

Family ISCIINURIDÆ.

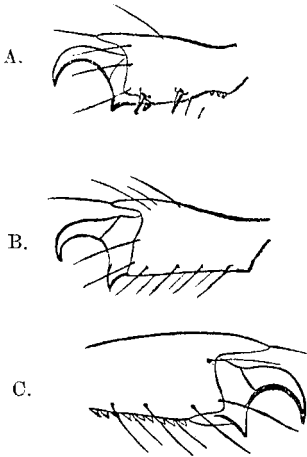


Fig. 21.—A. *Chironomachetes fergusonii*, tarsus of 4th leg, external view.
 B. *Hormurus australasie*, ditto.
 C. *Iomachus læviceps*, ditto.

Legs furnished with a single pedal spur. *Sternum* broad and pentagonal. *Genital operculum* divided in male, undivided in female. Both movable and immovable fingers of *manubiale* un-toothed along the lower edge. No spine beneath aculeus on *vesicle* of tail. Extremity of *tarsi* squarely truncate, forming almost a right angle with the base of the claw-lobe, and not produced into a rounded lobe overlapping the claws at the side. *Carapace*, *abdomen*, and *chela* flat and depressed; hand with strong and complete finger-keel; edges of finger of *chela* granularly dentate, not produced into sharp triangular teeth. *Tail* thin, strongly compressed.

Distribution. Ethiopian Region; Madagascar; Oriental Region from India to Papua; northern part of Neotropical Region.

Synopsis of Indian Genera.

- a A single median keel on the lower side of all the caudal segments, that on the 1st sometimes obsolete; tarsi armed beneath and distally with many (5 pairs of) spines. HEMISCORPIUS, p. 77.
- b. No median keel on the under side of caudal segments 1-4; tarsi furnished below with paired setæ or at most a few spines, 2 distal and 1 proximal.
 - a¹. Median eyes well in front of the middle of the carapace; tarsi spined beneath, protarsi spined at the distal end. CHIROMACHETES, p. 77.
 - b¹. Median eyes only just in front of the middle of the carapace; protarsi not distally spined; tarsi at most with one posterior distal spine.
 - a². Tarsi with median row of spicules; posterior lateral eye above edge of carapace IOMACHUS, p. 81.
 - b². Tarsi without median row of spicules; all three lateral eyes on edge of carapace HORMURUS, p. 78.

Genus **HEMISCORPIUS**, Peters.

Hemiscorpius, *Peters, MB. Akad. Berlin*, 1861, p. 426 (April); *Pocock, A. M. N. II.* (6) xii, p. 308, 1893.

Hemiscorpiion, *Peters, MB. Akad. Berlin*, 1861, p. 511 (May); *Karsch, MT. Münch. ent. Ver.* iii, p. 15, 1879; *Kraep. Jb. Hamb. wiss. Anst.* xi, p. 110, 1894; *id. Tierr., Scorp. etc.* p. 142, 1899.

Carapace with median eyes in advance of the middle of the plate. *Tarsi* (fig. 5 A, p. 8) armed beneath and on each side of the distal extremity with many pairs of long and slender spines, and furnished with median row of spicules. *Sternum* elongate, parallel-sided, with deep median groove. Finger of *chela* with two parallel rows of teeth and externally with some larger teeth.

Type, *H. lepturus*, Peters.

Distribution. S. Arabia; Socotra; Baghdad and Baluchistan.

63. **Hemiscorpius lepturus**, *Peters, MB. Akad. Berlin*, 1861, p. 426, figs. 1-8; *id. op. cit.* p. 511 (Hemiscorpiion); *Kraep. Jb. Hamb. Wiss. Anst.* xi, p. 111, t. ii, figs. 39, 40, 1894; *id. Tierr., Scorp. etc.* p. 142, fig. 38, 1899.

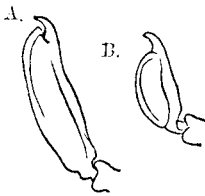


Fig. 22.—*Hemiscorpius lepturus*. A. Vesicle and aculeus of ♂. B. Do. of ♀.

♀. *Colour* uniform yellowish red, with browner fingers. *Carapace* and abdomen smooth to finely punctured. Keels of *tail* smooth or finely granular. *Vesicle* of normal form, not globular, with short and thick aculeus. Hand with nearly smooth finger-keel, its upper surface reticulated. *Pectinal teeth* 9. Total length 45 mm.

♂. Differing from ♀ in having *carapace* and abdomen finely granular or rugulose; *tail* very long and slender; *vesicle* very long, with blunt tuberculiform projection on each side at the base of the aculeus. *Pectinal teeth* 15-16. Total length 66 mm.

Distribution. Baghdad (*Petermann*); Northern Baluchistan (*Maynard & MacMahon*). The example from Baluchistan has lost its tail, and is identified as *H. lepturus* with some hesitation.

Genus **CHIROMACHETES**, Pocock.

Chiromachetes, *Pocock, Jour. Bom. N. II. Soc.* xii, p. 744, 1899.

Carapace with anterior border deeply excised in middle line; median eyes well in advance of the centre, the distance between them and the posterior margin nearly twice as great as the distance between them and the median excision; lateral eyes almost marginal, the anterior two separated by a very narrow space from the subjacent edge, the posterior practically on the edge. Extremity of *protarsi* spined; *tarsi* (fig. 21, A) armed below with a few spines, without median row of spicules except quite at base. Digit of

chela armed with two rows of teeth; brachium with large basal prominence.

Type, *C. fergusoni*, Pocock.

Distribution. Malabar coast, S. India.

Resembling the S. African and Neotropical genus *Opisthacanthus* in the spine-armature of its legs, except that the spines on the tarsi are fewer than in any known species of that genus. Further and especially differing in the forward position of the median eyes and the closeness of the lateral eyes to the margin, these eyes in *Opisthacanthus*, especially the posterior, being distinctly above the edge.

64. *Chiromachetes fergusoni*, Pocock, *Jour. Bom. N. H. Soc.* xii, p. 744, 1899.

Colour: upper side of body and tail blackish green, vesicle clear yellow; legs and *chela* blackish brown; tarsi yellow. *Carapace* and *terga* densely and finely punctured, without granules and without crests, except for the normal median low elevation on the *terga*; *carapace* a little longer than the 1st and 2nd caudal segments, shorter than the 4th and 5th. *Tail* about four times as long as *carapace*, densely punctured, smooth, except for a few granules on the lower side of the 4th and 5th segments; without keels; the 1st, 2nd, and 3rd segments posteriorly elevated on each side of the dorsal groove; segments impressed with serially arranged setiferous pores; *vesicle* compressed, thickly covered with long bristles below. *Chela* large, densely punctured, finely granular above, smooth below; both *humerus* and *brachium* longer than *carapace*; *humerus* and *brachium* with posterior side somewhat compressed, coarsely denticulate, but scarcely carinate; hand with finger-keel, underhand-keel, and area between them coarsely granular; underhand much longer than *carapace*, not twice as long as the width of the hand, longer than movable finger, which is strongly lobate, the immovable correspondingly notched; movable finger longer than *carapace*. *Legs* finely punctured; femora finely granular externally; protarsi with finely serrulate external edge, armed with 3 spines on the inner side at apex. *Pectinal teeth* 7-8.

Measurements in mm.—Total length 100, *carapace* 14, tail 44, underhand 18, movable finger 15, width of hand 10.

Loc. Trivandrum in Travancore (*Ferguson*).

Genus **HORMURUS**, Thorell.

Hormurus, Thorell, *A. M. N. H.* (4) xvii, p. 14, 1876; Pocock, *A. M. N. H.* (6) xii, p. 320, t. xiv, fig. 6, 1893; Kraep. *Jb. Hamb. wiss. Anst.* xi, p. 131, 1894; *id. Tierr., Scorp. etc.* p. 153, 1899.

Carapace with median eyes near the centre, and the three lateral eyes on the very edge. *Tarsi* (fig. 21, B) furnished beneath with four pairs of moderately long stiff bristles, not with spines, and without a median line of spicules; extremity of protarsi also bristly

and not spined. Movable finger of *chela* with two parallel rows of teeth. *Genital operculum* of female not narrowed and pointed behind; marked with median suture.

