp. nov.
3. *Parapilumnus guinotae* sp. nov. 4. *P. indicus* sp. nov.

into two prominent, flatly convex, finely crenulate, inner lobes · outer corner of each frontal lobe low, small, almost indipendent, but not prominent, and spine like or triangular. Upper oribital edge with two notches and lower edge with one gap just below the outer orbital corner, lower inner orbital corner is sharp. Infra orbital edge distinctly crenulate. Antero lateral sides of carapace armed with three spiniform accuminate teeth, beside the outer orbital angle, a subhepatic denticle present behind and below the outer orbital corner. Chelipeds unequal, upper edge of arm adorned with two stout, distal spines. Inner angle of wrist bidentate, each dent tubercular, blunt.

Upper and outer sutfaces of the wrists, smaller palm and of all but the lower distal corner of larger hand are covered with granules, which are concealed under the hairs. In large specimen, lower side of larger palm quite bare and smooth. These granules are arranged in rows. Fingers are short, light-to dark brown in colour and pointed at tips. Upper edges of the dactylus of hand is granular and hairy. Leg joints thickly hairy and granular on their upper outer surfaces. Anterior male pleopod is a stout process like the other members of the family.

Remarks : The specimens of *Pilumnus kempi* Deb are very much distinctive in appearance and cannot be mistaken or considered as a variety or subspecies of *P. vespertilio* as it was assigned by Alcock in 1898. The specimen examined and described by Alcock (1898) is a subadult from Karachi. The adult males of Port Okha, are much larger in size and surface hairs are more thicker, denser than the young males and adult females. The hairs on juveniles are much less thicker, rather scanty, more finer and lighter in colour than the adults and hence the young specimens can easily be mistaken for a separate species. The stiff, bristle like golden yellow, thick coat of hairs at once separate the *P. kempi* Deb, from any other known species and its nearest ally *P. vespertilio*. Distal apex and subapical spines on the anterior male pleopod of *P. kempi* are of quite different in shape, appearance and it is a sound evidence of their separate identity.

Distribution : Andamans ; Port Okha, Gujrat coast ; Karachi, Gulf of Suez ; Tor, Siaitic peninsula.

4. **Pilumnus karachiensis** n. sp.

(Pl. XIII, fig. 2)

Holotype : One, male, ZSI. Reg. No. C3238/2, paratypes : two males and three females from karachi, largest female measures W-29, L. 20mm and male W-24 mm; L-18 mm.

Carapace transversely oval in shape, very convex before backward than from side to side, thick ; regions of the entire carapace distinctly defined by broad, smooth, grooves, into convex regional areole. Clusters of sharp, prominent tubercles present on fronto-orbital and anterolateral regions and scattered, smaller granules present on other places. Upper surface of carapace covered scantily with golden yellow, silky, long fine hairs, which are more numerous and stiff on branchial regions and on appendages. Uudet surface of the crab tomentose. Front horizontal from dorsal aspect. Inner frontal lobes square shaped, free margins granular, outer lobule triangular and well separated on both sides. A post frontal, rounded, granular, ridge present. Entire orbital edge granular

nular and with two V shaped nothes present just below the outer orbital corner. Inner, infra orbital tooth promiment and visible from dorsal aspect. Anterolateral sides of carapace with three accuminate, granular teeth, except the outer orbital angle. A prominent, tubercular, subhepatic tooth present in berween the orbital and first antero lateral tooth which is visible dorsally, and can be mistaken as antero lateral tooth.

Posterolareral sides granular and convergent. Anterior edge of merus of external maxilliped concave. Posterior edge of carapace finely and evenly crenulate. Chelipeds stout, markedly unequal in both the sexes. Upper outer side of arm of cheliped with granular, teeth present on upper, distal end. Outer surfaces of wrists and hands covered with granular ridges and smooth grooves which are more distinct on the wrists and outer, lower side of palm. These granules extended upto a little distance of the base of dactylus. Fingers short, brown and dentate on their cutting edges. Leg joints stout, upper surfaces sharply and finely granular and thickly fringed with stiff, yellow hairs. Male abdomen seven segmented, anterior male pleopod is a tubular, double curved, 'S' like process as in the other *Pilumnus* species.

