NOTES ON CRUSTACEA DECAPODA IN THE INDIAN MUSEUM.

XVI. On two interesting crabs from the mouth of the River Hughli.

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Plate X.

In bygone years the Indian Museum was indebted to the members of the Bengal Pilot Service for numerous and often very valuable collections of zoological material obtained at the Sandheads off the mouth of the River Hughli. Numbers of specimens are registered as presented by the Commissioners of H. M. Pilot Brigs and foremost among those whose names are recorded as donors are A. J. Milner, W M. Daly and J. Barnet.

Nowadays the Pilot Brigs are replaced by modern steamships, one of which, the S.S. 'Fraser,' has recently been provided with a beam-trawl for such marine investigation as the exigencies of the service may permit. The results already obtained are of great interest and tend to show that our knowledge of the fauna which lives at the mouth of the Gangetic Delta at depths of about 20 fathoms is still very deficient.

Recent acquisitions among Decapod Crustacea include an example of the rare Penaeid *Atypopenaeus compressipes* (Henderson) and specimens of the two interesting crabs which are referred to below.

Family PORTUNIDAE.

Lissocarcinus arkati,[1] sp. nov.

(Plate X, fig. 1.)

The carapace is subcircular, with straight posterior margin, and is about one-fifth broader than long. The antero-lateral margins are evenly rounded but not strongly arched; the postero-lateral margins are straight, not concave as in *L. polybicides*, and meet the semicircular excavations in which the basal segments of the last pair of legs are accommodated in a blunt and obtuse angle. The posterior border is slightly concave in the middle, acutely angled on either side at the base of the last pair of legs, and is very broad, not far short of two-thirds the greatest breadth of the carapace.

The carapace is distinctly convex in both longitudinal and transverse directions, with a pair of rather faint grooves marking the lateral boundaries of the cardiac region. The greater part of the upper surface is closely covered with a series of transverse ridges, each bearing a short fringe of forwardly directed setae. In the anterior half of the carapace

[1] An officer of the Bengal Pilot Service is known in the vernacular as an *ārkāṭi sāhib* It is a tradition in the service that the name is derived from Arcot (*Arkāt*) in S. India and dates from the time when Madras was the seat of Government under the East India Company and pilots for all ports in the Bay of Bengal were in the service of the Nawab of Arcot. Forbes, in his Hindustani Dictionary, considers this derivation probable.

these ridges are long and often continuous across the carapace from side to side; in the posterior half, though equally conspicuous, they tend to become broken up into short lengths. On the extreme posterior parts the ridges are altogether wanting; in the middle line they are absent in the posterior quarter of the carapace, but on either side they extend backwards almost to the base of the last pair of legs. From 22 to 25 ridges may be counted in the mid-dorsal line of the carapace and from 28 to 32 on the margin behind the anterior orbital angle. In freshly preserved specimens the ridges and their setae are coloured deep red on a pinkish ground and the posterior smooth portions exhibit short streaks of dull red pigment which simulate ridges. The pterygostomian regions are conspicuously rugose, with numerous scattered setae.

The fronto-orbital border is nearly three-quarters the greatest breadth of the carapace and exceeds the breadth of the posterior border. The front projects very little and in the middle line is only a trifle in advance of the inner orbital angles (in this respect differing widely from *L. polybioides*); its breadth, excluding the inner orbital angles, is rather less than one-third the greatest breadth of the carapace. The margin is feebly notched in the middle line and on either side is straight or a little concave; the inner orbital angles are prominent with rounded tips and are separated from the front by a deep and rather wide notch. The orbits are large, with a notch in the upper border opposite the middle of the cornea and another in a similar position in the lower border.

The antero-lateral margins are thin and crest-like and are cut by four narrow incisions into five broad lobes (including the outer orbital angle) with acute or subrectangular anterior angles. The middle lobe is the broadest, and the foremost, which usually has a concave edge, is the shortest. The distance between the outer orbital angle and the hindmost tooth is scarcely half the breadth of the posterior margin.

The basal segment of the antenna is produced into the orbital hiatus and completely fills it to the exclusion of the flagellum, the produced portion of the segment being conspicuously carinate. The antennules are large and fold obliquely.

The outer maxillipeds do not differ materially from those of *L. polybioides*.