Type, *H. australasiæ* (Fabr.).

Distribution. India, Burma, and the whole of the Indo- and Austro-Malayan area as far as Fiji.

Synopsis of Indian Species.

- a. Upper and lower crests on posterior side of brachium granular; sterna thickly punctured; tail laterally granular *H. australasiæ*, p. 79.
- b. Lower crest on posterior side of brachium quite smooth; sterna not or scarcely punctured; sides of tail not granular *H. nigripes*, p. 80.

65. *Hormurus australasiæ*, *Fabr. Syst. Ent.* p. 399, 1775 (Scorpio); *C. L. Koch, Arachn.* iv, p. 71, fig. 294, 1838 (Ischnurus); *Thorell, Atti Soc. Ital.* xix, p. 251, 1876; *Simon, J. A. S. B.* lvi, p. 113, 1887 (Liocheles); *Kraep. Jb. Hamb. wiss. Anst.* xi, p. 133, 1894; *id. Tierr., Scorp. etc.* p. 154, 1899.

Ischnurus complanatus, *C. Koch, Arachn.* iv, p. 73, fig. 295, 1838; *Thorell, Ann. Mus. Genova*, xxvi, p. 420, 1888.

Colour of upper side of trunk, *chelæ*, and of tail reddish or greenish brown; under side of trunk paler; vesicle clear yellow or yellowish red, paler than the dorsal surface of the abdomen. *Carapace* and *terga* densely and finely punctured in ♀, sometimes granular laterally in ♂. *Sterna* finely punctured. *Tail* at most only about two and a half times as long as the carapace, weakly granular below, above, and at the sides; dorsal keels practically absent, but the extremities of the upper sides of segments 2-4 provided with a pointed upstanding tubercle; inferior crests of 3rd and 4th weakly granular, of 1st bearing posteriorly a pair of sharp downwardly and backwardly directed tubercles, similar tubercles on inferior median and lateral keels of 2nd; inferior lateral keels of the 5th denticulate; *vesicle* finely punctured and pitted, like the lower side of the tail, with setiferous pores. *Chelæ* massive, granular and punctured above, punctured below; anterior side finely granular; the keels strong and coarsely granular; base of the brachium in front elevated into a ridge bearing a pair of larger denticles; brachium shorter than carapace; underhand longer than carapace, not twice as long as the width of the hand; area below finger-keel coarsely granular; basal half of fingers granular; finger-keel and keel of underhand strong and coarsely granular; fingers short, about two-thirds the length of the underhand, shorter than carapace, not lobate in females and young males, but strongly lobate in large males. *Legs* externally finely granular, with under edge of femora and patellæ serrate. *Pectinal teeth* 5-8, mostly 6-7.

Measurements in mm. of adult ♂.—Total length 37, carapace 7, tail 18, underhand 8, movable finger 6, width of hand 5.

Loc. Burma: Akyab; Myanyoung, Moulmein; Kawkareik, Thagata-juva, and Mount Mooleyit, in Tenasserim; Tavoy and Reef Island (*Pea & Oates*); Great Cocos Island, Andamans (*Oates*); Nicobar Islands, thence over the whole of the Indo-Malayan and Austro-Malayan area.

Adults of this species vary much in size, some males with fully-developed sexual features being only about 30 mm., the carapace measuring 5, and the adult females may reach 45 mm. or more.

Subspecies *suspectus*, *Thorell*: *Hormurus australasiae*, *Fabr.*, var. γ . *suspectus*, *Thorell*, *Ann. Mus. Genova*, xxvi, pp. 420 & 422, 1888.

Differs from the Burmese representative of the typical form in having the upper side of the trunk and the tail, with exception of the yellowish-red vesicle, a deep greenish black, the chelæ being of much the same colour, and the legs, although ferruginous towards the extremities, are piceous and not paler than the upper side of the trunk. Total length of adult ♂ 42 mm.

Loc. Lower Burma: Prome (*Pea*) and the Pegu Hills (*Bingham*). The granulation of the carapace and terga, which Thorell relied upon as a basis for this form, is not more strongly developed than in many males of the typical form.

66. *Hormurus nigripes*, *Pocock*, *Jour. Bom. N. H. Soc.* xi, p. 117, 1897; *Kraepelin*, *Tierr., Scorp. etc.* p. 155, 1899.

Colour a shining pitchy brown, only the vesicle yellow; legs as dark as the body, with the exception of the tarsi which are yellow. *Carapace* smooth and punctured as in *H. australasiae*, but with the frontal border more deeply excavated and the frontal lobes more square. *Terga* much less conspicuously punctulate than in *H. australasiae*; *sterna* also scarcely noticeably punctulate. *Tail* of about the same strength and with the same armature of dentiform tubercles as in *H. australasiae*, but the segments are very noticeably shorter as compared to their length, and with the exception of the above-mentioned sharp tubercles are entirely without granules. *Chelæ* as large as in *H. australasiae*; humerus with granules and tubercles weaker; the upper surface of brachium smooth and punctured, crests of its posterior surface almost or quite smooth, the edge of the anterior basal prominence not produced into a crest bearing spiniform tubercles; hand punctulate and granulate as in *H. australasiae*, but with its posterior external angle projecting much more strongly, and the area opposed to the brachium prolonged internally so that when closed it overlaps the basal prominence of the brachium; in *H. australasiae* it falls short of the prominence, the teeth of which abut against the inner edge of the hand. *Pectinal teeth* 6 in ♀.

Measurements in mm.—Total length 35, of tail 14, carapace 6·3, underhand 6, movable finger 4·2, width of hand 3·8.

Loc. India: Pāñch Māhāls in Guzerat (*Wallinger*); Satna in Central Proviuces (*Dane*).

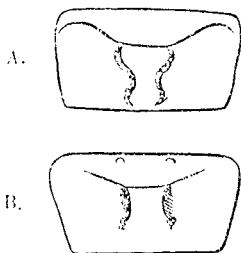
Genus **IOMACHUS**, Pocock.

Fig. 23. — A. *Iomachus laeviceps*, 4th tergal plate of abdomen. B. *Iomachus nitidus*, ditto.

Iomachus, Pocock, *A. M. N. H.* (6) xii, p. 320, 1893; *id. op. cit.* (6) xvii, p. 317, 1896; *Kraepelin, Jb. Hamb. wiss. Anst.* xi, p. 139, 1894; *id. Terr., Scorp. etc.* p. 155, 1899.

Nearly allied to *Hormurus*, but with the posterior lateral eye above the margin of the carapace, the tarsi furnished beneath with a median row of spicules and with a few long slender bristles at the sides; and the genital operculum of the female pointed posteriorly and without trace of a median suture.

Type, *I. laeviceps* (Pocock).

Distribution. Southern India; British and German East Africa.

Synopsis of Indian Species.

- a. Abdominal terga not visibly punctured, marked with a pair of short pits scarcely surpassing the middle of the terga *I. nitidus*, p. 83.
- b. Abdominal terga visibly punctured, especially laterally, marked with a pair of strong sigmoid grooves which extend almost to the posterior margin.
- a¹. Two setal pores on base of immovable finger above; tarsi with two pairs of bristles below *I. laeviceps*, p. 81.
- b¹. Three setal pores on base of immovable finger above; a spine on posterior distal angle of tarsus below *I. punctulatus*, p. 83.
67. *Iomachus laeviceps*, Pocock, *A. M. N. H.* (6) v, p. 242, t. xii, figs. 1-1 a, 1890; *id. Jour. Bom. N. II. Soc.* vii, p. 303, 1893 (*Hormurus*); Pocock, *A. M. N. H.* (6) xii, p. 320, t. xiv, f. 5, 1893; *Kraep. Jb. Hamb. wiss. Anst.* xi, p. 139 (1894); Pocock, *Jour. Bom. N. II. Soc.* xi, p. 116, 1897; *Kraep. Terr., Scorp. etc.* p. 156, 1899 (*Iomachus*).

