

FURTHER NOTES ON CRUSTACEA DECAPODA IN THE INDIAN MUSEUM.

X. ON TWO SPECIES OF HERMIT CRABS FROM KARACHI.

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In connection with his work on the spermatogenesis of certain Indian crabs and hermit crabs, Dr. Vishwa Nath of the Zoology Department of the Punjab University sent to us for identification a small collection that he had made at Karachi on the Arabian Sea coast of India, in September, 1938. In addition to the specimens that he needed strictly for his own work, Dr. Vishwa Nath also made, at the request of one of us, a general collection, chiefly of crabs, for the Indian Museum. The collection for the most part consists of species of crabs that are already known to occur commonly in Indian waters, but the two species of hermit crabs that he brought back have proved of special interest; one is new to science, and the second, in addition to being somewhat rare, is recorded from India for the first time. The present note deals with these two hermit crabs only.

The specimens that Dr. Vishwa Nath needed for his cytological work had necessarily to be dissected for the removal of gonads, but this was done with as little injury to the animals as possible. Wherever practicable one or more examples were left undissected also. The collection on the whole is very well preserved.

We are grateful to Dr. Vishwa Nath for giving us an opportunity of examining his collection, as also for presenting a lot of valuable material to the Indian Museum.

Family PAGURIDAE.

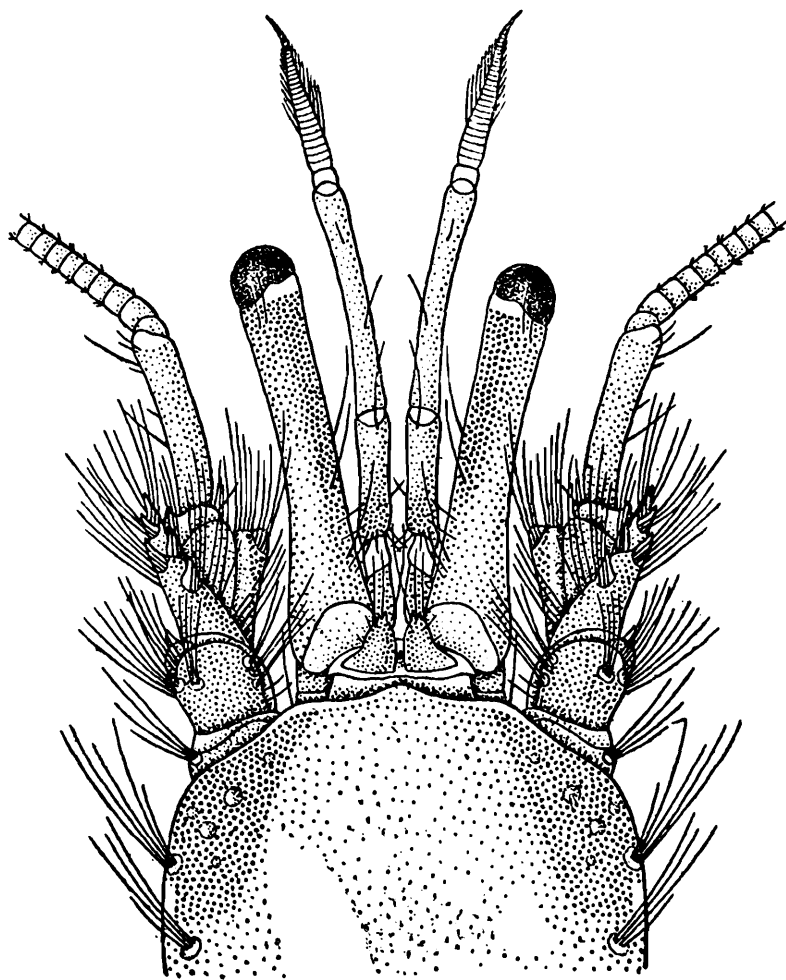
***Clibanarius nathi*¹, sp. nov.**

The new species is represented in the collection by three examples only.