Remarks : Though the geographical dimensions of the carapace of the carb is very distinct for its broadly oval and very convex carapace which is quite different from the genus *Pilumnus*, yet the presence of surface hairs, subhepatic tooth and other characters viz. the front, anterolateral teeth, anterior male pleopod etc. are very much like the genus *Pilumnus*. Regional lobulations, granular surface pattern, such as small, clusters of 3-4 granules on fronto and anterolateral sides, and scattered, sharp, granules all over the carapace etc. are very distinctive and unlike the other known, allied species. The presence of a subhepatic tooth and two triangular teeth on upper edge of arm ; outer surface of wrist with rows of clusters of granules and smooth inter space between these clusters and lastly the nature of apex of the anterior male pleopod etc. are very must different from the allied species, *P. rotundus* Borradaile 1902.

5. **Pilumnus wood masoni** sp. nov.

(Pl. XII, fig. 2)

Material : Holotype : One male from Tuticorin, 18 km from shore ; south India, 9-10 fms. ZSI. Regd. No. C2948/2 ; Measuring 17 mm in width and 14 mm in length, collected by Dr. H. S. Rao, eb.-March 1926

Description of male : Carapace more subcircular or square than hexagonal in shape. Slightly convex in both the directions, regions deeply defined medially, specially the gastric and cardiac regions, where it is smooth also in touch. Hairs and sharp, minute granules present on epibranchial and postero-lateral sides and also on pterygostomian regions. Front lamaller, bilobed, obliquely deflexed, median suture deep, outer corner of frontal lobe very distinct and separated from the supra orbital edge. Free margin of the front finely crenulate. Orbital margins also crenulate and have fissures, two dorsal and one below the outer orbital corner. The lower inner orbital angle is prominent, tooth like, visible dorsally from above.

Antero-lateral sides shorther than the postero-lateral sides and armed with three, strong, pro-curved spines, other than the outer orbital angle. First spine larger and

last one smaller ; postero-lateral sides rough ; sharp, minutely spinulate. Pterygostomian region thickly spinulate. Eye stalk thick, long and adorned with a bundle of long hairs on upper side. Antennules long, obliquely and transversely folded. Antenna long, basal joint stands loosely on orbital hiatus and are in touch with the outer, small, frontal lobe. Inner edges of maxillipeds fringed with long bristles ; anterior edge of merus concave, its upper outer corner angular. Chelipeds in male unequal, twice as long as the length of the carapace. All the three edges of the arm crenulate ; the subterminal spine on the upper edge of arm, very prominent. Outer side of wrist sharply granular and spinulate, inner corner largely spinate. Inner side of both the palms smooth, outer side including basal part of both the fingers sharply granular. The granules arranged longidudinally ; curved, tips broad and hoofed ; cutting edges finely and evenly dentate and leaves a narrow gap when apposed. Leg joints narrow, compressed, long ; upper edges of merii of first three pairs of legs armed with two spines and granules, one stout spine on the middle and the other on distal end of merii. Only the distal spine present on the granular upper edge of merus of last legs. Legs are very long, slender, compressed, covered with the short felt and long, yellow hairs and granules ; dactylus long, rod like, hairy, apical claw brown in colour, small. Male abdomen distinctly seven segmented ; anterior male pleopod long, slender, curved process ; apex acute angular, the process is loop like coiled subapically. Preserved specimen is covered with long, yellowish, fine hairs all over except on upper anterior side of carapace where it is dark greenish brown in colour. Fingers light brown with white tips.

The specific name wood masoni is given as a matk of recognition and respect to the renowned carcinologist J. Wood Mason for his laborius attempt to study the Indian Marine Crabs, at the very begining of their study.

Remarks : So far the genus was represented by seven species from Andaman. The present one is an interesting species which markedly differs from the *P. longicornis*, in following characters : *P. Wood masoni* Deb is having (i) distinctly and moderately convex carapace in both directions, and in dorsal view it is sub-circular in shape. (ii) obliquely deflexed front with finally crenulate free frontal edge. (iii) Edges of orbit finely crenulate (iv) pterygostomian region sharply granular and (v) three edges of arm of cheliped adorned with a subterminal spine (vi) The upper edge with one median and one distal spine (vii) Outer side of wrists and palms sharply granular ; only the larger palm is with 4-5 longitudinal rows of granules on its outer side (viii) Loop like coiled male pleopod is also vety much distinctive to be mistaken for any other known species.

Pilumnus rotundus Borr.