Colour: body and tail yellowish or reddish to almost blackish brown above; chela redder; legs reddish or yellowish brown, always paler than the body; vesicle clear yellowish red. *Carapace and terga* closely and finely punctured throughout, sometimes very finely granular laterally; carapace a little longer than 1st and 2nd caudal segments; about as long as 4th and 5th in ♀, shorter in ♂. *Sternum* very faintly and closely punctured. *Tail* barely

three times as long as carapace in ♀, rather longer in ♂; scarcely granular, and except the 5th segment, non-carinate. *Chelæ* finely punctured throughout, scarcely granular above; humerus and brachium subequal and about as long as carapace; brachium armed in front at base with a low subtidal prominence; hand at most

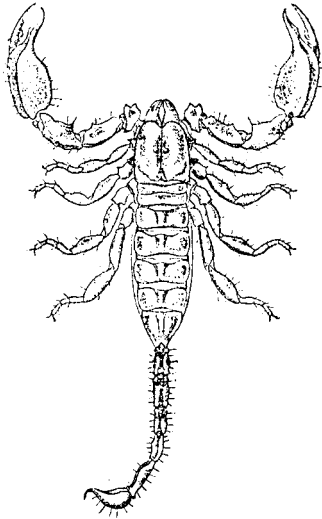


Fig. 24.--*Ischnurus leviceps*, ♂. Nat. size.

subrugulose above, its external portion coarsely granular; finger-keel strong, almost smooth, keel of underhand more granular; underhand a little longer than carapace, longer than width of hand by one-fourth (♀) or about one-third (♂) of its length; movable finger a little shorter than carapace, weakly lobate in ♀ and young ♂, strongly lobate in adult ♂. Two setal pores on upper side of immovable finger. *Pectinal teeth* 3-6, usually 5.

Measurements in mm. of ♂.—Total length 55, carapace 8, tail 25, underhand 9, movable finger 7, width of hand 5.5.

Loc. S. India: Yercaud in Shevaroy Hills (*Henderson*); Kotagiri, Nilgiri Hills (*Henderson & Daly*).

Subspecies *malabarensis*, nov.

A dark form, differing from the typical form of *leviceps* in having the chelæ black and the legs a deep blackish brown, and the movable finger of the chelæ both in male and female much more strongly lobate, and the immovable correspondingly deeply notched.

Loc. Mangalore on the Malabar coast (*Battie*).

68. *Iomachus punctulatus*, Pocock, *Jour. Bom. N. H. Soc.* xi, p. 116, 1897; *Kraep. Tierr., Scorp. etc.* p. 156, 1899.

♂. Closely allied to the preceding. *Trunk, limbs, and tail* black or reddish black, legs not lighter than body. *Tail* three and a half times the length of the carapace, which is as long as its 1st and 2nd segments. *Chelæ* longer than in *I. leviceps*, the movable finger quite as long as the carapace, and only slightly shorter than the underhand; process at base of brachium smaller than in *I. leviceps*. Base of finger on upper side with three setal pores, the first of small size, the others larger and situated farther along the finger. Distal bristle on the posterior side of tarsus replaced by a spine.

♀. *Chelæ* and tail shorter than in ♂; tail about three times as long as the carapace, which equals its first two segments and half the third. *Pectinal teeth* 5.

Measurements in mm. (♂).—Total length 62, carapace 8, tail 30, underhand 8.5, movable finger 8, width of hand 5.8.

Loc. S. India: Coimbatore (*Davison*); Nilgiri Hills (*Daly*).

69. *Iomachus nitidus*, sp. n.

Colour: legs, chelæ, tail, with exception of the reddish-yellow vesicle, and upper side of body black. *Carapace* very finely punctured at the sides and in the depression surrounding the median eyes, the rest of its median area smooth and not or scarcely visibly punctulate. *Terga* smooth, not visibly punctulate, marked in the anterior half with a pair of deep longitudinal pits, which, however, are not or scarcely prolonged posteriorly beyond the middle of the plate, and do not present the sigmoid shape and the median piriform area so noticeable in *I. leviceps* and *punctulatus*. Moreover, the anterior portion of the terga in front of the impression presents no strong transverse sinuous groove running from side to side as in *I. leviceps* and *punctulatus*, this groove being moderately deep only in the middle between the anterior ends of the impressions and becoming obsolete at the sides. *Sterna* also smooth, not visibly punctured. *Tail* as in *I. leviceps*, but with the 4th and 5th segments finely granular dorsally. *Chelæ* punctured and carinate as in *I. leviceps*: two setal pores on base of immoveable finger above as in that species. *Tarsi* furnished below with setæ as in *I. leviceps*. *Pectinal teeth* 5. Total length 45 mm.

Loc. Southern India: Nellore (*Popert*).

Family SCORPIONIDÆ.

(=Scorpionidæ, subfam. Scorpionini, *Pocock, A. M. N. H.* (6) xii, p. 306, 1893; *Kraep. Tierr., Scorp.* p. 106, 1899.)

Differing from the *Ischnuridæ* in having the tarsi produced distally on each side into a large lobe overlapping the base of the claw and forming a very acute angle with the base of the claw-lobe (fig. 4 B, p. 8). Body and chelæ not flat and depressed; hand usually convex above, the finger-keel absent, or not so strong and complete as in the *Ischnuridæ*; fingers armed with strong triangularly pointed teeth. *Tail* powerful, not compressed.

Distribution. Ethiopian Region; Oriental Region from India to Borneo.

Genus PALAMNÆUS, Thorell.

Palamnæus, *Thorell, A. M. N. H.* (4) xvii, p. 13, 1876 (in part);

Pocock, A. M. N. H. (6) xviii, p. 77, 1896 (sensu stricto).

Pandinus, *Thorell, Atti Soc. It.* xix, p. 199, 1877 (in part).

Scorpio, *Pocock, Jour. Bom. N. H. Soc.* vii, p. 309, 1893; *Kraep. Jb. Hamb. wiss. Anst.* xi, p. 28, 1894 (in part).

Heterometrus, *Hemp. & Ehrenb. Symb. Phys., Scorp.* p. 2, 1829 (in part);

Simon, Rev. et Mag. Zool. (2) xxiii, p. 56, 1872 (in part); *Kraep. Tierr., Scorp. etc.* p. 107, 1899 (sensu stricto).

Carapace deeply notched in the middle line; median eyes close to the centre. *Tarsal lobes* of 3rd and 4th legs with 2, very rarely 3 spines. Brachium of chela with its underside posteriorly rounded, not or scarcely keeled, and furnished with only a few setiferous pores. A stridulating organ situated between the chela and the first leg, consisting of a series of granules forming a rasp upon the coxa of the 1st leg, and a cluster of vibrating bristles upon the coxa (maxilla) of the chela.

Type, *P. petersii*, Thor. (= *silenus*, Sim.).

Distribution. Oriental Region from India and Ceylon to Borneo and the Philippines.

Synopsis of Indian Species.

a. Inner edge of hand scarcely compressed, rounder and thicker; large spiniform tubercle at base of brachium in front.

*a*¹. Inner edge of hand beset with low moderately sharp or blunt tubercles; chela of ♂ much longer than of ♀, the hand very narrow and long

[p. 97.
P. longimanus,

*b*¹. Inner edge of hand beset with strong, spiniform tubercles; chelæ in ♂ approximately like those of ♀, the hand short and thick

P. oatesii, p. 98.

b. Inner edge of hand compressed; no large spiniform tubercle at base of brachium in front.