The greatest breadth of the carapace is about two-thirds of its length in the median line. The portion in front of the cervical groove is rectangular in shape, and the antero-lateral angles are markedly rounded, more so than the postero-lateral. The surface of the carapace is coarsely punctate, especially in the anterior half. All the margins, and particularly the lateral and the posterior margins of the posterior half of the carapace, are thickly beset with long, yellowish silky hairs. The rostrum (text-fig. 1) is very small, scarcely extends to the base of the ophthalmic scales, and is somewhat more prominent than the antero-lateral angles of the carapace. The frontal margin is slightly concave

¹ The species is named after the distinguished cytologist Dr. Vishwa Nath, who collected it.

on either side between the rostrum and the antennal angle, and from the latter point sharply slopes backwards and outwards to form the rounded antero-lateral margins. In the largest of the three specimens the rostrum and the antennal angles are less prominent than in the other two examples.



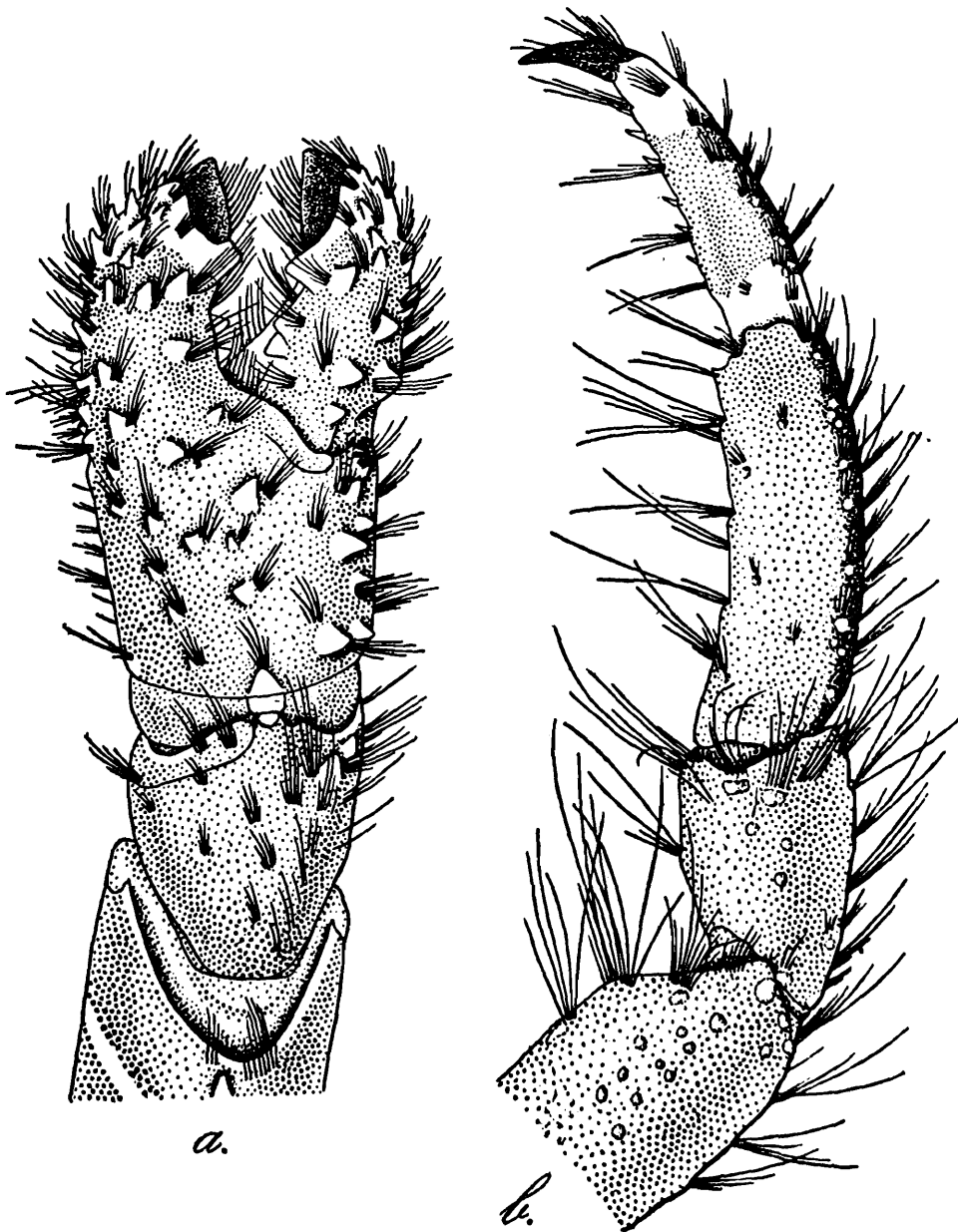
TEXT-FIG. 1.—*Clibanarius nathi*, sp. nov.