(Pl. XII, fig. 3)

Pilumnus rotundus Borradaile 1902 : 246.

Material examined are, one large female, W-22.5 mm, L-15 mm Fornt-6mm, from Pearl Bank, Sri Lanka, collected by T. Southwell, dt. Feb. 1911 ; and one small female, W-12-mm, L-7mm. from Ross Island, Port Blair, S.W. Kemp's collection of 23-2-1915.

Description of the female : Carapace broadly oval in shape, and very convex in both the directions, regional lobules faintly outlined. Surface of carapace rough, sharply and minutely granular. Front deflexed downwards, bilaminar, convex medially, free edge of lamina oblique and crenulate. Outer corner of each lobe distinct and well separated on both the sides. Orbital edges finely crenulate, with two dorsal notches and one gap just below the outer orbital angle. Lower inner corner of orbit spine tipped. Antero lateral sides of carapace armed with three, spine tipped, triangular teeth, other than the outer orbital corner, which is low and followed by a tubercle. No subhepatic teeth present. Two, small, tubercles present on the carapace just near the inner dorsal corner of orbits.

Chelipeds in female is almost equal or so. Three edges of the arm of chelae granular, upper distal corner of arm with two strong procurved spines. Surface of the appendages covered with yellow, short, thick hairs. Outer surfaces of wrists and plams armed with scattered spines, which extended upto the middle of dactylus. The spines on wrists are much smaller and lesser in number than the same on palms. Fingers are thin, compressed, grooved and white in colour, tips pointed. Cutting edges of fingers are thin, compressed, grooved and white in colour, tips pointed. Cutting edges of fingers evenly dentate and leaves no gap when apposed. Leg joints rather narrow, upper distal corners of all the merii and carapii are spine tipped ; rest of the edges are granular, and rough.

Remaks : The present specimen is a female and much larger than the type from Nallandu Ils. of Maldive area. The second female from Ross Is. Port Blair, is of same size of the type. The description and text figure given for the type are tallying fully with the female described above, but for only one exception. The spinule present on the middle of upper edges of merii of legs are absent in the present specimens, though the entire upper edges of merii are rough, and granular. The presence and absence of spinules on leg joints is a common phenomenon of age differrence in *Pilumnus* species and hence can not be considered as species difference while other details are agreeing very well with the type.

Distribution : Pearl Bank, Sri Lanka ; Ross Island, Port Blair both are new localities, Maldives, etc.

Genus **Parapilumnus** Kossmann, 1877

Parapilumnus, Balss, 1933 : 38 ; Sakai 1939 : 544 ; Barnard 1950 : 269 ; Monod, 1956 : 254 ; Takeda & Miyake 1969 : 138.

Carapace is small or medium sized, hairy crabs, inhabitant of coral reefs, deep, and moderately convex from before backwards. Dorsal surface faintly outlined, granules are very minute and less marked ; soft, plumose, sparse tufts or rows of hairs present usually near the anterior half of the carapace. Front bilobed, and each lobe is without minute, lateral outer lobule. Anterolateral sides of carapace usually with three-four teeth which are either minute or obscure. Basal antennal segment not reached the front.

Chelipeds are unequal in male and less so in female. Male abdoman with seven separate segments and anterior male pleopods are *Pilumnus* like double curved 'S' shaped process.

Remarks : The crabs whose frontal lamina is without a lateral, small lobule is separated from *Pilumus*, a nearest genus for easy identification. The crabs of this genus are of very small in sizes and are generally mistaken as the early, juvinile stages of the genus *Pilumnus*.

There are only few already known species of this genus present in India, and two new spp. viz. *P. indicus*, *P. guinotae* are added & described below. These crabs are inhabitants of coral reefs.

Key to the Indian species of *Parapilumnus*

1. (a)	Fingers of the chelipeds ivory white in colour ...	2
(b)	Fingers of the chelipeds light brown in colour ...	*trispinosus*
2. (a)	Upper edge of dactylus blade like, shrp, crested, fingers grooved ...	*indicus*
(b)	Upper edge of dactylus not sharp, crested and fingers not grooved ...	*gninotae*

Parapilumnus indicus sp. nov.

(Pl. XIII, fig. 4)

Material : Holotype : 1 male, measuring 10 mm in width and 8 mm in length, paratype : 2 females, width 8-9 mm ; length : 7-8 mm. ZSI. Regd. No. C2949/2 ; and C2949a/2. The specimens were collected from Port Blair, By R. P. Mullins in 1918.