- a*². Humerus of chela coarsely granular on the underside at base; 5th caudal segment not shorter than carapace [p. 86.
P. swammerdami,
- b*². Humerus smooth below, or with only a few granules; 5th caudal segment much shorter than carapace.
- a*³. Tarsal lobes armed each with 3 spines, 1 at the apex above and 2 below [p. 90.
P. latimanus,
- b*³. Tarsal lobes armed with 2 spines each, the apex not spined, tipped with bristles.
- a*⁴. Lower side of vesicle perfectly smooth and polished, hairy and punctured *P. tiarus*, p. 91.
- b*⁴. Vesicle furnished below with at least four rows of sharp tubercles.
- a*⁵. Inner edge of hand not beset with sharp tooth-like tubercles, crested at base of finger; upper surface with four low longitudinal crests [p. 90.
P. gravimanus,
- b*⁵. Inner edge of hand studded with sharp denticles, not crested at base of finger; tubercles of the dorsal side not running into four distinct longitudinal crests.
- a*⁶. Outer portion of upper surface of hand defined above by a distinct but irregular ridge or crest.
- a*⁷. Legs reddish yellow *P. fulvipes*, p. 87.
*b*⁷. Legs deep blackish brown *P. wroughtoni*,
- b*⁸. Outer portion of upper side of hand not defined above by a longitudinal ridge. [p. 89.
- a*⁸. Length of adult only about 75 mm.; legs reddish yellow as in *fulvipes*. [p. 92.
P. xanthopus,
- b*⁸. Length of adult not less than 100 mm.; legs coloured like trunk, generally nearly black.
- a*⁹. Hand exceedingly smooth above; terga with three posterior tubercles *P. scaber*, p. 93.
- b*⁹. Hand rugose or tubercular; terga not tubercular.
- a*¹⁰. Hands orange-yellow; rest of chelæ, body and legs black. *P. barberi*, p. 95.
- b*¹⁰. Hands much the same colour as rest of chelæ
- a*¹¹. Hands narrow, smooth, covered above with sculpturing of reticulated ridges. [p. 94.
P. bengalensis,
- b*¹¹. Hands broad, covered above with large tubercles or coarsely reticulated.
- a*¹². Last abdominal sternum without four low crests, densely punctured; basal portion of pecten broad, its angle less obtuse *P. phipsoni*, p. 94.

- b*¹². Last abdominal sternum with four low crests; not visibly punctured; basal portion of pecten very narrow.
- a*¹³. Frontal lobes of carapace and underhand thickly granular *P. cesar*, p. 97.
- b*¹³. Frontal lobes of carapace and underhand not conspicuously granular.
- a*¹⁴. Inner border of hand widely rounded from base of immovable finger; upper keels of tail strongly denticulated. *P. serratus*, p. 97.
- b*¹⁴. Inner border of hand nearly straight between base of immovable finger and posterior lobe; upper keels of tail smooth or nearly so *P. ndus*, p. 96.

70. *Palamnæus swammerdami*, *Simon, Rev. et Mag. Zool.* (2) xxiii, p. 56, f. 3, 1872 (Heterometrus); *Pocock, A. M. N. H.* (6) v, p. 237, 1890; *id. Jour. Bom. N. H. Soc.* vii, p. 304, 1893; *Kraep. Jb. Hamb. wiss. Anst.* xi, p. 42, 1894 (Scorpio); *id. Tierr., Scorp. etc.* p. 112, 1899 (Heterometrus); *asper, Thorell. Atti Soc. It.* xix, p. 199, 1877 (Pandinus); *kochii, Karsch, M T. Münch. ent. Ver.* iii, p. 127, 1879 (Pandinus).

Colour blackish, greenish, or reddish brown; vesicle reddish yellow; hand and legs deep reddish brown; basal segment of mandibles yellowish red. *Carapace* more or less covered with coarse granules; area at the sides of and behind the tubercle on each side swollen and elevated; lateral margins strongly converging in front; in ♀, carapace a little shorter than the 1st and 2nd caudal segments, and about as long as the 5th. *Terga* granular at the sides and posteriorly. *Sterna* smooth and polished; the last scarcely crested. *Tail* long and powerful, about $4\frac{1}{2}$ times as long as the carapace; all the segments coarsely granular above and to a less extent at the sides; segments 1, 2, and generally 3, smooth below, rarely subdenticulate; the rest of the keels denticulate; inferior intercarinal spaces of 4th and 5th segments sparsely granular; *vesicle* large, wider than high, as wide as 5th segment or wider, with 4 rows of granules below, and tolerably thickly granular also at the sides. *Chela* with humerus and brachium much shorter than carapace; humerus coarsely granular above and at base below; brachium rugose though scarcely definitely granular behind; hand covered above with large, smooth, oval or circular tubercles, the inner edge sharply tubercular and nearly straight, posterior lobe very long, projecting far back beyond the posterior end of the keel of the underhand; fingers granular beneath, the immovable not crested; movable finger about as long as carapace, a little

exceeding greatest width of hand; underhand about two-thirds the length of the movable finger. *Legs* with granular femora; tarsi armed beneath with 6 posterior and 4 anterior spines, the distal 2 of these situated on the terminal lobes; tips of the lobes furnished with bristles. *Pectinal teeth* 16-20 (σ , φ).

σ . With larger pectines and a longer tail than in φ : the tail sometimes nearly five times as long as the carapace, and the latter considerably shorter than the 1st and 2nd segments. Chelæ in σ as in φ .

Measurements in mm. (specimen from Trichinopoly).— φ . Total length 140, carapace 18, tail 78, width of hand 17, underhand 12, movable finger 18.

σ . Total length 138, carapace 17.2, tail 82, width of hand 17, underhand 12.5, movable finger 18.5.

Loc. India and the plains of Ceylon; absent from the Konkan, the Malabar coast, and the hills of Ceylon; Dehra Dûn (*Greenow*): Burdwan and Chota Nagpore (*Dundas Whiffen*) in Bengal; Satna (*Gimlette*) and Raipur (*Martin*) in the Central Provinces; Shahabad (*Bocano*) in the Dekhan; Dowlaishweram on the Godâvari (*Wybrow*); Dharwar (*Woodrow*); Madras (*Henderson & Thurston*); Tanjore (*Popert*); Ramnad (*Henderson, Fabre*); Trincomali (*Burlett & Bassett-Smith*) and Chilam (*Green*), in Ceylon.

This is the largest Scorpion of India, and, with the exception of its near ally the West-African *Pandinus imperator*, the largest species in the world, sometimes reaching a length of 180 mm. (7 inches).

In addition to the typical form above described, with legs and chelæ a deep brown colour and almost as dark as the upper side of the trunk, the following two subspecies may be recognized:—

Subspecies *lucidipes*, *Simon, Bull. Soc. Zool. Fr.* x, p. 38, 1885 (Scorpio).

Differs from the typical form in having the legs clear yellow.
Loc. Ramnad (*Fabre*); Trichinopoly (*Popert*).

Subspecies *flavimanus*, nov.

Resembles *lucidipes* in having the legs clear yellow, but differs from it and from the typical form in having the hands of the chelæ clear red or yellow, and contrasting strongly with the dark tint of the body.

Loc. Coonoor; Coimbatore (*Bradley*, type).

71. *Palamnæus fulvipes*, *C. Koch, Arachn.* iv, p. 45, fig. 278, 1838, (*Buthus*); *Karsch, Abh. Ver. Bremen*, ix, p. 68, 1887; *Simon, Bull. Soc. Zool. Fr.* x, p. 23, 1885 (*Pandinus*); *Pocock, Jour. Bom. N. H. Soc.* vii, p. 304, 1893; *Kraep. Jb. Hamb. wiss. Anst.* xi, p. 44, 1894 (Scorpio); *Kraep. Tierr., Scorp. etc.* p. 112, 1890 (*Heterometrus*).

φ . *Colour* much as in the preceding species; body a deep blackish or reddish brown; hands redder; legs, vesicle, and mandibles clear yellow, or more rarely reddish brown. *Carapace* much flatter than in *P. swammerdami*, not swollen in the middle, its sides less

abruptly converging in front, finely granular at the sides and in front; longer than 1st and 2nd caudal segments, or than 5th. *Tergites* finely granular laterally, smooth in the middle; the last crested as in *P. swammerdami*. *Sterna* smooth as in the latter. *Tail* shorter, about three and a half times as long as the carapace, the upper and lateral surfaces only weakly granular; keels as in *P. swammerdami*, but not so strongly denticulate; vesicle granular as in the last-named. *Chelæ* with humerus not so granular, either above or below, as in *P. swammerdami*, smooth or with a few granules below; *brachium* as in *P. swammerdami*; *hand* granular below and on its inner side as in the latter, but the tubercles of the upper side more crowded and a little smaller; the inner edge of the hand is convex, and the lobe only projects backwards a short distance beyond the posterior end of the keel of the underhand. Moreover the external portion of the upper surface rises vertically from the keel of the underhand and is bordered above by an irregular smooth ridge; immovable finger at most obsolete crested. *Legs* as in *P. swammerdami*. *Pectinal teeth* rarely as low as 12 in ♀, and as high as 18 in ♂; usually 14–16. Basal angle of pecten about 110°.