Anterior part of carapace, with eyes, antennae, etc. : $\times 8$.

The eye-stalks are long and slender and the terminal cornea occupies a very small portion of the stalk. The eye-stalks are as long as the anterior border of the carapace and extend as far as the antennal peduncles. They are slightly shorter than the peduncle of the antennule, extending up to about two-thirds the length of the distal peduncular segment. The right eye is shorter than the left. There are a few long setae on the stalk, especially in the proximal half. The ophthalmic scales are well developed and lie close to one another; they bear three or four small teeth and some long setae on the anterior margins. The antennal peduncle is rather thickly setose and the acicle is similarly covered with setae. The latter extends up to the distal end of the second peduncular segment. This segment is distally broadened, has a lobe on its inner side, and a fairly prominent spine at its outer distal angle. The acicle also has a few sharp spines distally. The antennal flagellum is almost as long as the carapace.

The chelipeds (text-fig. 2a) are similar and subequal in size. They are considerably stouter and shorter than the next two legs, and are thickly studded on the hand with sharply-pointed, almost spine-like

tubercles, interspersed with stiff setae. The merus is flattened and has some scale-like markings only on its outer and upper surface and two sharp spinules at the far end of the outer lower border. The carpus has three or four tubercles on its inner border, increasing in size from the proximal to the distal end, the last one being very prominent. The hand, including the fingers, is thickly covered with sharp tubercles on its upper and outer surface, and there are a few similar tubercles on the other side also. The fingers open in a horizontal plane. They are broadly spooned at the tips, which are corneous. There is only a small gap left when the fingers meet. The under surface of the palm also is tuberculate, but the tubercles are rather low and blunt. All over the cheliped there are stiff setae, arising mostly in tufts.



TEXT-FIG. 2.—*Clibanarius nathi*, sp. nov.

a. Left cheliped, upper and outer view : \times ca. 10.

b. Third leg of the left side : \times ca. 8.

The second and third pairs of legs are longer on the right side than on the left. There are some low tubercles on the outer surface of the

merus, carpus and propodus of the third leg (text-fig. 2*b*) on both the sides, in addition to the stiff hairs, arising mostly in bundles, that are present on both the margins of all the segments. The merus of the second leg has a sharp spinule at the distal end of its lower border; this is more prominent on the right leg than on the left and is sometimes double. The carpus in both the pairs has a spine at the distal end of the upper border. The propodus of both the legs of the second pair and of the right leg of the third pair is subcylindrical, while that of the left leg of the third pair is markedly flattened and is somewhat carinate near its upper margin. The dactylus is flattened in both the pairs and bears 5-7 sharp spinules along its lower margin, the distal-most spinule being the largest of the series. The black corneous tip is prominent and is bent downwards. The dactylus, including the tip, is almost equal to the propodus in length.

The colour of the specimens preserved in weak formalin is rather characteristic. The anterior part of the animal is flesh-red in colour. In two specimens the anterior half of the cephalothorax is whitish, with a few reddish spots, including two prominent ones at the anterolateral angles; in the third example the ground colour in this part is reddish, obscurely speckled with white, and the spots are somewhat darker. The eye-stalks, antennular and antennal peduncles, the chelipeds and legs are all flesh-red, the chelipeds being deeper in colour than the other parts. The antennal acicles and the ophthalmic scales are tipped with white, and there is a white ring just behind the black cornea. The terminal segment of the antennal peduncle has a narrow, white, longitudinal stripe along its upper border. The tubercles on the chelipeds and sometimes the low tubercles on the third leg are also tipped with white. The dactylus of the second and third legs on both the sides has two prominent, broad, yellowish-white rings, one just in front of the propodal joint, and the other at the distal end, immediately behind the dark tip. The distal ends of the fingers of the chelipeds are markedly lighter in colour than the rest of the claw while the tips are black. The setae are brownish and the silky hairs on the margins of the carapace light yellowish.