Description of the male : Small, sub-circular crab with rough carapace, anteriorly covered with fine hairs. It is moderately convex in both the directions, meso-gastric area is only marked by grooves, other regions are ill defined. Antero-lateral sides shorter than the postero-lateral and cut into three, curved spines, excluding the outer orbital angle. No sub-hepatic spine or tooth present. Postero-lateral sides moderately convergent. Front one third of carapace, convex medially and obliquely deflexed, cut into two oblique lobes, free edge sharp and smooth, outer corner of front not sepapated. Two shallow V-shaped notches present on upper orbital edge, one V-shaped gap present just below the outer orbital corner. Chelipeds unequal in male and almost equal in female, Upper edge of arm crenulate and with a sub-distal spine. Inner angle of wrist spinate, outer side armed with sharp spinules, granules and hairs. Outer surface of palm also sharply granular, and these granules are arranged in longitudinal rows. Fingers broad, thin and smooth, colour ivory white, cutting edges regularly and evenly dentate and leaves no gap when apposed. Both the fingers are traversed by longitudinal, broad, canal or groove leaving the upper edge of dactylus and lower edge of propodus as a sharp, thin, smooth, blade ; tips of the fingers are pointed. Lower and inner sides of palm in larger chela almost smooth and hairless, otherwise both the chelae and leg joints covered and fringed with long, yellow and short, brownish, thick fur. Leg joints compressed, upper outer sides of joints rough, hairy. Male abdomen distinctly seven jointed. Anterior male pleopod long, 'S' like curved process, apex obtusely reonded and narrowed ; opening of ciliary groove long, narrow and apical. Outer sides of sub-apical area adorned with rows of small spinous setae only.

Remarks : The main distinguishing features of *Parapilumnus indicus* Deb, are its broad, thin, smooth and canalicular fingers, the upper edge of dactylus and lower edge of propodus of the chelipeds are sharp, blade

like, thin, which is not found in any other known species of the genus. It has got some apparent similarity of shape of carapace with *Pilumnus parapilumnoides* Takeda and Miyake 1970, and with the anterior male pleopod of the later but the main canalicular, grooved fingers remain distinctive for the *P. indicus* Deb.

Parapilumnus guinotae sp. nov
(Pl. XIII, fig. 3)

Material examined : Holotype female, egg laden : Off Little Aadamans, 10 fms., Marine Survey of India collection, made on -12-1888 Z.S·I. Reg. No. 3911/9 ; Measurements.— Width-7 mm. Length-5 mm Front-2.5 mm.

Description of female : Carapace subcircular in shape, moderately convex in both the directions, deep or thick, soft white tomentum and fine sharp granules present near the antero lateral sides of carapace, but bare and smooth medially. Only the meso gastric area is faintly outlined. Front obliquely deflexed, bilobed, lobes rounded, outer angle of each lobe not cut off or present. The regions behind the orbits and front are sunken. Antero lateral sides of carapace armed with three, erect spines, other than the outer orbital corner, orbits elongate, upper orbital edge prominent, with shallow notch ; eyes are large and exposed.

Chelipeds almost equal in female, stout, hairy and rough on outer surfaces. Upper edge of arm with two distal, prominent, spines. Inner corner of wrists not prominent. Outer surfaces of distal half of wrists and of entire palm covered with thick, long, matted hairs and gives the palm somewhat puffy, globose appearance. No. spinules are detectable under the thick hairy coat. Fingers are long, narrow, somewhat compresed and quite bare but for the base of dactylus. Colour of the fingers are white, cutting edges evenly dentate, tips pointed and crossed, The hairy, puffy, globose palm with curved fingers seem to be as birds head with beak. The leg joints are compressed, narrow, except few, lank, scattered hairs ; the meri are bare, but the carpus, propodus and dactylus are thickly and profusely hairy. The tips of these hairs are club shaped.

Remarks : The *P. guinotae* Deb is an unique female crab which is assigned to the genus for its hairy nature and not having an outer, notched off tubercles of frontal lamina and uptil now only few species are there under this genus. The presence of unique, puffy, globose apparance of hand with club tipped hairs on the palm of both the almost equal chelae gives the specimen a separate specific status unlike any other known species of the genus so far described.

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