♂. Carapace and terga a little more granular tail, a little or considerably longer, and the hand thinner or flatter than in ♀.

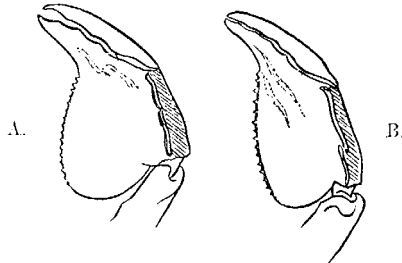


Fig. 25.—A. Hand of *Palammæus fulvipes*, ♂.
B. Hand of *P. fulvipes*, subsp. *madraspatensis*, ♂.

Measurements in mm. of ♀ (from Násik).—Total length 110, carapace 17, tail 58, brachium 12, underhand 11, movable finger 16, width of hand 15.

Loc. Western and Southern India; absent from the Konkan and Malabar coast and Ceylon. Also recorded from Burma and Java (type), but probably erroneously.

Two well-marked subspecies may be recognized, and diagnosed as follows:—

Subspecies *madraspatensis*, nov.

Chelæ in ♂ long; brachium as long as carapace; hand not so flat, narrower, its width only equal to length of underhand, and less than median length of carapace.

Measurements in mm.—Carapace 15, brachium 15, underhand 12, movable finger 16·5, width of hand 11.

Loc. Madras (*Henderson*): Cuddapah (*Poppert*): Secunderabad (*Ricardo*)*.

Subspecies **bombayensis**, nov.

Chelæ in male shorter; brachium much shorter than carapace; hand much flatter above and wider, its width equal to the median length of the carapace and much greater than length of underhand.

Measurements in mm. (of type from Násik).—Length of carapace 16, brachium 14, underhand 10·5, movable finger 15·5, width of hand 14.

Loc. Ajmeer in Rajputana; Pánch Máhals in Guzerat (*Waltinger*); Karaghora in Kattyawar (*Bulkley*); West Khandesh (*De Boulay*); East Satpura Hills; Talgaon and Chalisgaon in East Khandesh (*Madan*); Niphad, Chandor, Sinnar, Yeola, Malegaon, Nandgaon, and Kalwan in Násik (*Duxbury*).

72. **Palamnæus wroughtoni**, *Pocock, Jour. Bom. N. H. Soc.* xii, p. 745, 1899.

♀. *Colour* nearly black, vesicle and mandibles redder; legs very deep olive-brown, with slightly paler extremities. Upper side of body as in *P. fulvipes* but smoother; carapace finely granular at the sides, its median area and frontal lobes quite smooth; terga only very finely and sparsely granular at the sides. *Tail* practically smooth, at most very scantily granular throughout, except the keels, which are armed as in *P. fulvipes*; *vesicle* not granular at the sides. *Chelæ* with humerus and brachium as in *P. fulvipes*; hand with the outer portion of its upper surface vertical and crested as in *P. fulvipes*; the underhand longer and not granular; the whole hand narrower, the inner and outer edges more parallel, the inner edge more convex near the base of the immovable finger and much less convex in its posterior half. *Pectinal teeth* 17.

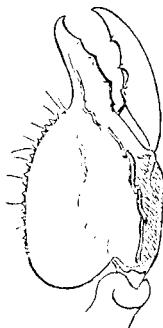


Fig. 26.—Hand of *Palamnæus wroughtoni*.

Measurements in mm.—Total length 100, carapace 15, tail 51, brachium 12, underhand 11·5, movable finger 14, width of hand 12·5.

Loc. Belgaum (*Talbot*), and Gadingal in the Kolhápúr State (*Wray*).

* Young specimens from Dharwar (*Woodrow*), and Raybág and Kalkal in the Kolhápúr State (*Wray*), are doubtfully referred to this subspecies.

73. *Palamnæus latimanus*, Pocock. *A. M. N. H.* (6) xiii, p. 74, 1894 (Scorpio); *Krup. Tierr., Scorp. etc.* p. 113, 1899 (Heterometrus).

Colour (dry specimen) castaneous, with yellow legs; chela darker. *Carapace* finely granular at the sides, on the frontal lobes, and in the median anteocular groove; longer than the 1st and 2nd and half the 3rd caudal segments or than segments 3 and 4, and as long as the 5th and $\frac{2}{3}$ of the 4th. *Tergites* only weakly granular at the sides. *Sterna* smooth, the last with four strong crests. *Tail* short, not more than three times as long as the carapace, almost entirely smooth, lateral surface rugose, superior and supero-lateral crests on segments 1-3 practically smooth; keels of 4th weakly denticulate, of 5th normally denticulate; vesicle granular

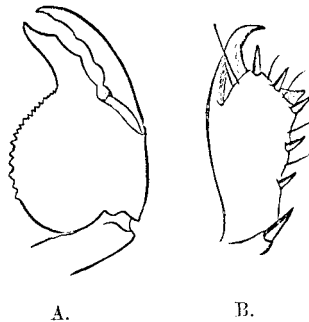


Fig. 27.—A, Hand, and B, tarsus of 4th leg of *Palamnæus latimanus*.

below. *Chelæ* with humerus very weakly granular above, strongly granular in front; brachium practically smooth throughout; hand very wide, its inner border strongly convex and rising at right angles to the base of the immovable finger, its inner edge denticulate, covered above with a reticulation of smooth ridges, which become more tubercular towards the base of the fingers and externally, and entirely disappear posteriorly; lower surface with a few granules; width of hand almost equal to length of carapace and to movable digit; immovable finger with a strong crest. *Legs* with posterior femora very weakly granular; spine-armature of tarsi, 6 behind, 5 in front, but differing from all the other species in having a strong spine, not bristles, upon the upper angle of the tarsal lobe. *Pectinal teeth* 15.

Measurements in mm.—Total length 75 (about), carapace 12·8, tail (segments 1-5) 30·5, brachium 9, underhand 7·8, movable finger 12, width of hand 11·5.

Loc. ? India.

74. *Palamnæus gravimanus*, Pocock, *A. M. N. H.* (6) xiii, p. 75, 1894 (Scorpio).

♂. *Colour*: body reddish black, legs dark reddish brown. *Carapace* smooth above, weakly granular at the sides, frontal lobes

obsoletely rugose; about as long as the 3rd and 4th caudal segments. *Terga* granular laterally and posteriorly, smooth in the middle, the last very sparsely granular in the middle. *Sterna* smooth, the last with four weak crests. *Tail* about $3\frac{1}{2}$ times as

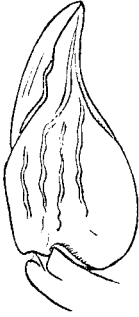


Fig. 28.—Hand of *Palamnæus gravimimus*. ♂.

long as carapace, upper and lateral surface of segments sparsely granular; superior and inferior lateral crests of segments 1-3 weakly denticulate, inferior crests of 4th weakly subdenticulate posteriorly, upper surface of 5th somewhat coarsely granular at the sides; *vesicle* granular at the sides as well as below. *Chelæ* with humerus coarsely but not closely granular above; brachium almost entirely smooth, with only a few granules in front; hand covered above with low round or elongate, often anastomosing tubercles, and furnished with four smooth longitudinal ridges; external portion of upper surface not vertical, cutting the underhand at an acute angle; the inner edge studded with small tubercles, smooth, compressed, and upturned at base of immovable finger, the edge of which in its posterior half is similarly compressed; lower surface very weakly granular; immovable finger with a low crest; width of hand about equal to movable finger and a little less than length of carapace. Tarsal spines 4-5. *Pectinal teeth* 12-14 (♀, ♂).