The measurements, in millimetres, of the three specimens (I—III) in the collection are given below.

	I	II	III
Median length of gastric region of carapace	6.5	6.0	6.8
Median length of posterior part of carapace	5.5	5.0	6.0
Anterior breadth of carapace	4.9	4.5	5.0
Greatest breadth of carapace	7.8	7.2	8.0
Length of eye (stalk and cornea)	5.0	4.4	5.0
Length of antennular peduncle	5.4	4.9	5.5
Length of antennal peduncle	5.0	4.5	5.0

	2nd Right Leg			2nd Left Leg			3rd Right Leg			3rd Left Leg		
	I	II	III	I	II	III	I	II	III	I	II	III
Length of merus	7.0	6.0	7.2	6.2	5.8	6.5	6.3	..	6.5	5.5	5.0	6.0
Length of carpus	4.5	4.0	4.7	4.5	3.8	4.5	4.0	..	4.3	4.0	3.8	4.6
Length of propodus	7.1	6.0	7.0	6.4	5.5	6.5	<u>7.0</u>	..	<u>6.5</u>	<u>5.4</u>	4.8	<u>5.0</u>
Length of dactylus (including claw).	6.5	..	6.5	6.0	5.2	6.0	<u>6.0</u>	..	<u>5.5</u>	<u>5.0</u>	4.5	<u>4.8</u>

Locality.—The three specimens on which the foregoing description is based were collected by Dr. Vishwa Nath at low tide from the Rocky Ledge on the south coast of Manora Island, Karachi, in September, 1938.

Type-specimens.—C 2326/1, Zoological Survey of India (*Ind. Mus.*).

Clibanarius nathi seems to resemble rather closely *C. cruentatus* (M.-Edw.)¹, of which a single incomplete specimen from Mergui is preserved in the collection of the Indian Museum. This specimen has been fully described by de Man² and Alcock³. It is now altogether faded, the red colour having disappeared completely, but the characteristic white spots can be clearly made out. The arrangement of the white spots on the gastric region of the carapace is exactly as described by de Man. In our new species this part of the carapace is generally yellowish-white and has some reddish spots, of which the two at the antero-lateral angles are the most conspicuous. The two prominent white rings on the dactyli of the 2nd and 3rd legs in *C. nathi* have not been described in Milne-Edwards' species, either by Alcock or by de Man, nor can any trace of these be made out in the Mergui specimen that we have examined. In Filhol's⁴ figure of *C. cruentatus* also no white rings are shown on the dactyli, though the arrangement of the white spots on the carapace is well brought out. The large white spots on the walking legs, present in *C. cruentatus*, are not seen in our species. In addition to these colour differences, there are some other points also in which the two species differ. In Milne-Edwards' species the cyc-stalks are stout and are as long as, or even slightly longer than, the antennular peduncles; in the Karachi examples they are less stout and are shorter than the peduncles of the antennules. The carpus of the cheliped, in *C. cruentatus*, is smooth, except for a terminal spine at the distal end of the inner margin; in our species there are three or four tubercles in this position, the last two of which are quite large and conspicuous. Further, in our species the palm and the fingers are more densely spinose than in *C. cruentatus*. In the Mergui specimen of Milne-Edwards' species, that we have seen, the inner surface of the palm is quite smooth; in *C. nathi* it is distinctly tuberculate.

¹ Milne-Edwards, H., *Ann. Sci. Nat. Zool.* (3) X, p. 62 (1848).

² de Man, J. G., *Journ. Linn. Soc.* XXII, pp. 250-252 (1888).

³ Alcock, A., *Cat. Ind. Mus. Decapod Crust.* Pt. II, fasc. 1, p. 50 (1905).