Measurements in mm.—Total length 100, carapace 16, tail 53.5, brachium 14.5, underhand 12.5, movable finger 15.5, width of hand 14.5.

Distribution. S. India, Tanjore (*Popert*); Ceylon (*Templeton*).

75. *Palamnæus liurus*, *Pocock, Jour. Bom. N. H. Soc.* xi, p. 114, 1897; *Kraep. Tierr., Scorp. etc.* p. 115, 1899 (*Heterometrus*).

♀. *Colour* of upper side and of tail a deep reddish brown, darker on the abdomen beneath; legs and vesicle yellow; chelæ reddish brown. *Carapace* very finely granular at the sides, smooth above, with frontal lobes slightly rugulose; almost as long as the first three caudal segments or as the 4th and 5th, considerably longer than 3rd and 4th. *Terga* smooth and polished, the last subrugose at the sides, with a pair of piliferous tubercles on each side. *Sterna* smooth and polished, the last with four smooth crests. *Tail* short, scarcely three times as long as the carapace; smooth, the keels at most roughened with punctures, and inferior keels of 5th denticulate; *vesicle* small, smooth, merely punctured. *Chelæ* with humerus coarsely granular in front, sparsely above; brachium quite smooth, except for some coarse granules on the front below; hand covered above with a network of smooth ridges, which pass into tubercles towards the inner edge and externally, inner edge denticulate, lightly convex; immovable finger with

complete smooth keel; underhand equal to width of hand, and about four-fifths the length of the immovable finger, which is almost as long as carapace. Spine-armature of tarsi 4-5. *Pectinal teeth* 10-13.

♂. *Terga* finely and closely granular laterally and posteriorly. *Tail* longer than in female, more than three times as long as carapace, which is considerably shorter than its 4th and 5th segments; vesicle inflated, as wide as 3rd segment. *Chelæ* longer than in female; brachium a little longer than carapace; underhand a little shorter, but much exceeding width of hand. *Genital operculum* not narrowed posteriorly. *Pectinal teeth* 14-16; basal angle of pecten about 90°.

Measurements in mm.—♀. Total length 76, carapace 12, tail 35, brachium 10, underhand 9, movable finger 11·5, width of hand 9·2.

♂. Total length 80, carapace 12, tail 39, brachium 12·2, underhand 11, movable finger 13, width of hand 8.

Loc. Central India: Gwalior and Bhopal (*Daine*).

76. *Palamnæus xanthopus*, *Pocock, Jour. Bom. N. H. Soc.* xi, p. 116, 1897; *Krapf. Tierr., Scorp. etc.* p. 115, 1899 (Heterometrus).

♀. In size, colour, &c. resembling small specimens of *P. fulvipes*. *Carapace* weakly granular laterally and on the frontal lobes, longer than 3rd and 4th caudal segments, and nearly as long as 4th and 5th. *Terga* smooth, the last weakly granular at the sides. *Sternum* smooth, the last with four crests. *Tail* about three times the length of the carapace, smooth above, scarcely granular laterally, superior and supero-lateral keels weakly denticulate; inferior keels of 3rd weakly denticulate; 5th segment carinate as in *P. fulvipes*, with no denticulate supero-lateral crests; *vesicle* granular at the sides and below. *Chelæ*: brachium with superior crest granular, posterior surface only lightly rugose: hand not crested above as in *P. fulvipes*; upper side strongly convex, ornamented with a reticulation of ridges, inner edge subdenticulate, strongly rounded; lower side nearly smooth; width equal to length of movable finger, much greater than length of underhand. Spine-armature of tarsi 5-6. *Pectinal teeth* 13-15 (♂, ♀).

♂. Carapace almost covered with granules. *Terga* finely and closely granular in the posterior half. *Chelæ* longer, brachium almost as long as carapace: width of hand a little exceeding underhand and less than movable finger.

Measurements in mm.—♀. Total length 74, carapace 11, tail 34, brachium 7, underhand 6·5, movable finger 9, width of hand 9.

♂. Total length ?, carapace 11, tail ?, brachium 9·5, underhand 8, movable finger 10·3, width of hand 8·7.

Loc. Western India: Kadao Tal in the Satara District (*Willkins*).

77. *Palamnæus scaber*, Thorell, *Atti Soc. It.* xix. p. 202. 1877 (Pandinus), for *Heterometrus afer*, Sim. (nec Linn.) *Rev. Mag. Zool.* (2) xxiii, p. 51, 1872; Pocock, *Jour. Bom. N. H. Soc.* vii, pp. 310-311, 1893; Kraep. *Jb. Hamb. wiss. Anst.* xi, p. 58, 1894 (*Scorpio*); Kraep. *Tierr., Scorp. etc.* p. 116, 1899 (*Heterometrus*).

♀. *Colour* uniformly black or blackish green, with hands and vesicle tinged with red. *Carapace* covered with coarse granules or tubercles, smoother above as a rule; a little longer than 1st and 2nd caudal segments, shorter than 3rd and 4th. *Terga* also coarsely granular or tubercular, with a larger central tubercle. *Sternum* smooth, the last obsolete crested. *Tail* more than three and a half times as long as carapace, superior and lateral intercarinal spaces coarsely granular, superior and in a less degree supero-lateral keels denticulate; inferior keels of 3rd segment scarcely denticulate; keels of 5th strongly dentate; *vesicle* coarsely granular at the sides as well as below. *Chela* with humerus dentate above and in front; brachium almost smooth, a few granules in front; upper surface of hand very smooth, finely reticulated, punctured, its inner edge denticulate, nearly straight; immovable finger scarcely keeled; width of hand exceeding length of underhand. Tarsal spines 4-5. *Pectines* small, teeth 10-12.

♂ like female, but more closely granular and with chela longer (*see* measurements). *Pectines* quite small, not larger, and with teeth not more numerous than in female.

Measurements in mm.—♀. Total length 130, carapace 19, tail 70, brachium 15, underhand 13, movable finger 20.5, width of hand 16.

♂. Total length 113, carapace 17, tail 63, brachium 15, underhand 12.5, movable finger 18, width of hand 13.

Loc. S.W. India: the Malabar coast from Trevandrum (*Ferguson*) northwards to Yelgit and Jedkal in Mangalore and the Mangalore Ghâts (*Battie*); also Dharwar (*Woodrow*), and Coorg above the Ghâts.*

Subspecies *kanarensis*, nov.

Of the same size, colour, and sculpturing of hand as the typical form, but much smoother: the median area of the carapace smooth or weakly granular; terga also furnished in the middle with only a few granules or almost smooth, sometimes only the three transversely set tubercles present; intercarinal spaces of tail also more sparsely granular and the keel less strongly denticulate.

Loc. Kanara (*Bell*).

* In his original description of this species, which he erroneously identified with the *Scorpio afer* of Linn., Simon says "appears to be common in Bengal." This, however, is almost certainly an error, since the only species of the genus *Palamnæus* known to occur in Bengal are *swammerdami* and *bengalensis*, and possibly the Burmese form *outesii*.

78. *Palamnæus bengalensis*, *C. Koch. Arachn.* ix, p. 3, fig. 696, 1842 (Buthus); *Pocock, Jour. Bom. N. H. Soc.* vii, pp. 310 & 312, 1893; *id. A. M. N. H.* (6) xiii, p. 72, 1894; *Kraep. Jb. Hamb. wiss. Anst.* xi, p. 51, 1891 (Scorpio); *Kraep. Tierr., Scorp. etc.* p. 114, 1899 (Heterometrus).

♀. *Colour* generally dark reddish brown, more rarely deep blackish green; legs the same colour as the dorsal surface of the body; vesicle yellowish red. *Carapace* granular laterally, mostly smooth above, scarcely so long as the 3rd and 4th caudal segments. *Terga* granular laterally. *Sterna* smooth, the last only obsoletely crested. *Tail* about three and a half times as long as carapace, its dorsal surface nearly smooth, lateral surface finely granular; superior and inferior lateral keels denticulate, inferior keels of 4th denticulate, of 3rd very weakly so; vesicle granular below and at the sides. *Chelæ*: brachium with upper crest rugose; posterior surface not crested above, rugose; hand narrow, its width not much exceeding underhand, inner edge denticulate, lightly convex, upper surface covered with a reticulation of ridges and low tubercles, the tubercles more distinct externally and internally; outer portion of upper surface vertical, strongly convex; immovable finger weakly crested; movable finger about as long as carapace. Tarsal spine-armature 6-4. *Pectinal teeth* up to 16 in ♂, as low as 12 in ♀.

♂. With longer and more powerful tail and longer chelæ than ♀. *Tail* nearly four times the length of the carapace. *Brachium* as long as carapace; underhand much longer than width of hand; movable finger as long as carapace or longer.

Measurements in mm. (specimen from Satna).—♀. Total length 103, carapace 14, tail 49, brachium 11, underhand 10, movable finger 14, width of hand 10.

♂. Total length 103, carapace 15, tail 57, brachium 15, underhand 12.2, movable finger 16, width of hand 9.

Loc. North India: Dehra Dûn (*Gamble, Smythies, Gladow*); Gwalior and Allahabad; Satna in the Central Provinces (*Gimlette*); Bengal, Chota Nagpore (*Dundas-Whiffen*); Sibsagar in Assam (*Cambridge*).

79. *Palamnæus phipsoni*, *Pocock, Jour. Bom. N. H. Soc.* vii, p. 370, 1893; *A. M. N. H.* (6) xiii, p. 73, 1894 (Scorpio); *Kraep. Tierr., Scorp. etc.* p. 114, 1899 (Heterometrus).

♀. *Colour* a uniform blackish green or brown; vesicle ferruginous. Upper side of body rather smoother than in *P. bengalensis*; sides and upper surface of tail also smoother. *Carapace* as long as 3rd and 4th segments; vesicle smooth at the sides; inferior keels of 4th nearly smooth, not so distinctly denticulate as in *P. bengalensis*. Integument finely punctulate under the lens; the punctulation especially distinct upon the last sternum of the abdomen, which has no trace of crests. *Chelæ* with hand much broader than in *P. bengalensis*, the width exceeding the underhand, the inner border more strongly convex and more coarsely denticulate; the sculpturing of the upper surface consisting of distinct rounded, oval or

irregularly shaped tubercles; immovable finger with distinct keel. Tarsal spine-armature 6-5. *Pectinal teeth* up to 16 in ♂, as low as 10 in ♀.

♂. Differing from ♀ in the same characters as *P. bengalensis* (see measurements).

Measurements in mm.—♀. Total length 113, carapace 16, tail 55, brachium 14, underhand 12·2, movable finger 16, width of hand 14·5.

♂. Total length 110, carapace 16·5, tail 60, brachium 18, underhand 15, movable finger 17, width of hand 12.

Loc. Bombay and Matheran (*Phipson*); Kolata (*Green*), Tanna in the North Konkan (*Wroughton*), Ratnagiri in the South Konkan (*Drew*); north, central, and south Point, Nāsik Ghats, Dindori and Lena in Nāsik (*Darbury*); Bhudhargarh and Panhāla in the Kolhāpur State (*Wray*).

Subspecies *collinus*, nov.

Closely resembling the typical form in size, colouring, and other characters, but with the tail distinctly shorter in both male and female. In the female it is less than three times as long as the carapace, and the latter is longer than the 1st, 2nd, and half the 3rd, and as long or almost as long as the 3rd and 4th caudal segments. (In the typical form the tail is about three and a half times as long as the carapace, and the latter is shorter than the 1st, 2nd, and half the 3rd, and only as long as the 4th and $\frac{2}{3}$ of the 5th caudal segments.) Moreover, the hand in *carinatus* is lower and not so strongly convex above the keel of the underhand.

Measurements in mm. (type from Nilgiri Hills).—Total length 95, carapace 16, tail 42·5.

Loc. Nilgiri Hills (*Daly*); Yercaud in the Shevaroy Hills (*Henderson*).

80. *Palamnæus barberi*, sp. n.

Colour a deep blackish green all over except the hands, which are orange-yellow, darker externally and blackish towards the base of the fingers. *Carapace* weakly granular laterally and on the frontal lobes; longer than 3rd and 4th caudal segments. *Terga* scarcely granular laterally, except the last, which has some coarse granules. *Sterna* smooth, the last not crested. *Tail* short, about three times as long as the carapace; segments smooth between the keels or nearly so; superior keels normally but not strongly denticulate, inferior keels of 3rd smooth, of 4th denticulate posteriorly; *vesicle* smooth at the sides. *Chelæ* with humerus and brachium as in *P. phipsoni*, but upper crest of brachium not so pronounced; hand ornamented with a reticulation of ridges much as in *P. bengalensis*, not so smooth as in *P. scaber* but very nearly resembling that of the latter in shape; coarsely granular on its inner side and having a pair of granular crests; immovable finger with complete crest. Tarsal spine-armature 6-4. *Pectinal teeth* 11-12; basal angle of pecten about the same as in *P. phipsoni*.

Measurements in mm.—♀. Total length 124, carapace 19, tail 58, brachium 16, underhand 13, movable finger 18, width of band 15.
Loc. Tinnevely in S. India (*Barber*).

81. **Palamnæus indus**, *De Geer. Mém. Hist. Ins.* vii, p. 341, 1778 (Scorpio); *Thorell, Atti Soc. It.* xix, p. 164, 1877 (Scorpio); *Kraep. Tierr., Scorp. etc.* p. 113, 1899 (Heterometrus): ceylonicus, *Herbst, Nat. ungest. Ins.* iv, p. 38, pl. 1, fig. 1, 1800; *Kraep. Jb. Hamb. Wiss. Anst.* xi, p. 46, 1894 (Scorpio): megacephalus, *C. Koch, Arachn.* iii, p. 73, fig. 224, 1837 (Buthus); *Thorell, Atti Soc. It.* xix, p. 203, 1877 (Pandinus); *Pocock, Jour. Bom. N. H. Soc.* vii, p. 311, 1893 (Scorpio).

Related to *P. phipsoni* and *flavimanus*.

♀. Colour a uniform deep blackish green. Carapace smooth above and on the frontal lobes, granular at the sides, a little longer than 3rd and 4th caudal segments. Terga almost entirely smooth, the last with a few granules at the sides. Sterna smooth, the last with four low crests. Tail short, about three times as long as the carapace; almost entirely smooth; the superior and supero-lateral keels at most weakly denticulate, sometimes quite smooth; inferior crests of 4th denticulate posteriorly; upper side of 5th not granular except along the lateral keel; vesicle scantily granular laterally or smooth. Chelæ with hand very large, its inner edge shaped much as in *P. flavimanus* and *scaber*, not so convex as in *P. phipsoni*; the dorsal surface flatter than in these species, the external portion of the upper surface not so vertical; keel of underhand very strong, stronger than in the species just mentioned and more convex; upper side studded with rounded, oval, or irregularly-shaped tubercles, much like those of *P. phipsoni*; lobe of hand large; width of hand almost as great as length of movable digit or of carapace; immovable finger with smooth crest. Tarsal armature mostly 5-4. Pectinal teeth 11-12; base of pecten very narrow, the teeth starting some distance from its point of attachment.

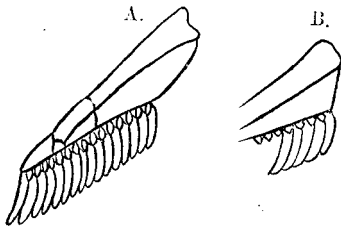


Fig. 29.—A. Pecten of *Palamnæus indus*.
 B. Base of pecten of *P. fulvipes*.

♂. Scarcely differing from ♀ in form of chelæ and length of tail, and thus easily recognizable from the male of *P. phipsoni* or *bengalensis*. Pectines larger than in ♀

Measurements in mm.—♀. Total length 117, carapace 20, tail 62, brachium 16, underhand 15, movable finger 21, width of hand 18.5.