⁴ Filhol, H., *Miss. de l'île Campbell Zool.* III, p. 424, pl. lii, fig. 4 (1886).

The new species also shows a certain amount of resemblance to *C. carnifex* Heller¹ from the Red Sea, but in this the eyes are longer than the antennular peduncles, the antennal acicle extends up to the middle of the third peduncular segment and the inner and the lower surfaces of the hand are smooth. The comb-shaped arrangement of the teeth on the upper margin of the palm, so characteristic of Heller's species, is not seen in the Karachi form.

C. virescens (Krauss)² has colour rings on the dactyli of 2nd and 3rd legs similar to those in the present species, but, in addition to several other differences, the general colour in this species is green or olive-green.

***Clibanarius signatus* Heller.**

1861. *Clibanarius signatus*, Heller, *Sitzs k. Akad. Wien* XLIV, p. 252.

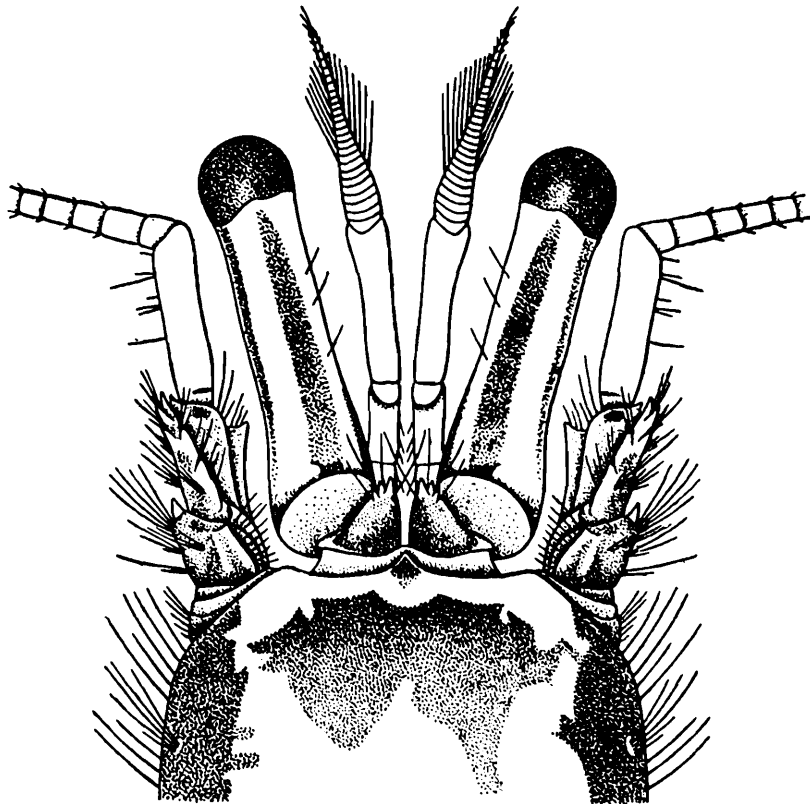
1905. *Clibanarius signatus*, Alcock, *Cat. Ind. Mus. Decapod Crust.* Pt. II, fasc. 1, p. 160 (Ref. only).

1906. *Clibanarius signatus*, Nobili, *Ann. Sci. Nat. Zool. Paris* IV, p. 115 (key only).

1937. *Clibanarius signatus*, Buitendijk, *Temminckia* II, pp. 266, 267 (key only).

There is a fine series of 17 female specimens of this species in the Karachi collection. Some of these are preserved in spirit, while others are in weak formalin, but the colour is very well preserved in all of them.

The specimens agree very closely with the fairly detailed description given by Heller, and though we had no named examples to com-



TEXT-FIG. 3.—*Clibanarius signatus* Heller.