♂. Total length 101, carapace 17, tail 55, brachium 14, underhand 11, movable finger 17.5, width of hand 14.

Loc. Ceylon (*Templeton, Barnes, etc.*), Peradeniya (*Freeman*).

82. *Palamnæus serratus*, sp. n.: Scorpio cæsar, *Pocock, A. M. N. II.* (6) xiii, p. 73, 1894 (*nec* *Buthus cæsar*, *C. Koch, Kraepelin*).

♂. *Colour* as in the preceding, to which it is nearly allied. *Carapace* and *terga* more coarsely granular laterally. Superior and supero-lateral crests of *tail* strongly denticulate; lateral surface of segments sparsely granular, upper side of 4th segment with some coarse granules, of 5th with many large granules on the anterior half on each side of the median sulcus. *Chelæ* with hand ornamented above as in *P. indus*, the inner border more strongly convex, forming anteriorly with the base of the immovable finger an angle much less obtuse than in that species, the denticles of the inner border running right up to the base of the immovable finger, the edge of which is at least as thick as in *P. indus*; the underhand reticulated and furnished with a few large granules; keel on immovable finger complete as in *P. indus*. *Pectines* practically as in *P. indus*. Tarsal spine-armature 6 or 5 behind, 4 in front.

Measurements in mm.—♂. Total length 125, carapace 18, tail 64, brachium 15, underhand 12·5, movable finger 19, width of hand 17.

Loc. Ceylon.

83. *Palamnæus cæsar*, *C. Koch, Arachn.* ix, p. 6, fig. 697, 1842 (*Buthus*): *Kraep. Tierr., Scorp. etc.* p. 114, 1899 (*Heterometrus*).

According to Kraepelin's description this species differs from *P. serratus* in having the frontal lobes of the carapace thickly granular or tubercular; the inner edge of the hand forms a well rounded arch where it passes into the immovable finger, which is very flat, wide, and has a sharp, smooth, not swollen border: the keel on its upper side is weak and becomes obsolete in the middle; the underhand is beset with conspicuous isolated tubercles; the tarsi are armed beneath with 5 or 6 spines behind, 3 in front. Pectinal teeth 12-16.

Loc. Ceylon.

84. *Palamnæus longimanus*, *Herbst, Nat. ungeft. Ins.* iv, p. 42, pl. ii, fig. 1, 1800 (*Scorpio*); *Kraep. Tierr., Scorp. etc.* p. 111, 1899, in part (*Heterometrus*): *bengalensis*, *Simon, Ann. Mus. Genor.* xx, p. 360, 1884 (*nec* *Buthus bengalensis*, *C. Koch, 1842*): *petersii*, *Thorell, Ann. Mus. Genova, (2)* vii, p. 588, 1889 (*nec* *petersii*, *Thor.* 1876 & 1877): *thorelli*, *Pocock, A. M. N. II.* (6) ix, p. 40, 1892 (*Palamnæus*).

♀. *Colour* a uniform black or deep blackish brown, reddish brown below and on the hands and vesicle. *Carapace* granular at the sides and on the frontal lobes, smooth or obsoletely granular above, differing from all the foregoing species in having the depression on each side of the median ocular tubercle continuous posteriorly with the postero-lateral sulcus of the carapace; a little longer than the 3rd and 4th caudal segments. *Terga* weakly granular at the sides;

the last subgranular in the middle, more coarsely granular at the sides and furnished with a pair of short granular crests. *Sterna* smooth and polished; the last not crested. *Tail* less than three and a half times as long as carapace, upper surface smooth, lateral surface only weakly granular; superior and inferior lateral crests denticulate, inferior keels of 4th weakly denticulate, superior lateral crest of 5th rectangular but only subdenticulate; *vesicle* smooth or almost smooth at the sides. *Chelæ* with humerus weakly granular in its basal half above; the upper and anterior surface bounded by strongly denticulate crests, the anterior surface with a few large tubercles; lower surface lightly reticulated mesially, with long finely granular posterior crest; brachium shorter than carapace, armed in front at base with single long spine, posterior surface smooth; *hand* thick, strongly convex above, its inner edge not so compressed as in the Indian species, the width less than length of underhand, which is about three-fourths the length of the movable finger; dorsal surface of hand smooth, punctured and obsoletely reticulated, weakly carinate, the reticulation becoming coarser toward the inner edge, which is itself somewhat thickly and coarsely granular; immovable finger with smooth keel. Penultimate fang of the movable finger of the *mandibles* longer than in the foregoing species. Tarsal spine-armature 7 or 6 behind, 4 in front. *Pectinal teeth* about 14-16 (♂, ♀).

♂. *Tail* a little and *chelæ* very much longer than in the female; tail not quite four times as long as carapace, which is shorter than the 3rd and 4th caudal segments; both humerus and brachium much longer than carapace; hand very long and slender, nearly parallel-sided, the width half the length of the underhand, which is longer than carapace and almost as long as the movable finger.

Measurements in mm.—♀. Total length 117, carapace 17, tail 56, humerus 13, brachium 14, underhand 13, movable finger 17, width of hand 11.5.

♂. Total length 103, carapace 16, tail 60, humerus 19, brachium 19, underhand 17, movable finger 19, width of hand 9.

Loc. Occurring in abundance throughout Burma (*Comotto, Oates, Fea*); Andaman Islands, Port Blair (*Pratt*). Borneo.

85. *Palamnæus oatesii*, nom. nov.: *Palamnæus spinifer*, *Pocock*, *A. M. N. H.* (6) ix, p. 40, 1892: [? *spinifer*, *Hempr. & Ehrenb. Symb. Phys., Scorp.* p. 3, t. i, fig. 2, 1839 (Heterometrus)]; *P. petersii*, *Thorell, Atti Soc. It.* xix, p. 214, 1877 (nec *petersii*, *Thorell, A. M. N. H.* (4) xvii, p. 13, 1876)*.

♀: Resembling the preceding in colour but more polished, and with the vesicle generally reddish yellow and much paler as a

* The name *petersii* was originally applied by Thorell in 1876 to the Cochin China form which Simon in 1872 had erroneously described and figured as *megacephalus*, C. Koch, and which he subsequently in 1882 renamed *silenus*.

rule than the segments of the tail. The upper elevated portion of the *carapace* quite smooth and polished, without a trace of granules; the margins of the frontal lobes distinctly denticulated. *Tail* not granular, keels more strongly denticulated. *Hand* with upper surface smoother, more polished, less strongly crested; its inner edge studded with much larger denticles. *Pectinal teeth* 14-18 (♂, ♀).

♂. Strikingly different from the male of *P. longimanus*, with secondary sexual characters poorly developed; brachium a little longer than humerus, but not or scarcely longer than carapace; hand not narrowed, its width equal or nearly equal to underhand and considerably less than movable finger; inner edge of hand shaped as in female, lightly convex, with large rounded lobe, not straight and parallel to the outer surface as in *P. longimanus*.

Measurements in mm. (specimens from Rangoon).—♀. Total length 128, carapace 18, tail 67, humerus 14, brachium 16, underhand 15, movable finger 20, width of hand 14.

♂. Total length 114, carapace 16.5, tail 62, humerus 14, brachium 15, underhand 14, movable finger 18, width of hand 12.5.

Large specimens of this species reach a length of 180 mm.

Loc. * Burma: Rangoon (*Oates*) and Mergui (*Anderson*). Siam: Singapore.

The following species no doubt belongs to this genus; but is not recognizable:—

Scorpio leioderma, *Dufour*, *Mém. prés. Ac. Sci. Paris*, xiv, p. 571. 1856.

Colour subfuscous, with paler legs. Very smooth; carapace with eight eyes, emarginate and bilobed; hands very wide, rough; caudal segments granular. Pectinal teeth 13. Length 4 inches (french)=108 millim.

Loc. Malabar.

* There are a couple of specimens in the British Museum labelled "Bengal." This locality, however, requires verification.