Anterior part of carapace, with eyes, antennae, etc. : $\times 15$.

pare our material with, there seems little doubt that the Karachi specimens are referable to Heller's species. *C. signatus* has a very charac-

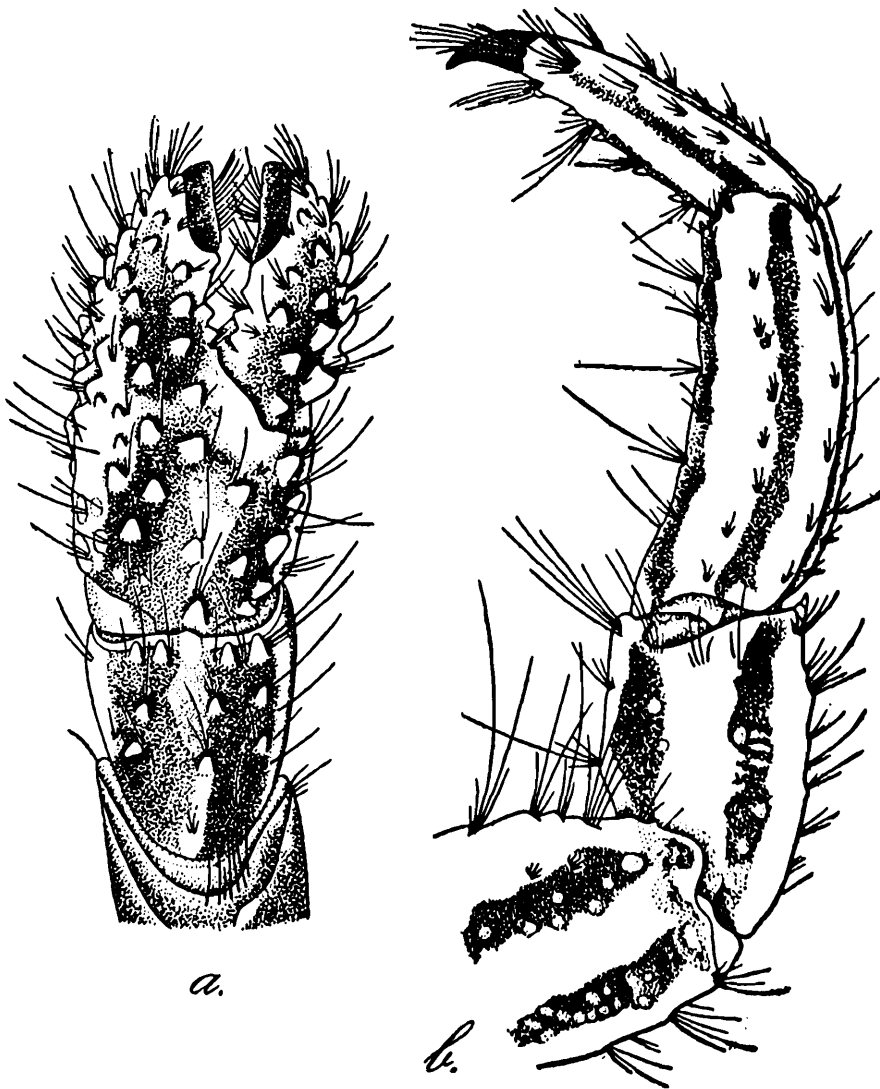
¹ Heller, C., *Sitz. k. Akad. Wien* XLIV, p. 250 (1861).

² Krauss, F., *Sudafrik. Crust.*, pp. 56, 57, pl. v, fig. 3 (1843).

teristic colouration and the colour in our examples agrees very closely with Heller's account.

The anterior part of the carapace (text-fig. 3) is rectangular in shape, all the four sides being more or less straight, the posterior angles rounded and the anterior somewhat more sharply cut. The greatest breadth of the carapace is about two-thirds of its length in the median line. The gastric region is markedly punctate and has a somewhat sparse growth of yellowish hairs on its lateral margins. In the posterior part the margins of the carapace are thickly beset with fine silky hairs of a lighter colour. The minute rostrum is pointed and the anterior border of the carapace on either side of it is practically straight. The antennal angles are hardly marked. From the base of the antennae the margins slope outwards and backwards and are continued as more or less straight lateral borders.

In large examples the eye-stalk (including the small cornea) is almost as long as the anterior margin of the carapace, measured between the



TEXT-FIG. 4.—*Clibanarius signatus* Heller.

a. Left cheliped, upper and outer view: $\times 15$.

b. Third leg of the left side: $\times 15$.

outer margins of the basal segments of the two antennal peduncles, but is distinctly longer than the straight frontal margin of the carapace.

In small specimens the eye-stalks are somewhat shorter. The eyes extend considerably beyond the antennal peduncles. The ophthalmic scales lie close to one another and have three small spinules on their anterior margins. The basal joints and the acicle of the antennal peduncle are sparsely hairy and the acicle extends only a little beyond the second segment of the peduncle.

The chelipeds are subequal and are shorter, but stouter, than the next two legs. The upper surface of the wrist and hand is studded with sharp tubercles interspersed with long, stiff hairs. The distal-most tubercle on the inner border of the upper surface of the wrist is appreciably larger than those preceding it. There is a spinule at the distal end of the outer lower border of the arm. The hand is flattened. The fingers are broad near the base, are toothed on the inner margins and leave an appreciable gap when they meet. The tips are broad and spooned. The palm is very characteristically swollen on the underside. The lower surface of all the joints is smooth.

The right legs are longer than those on the left side, and the second pair is distinctly longer than the third. The merus is considerably flattened and the carpus bears a sharp spinule at the distal end of its upper border. The propodus is subcylindrical, except that of the left leg of the third pair, in which it is flattened. The dactylus of the third leg, on both the sides, is slightly shorter than the propodus. The dactyli of the third pair of legs are somewhat flattened laterally and bear some minute spinules along the lower margin.

The colour markings are of a very distinctive pattern and in our specimens agree for the most part very closely with Heller's description. The ground colour of the cephalothorax is, however, yellowish-white, as described by Nobili¹, and not greenish as mentioned by Heller. The red markings on the carapace differ in extent in different specimens; in a few examples these are rather small and a great deal of the ground colour is visible, while in others the carapace is more red than yellow. A narrow, transverse streak of white is, however, always present immediately behind the front. The ophthalmic scales are red, with generally a narrow anterior border of white. The antennal and the antennular peduncles are also streaked and spotted with red. The longitudinal red stripes on the eye-stalks, mentioned by Heller, are very prominent, and the corneas are almost jet black. The chelipeds are of a darker red colour than the other legs and are obscurely streaked with yellowish-white along some of the margins. There is, however, in all the specimens a more or less prominent whitish area near the outer, lower margin of the palm, extending almost to the tip of the fixed finger. All the tubercles are white. The corneous tips of the fingers are black, but immediately behind the black tips there is a narrow white area. The walking legs, as described by Heller, are yellowish-white and bear very prominently on all the segments four or five red, longitudinal stripes, extending to the end of the dactylus. The tips of the dactyli are black. There are no transverse colour rings on the dactyli.

¹ Nobili, G., *Ann. Sci. Nat. Zool. Paris* IV, p. 115 (1906).

The colour markings are better seen in specimens preserved in spirit than those in formalin ; in the latter the red has become less distinct, and the black at the tips of the fingers and the dactyli has become brown.

Measurements, in millimetres, of a medium-sized specimen are given below.

Median length of gastric region of carapace	..	..	..	3.7
Median length of posterior part of carapace	..	..	..	3.0
Anterior breadth of carapace	..	..	..	2.8
Maximum breadth of carapace	..	..	..	4.5
Length of eye-stalk and cornea	..	..	..	2.5

	2nd Right Leg	2nd Left Leg	3rd Right Leg	3rd Left Leg
Length ¹ of merus	3.2	3.0	3.0	2.7
Length of carpus	2.1	2.0	2.1	2.0
Length of propodus	3.0	2.9	3.0	2.6
Length of dactylus	2.7	2.5	2.7	2.5

Locality.—*Clibanarius signatus* was so far known from the Red Sea only. The present specimens were collected by Dr. Vishwa Nath at low water on the Rocky Ledge, on the south coast of Manora Island, Karachi, in September, 1938. This record extends the range of the species eastwards very considerably.

The specimens are registered as C2327/1 in the books of the Zoological Survey of India.

¹ Length of the segments is measured along the upper margins.