The chelipeds are equal, or nearly so, and are a little longer and much stouter than the walking legs. The upper surfaces of the palm, carpus and distal half of the merus are closely covered with ridges fringed with setae, similar to those on the carapace. On the merus the ridges are mostly transverse in direction, some long and some short. The inner edge of the segment bears from 4 to 6 short teeth which increase in size distally and are succeeded at the anterior end by a large broadly-rounded lobe; the posterior edge is roughened, with some tufts of whitish setae, and the inferior edge is almost smooth. On the upper side of the carpus there is a long continuous ridge extending from the tip of the large blade-like inner tooth to the outer aspect of the mero-carpal articulation; the remaining ridges, which are mostly short, are oblique in direction. Towards the outer limit of the upper surface the ridges on the carpus tend to form low blunt teeth and on its outer aspect the

segment is rather densely clad with white hairs, among which two sharp forwardly-directed teeth may be detected close to the propodal articulation. The upper border of the palm is rounded and covered with ridges which are mostly oblique and short. As in the carpus the ridges merge into blunt teeth and tubercles on the outer side, with tufts of setae interspersed; not infrequently the tubercles form a distinct longitudinal row opposite the finger-cleft. In the lower third of its outer surface the palm is almost smooth but the inferior edge is sharply defined and roughened, with a few short teeth or tubercles near the base of the fixed finger. The ridges on the dorsal surface of the palm pass over on to the inner face, which is otherwise rough, with one or two rows of smooth tubercles running towards the base of the fixed finger. The fingers have from 5 to 7 large rounded teeth on their inner edges and the tips overlap when the claw is closed. Both fingers bear sharp ridges separated by deep V-shaped depressions filled with setae. On the fixed finger there are two ridges on each side, the lowermost extending backwards on to the palm. On the dactylus there are 6 ridges; of these four are visible on the inner side, the two centre ones coalescing at about the middle of the finger-length.

The first, second and third walking legs are slender, subequal in length and rather shorter than the chelipeds. The merus is smooth and hairless; the carpus and propodus are bicarinate above with two lines of setae. The propodus of the first leg is fully 2·5 times as long as wide and, in all three pairs, the lower border is perfectly straight and ends in a small tooth. The dactylus is slender and lanceolate, with yellow corneous tips, two lines of setae and five longitudinal carinae, two of the latter being on the upper face.

The last pair of legs is subdorsal in position. The merus is scarcely one and a half times as long as wide, with a fringe of setae along its anterior edge. The two last segments are conspicuously lamellar, with fringes on their posterior edges, the dactylus being about twice as long as broad.

The above description is based on three large females, 16·4 to 20 mm. in length, two of which are ovigerous. The only male examined is extremely small, 6·6 mm. in length, and is possibly immature. In most respects the male agrees very closely with the female; but the transverse ridges are confined to the anterior half of the carapace and, though the chelipeds have almost identical sculpture, they are without the tufts of setae which are conspicuous in females. As in males of other species of the genus the 3rd to 5th abdominal tergites are fused. The last two pieces together form an almost equilateral triangle and the sixth segment is about two-thirds as long as its basal breadth.

The specimens yield the following measurements (in mm.):—

Sex	♀ ovig.	♀ ovig.	♀	♂
Length	20·0	18·9	16·4	6·6
Breadth	23·4	23·4	19·7	7·3
Fronto-orbital breadth	16·9	16·1	13·8	5·9
Breadth of front [1]	7·6	7·4	6·4	2·7
Breadth of posterior margin	14·8	14·7	12·8	4·3

[1] Excluding inner orbital angles.

The specimens were all trawled by the S.S. 'Fraser' at the Sandheads, at the mouth of the River Hughli, in about 20 fathoms of water. Two of the females are regarded as types and are registered in the collection of the Zoological Survey of India under number C 693/1.

The only other species of *Lissocarcinus* which possesses numerous transverse ridges on the carapace is the little known *L. boholensis* Semper,[1] from Bohol in the Philippine Islands. The very brief original description of this species, as Miss Rathbun has pointed out (*loc. cit., infra*), is erroneous in stating that the carapace is longer than broad. According to Semper's account the species differs from that described above in the produced front, in the chelipeds, which are described merely as rough on the outer and upper sides, and in having the transverse ridges of the carapace (in a specimen 14 mm. in length) restricted to the anterior half. The only subsequent record of *L. boholensis* that I have been able to find is that by Miss Rathbun,[2] who has described an extremely small specimen, 3·7 mm. in length, from the vicinity of Koh Kut in the Gulf of Siam. From the account of this specimen *L. arkati* differs widely. The shape of the carapace is said to resemble that of *L. polybioides*, the postero-lateral margins are concave, the posterior border is only half the breadth of the carapace, the fronto-orbital breadth is very little less than the extreme width, the front is strongly projecting, the surface of the chelipeds is "finely roughened" and the posterior margin of the propodus of the first three walking legs is apparently without a tooth at the distal end. In all these respects the specimen differs from the small male of *L. arkati* referred to above.

Miss Rathbun notes that her specimen was found in Salpae and other species of the genus are known to be symbiotic. It is probable therefore that *L. arkati* has some peculiar habit of life, but as regards this point no information is at present available.

Family XANTHIDAE.

Liagore rubromaculata de Haan.

(Plate X, fig. 2.)

1898. *Liagore rubromaculata*, Alcock, *Journ. Asiat. Soc. Bengal*, LXVII, p. 93

A large male of this species, only once previously found in the Bay of Bengal, has recently been obtained by the S.S. 'Fraser' at the Sandheads, off the mouth of the River Hughli, in water about 20 fathoms in depth. The carapace is 25 mm. in length and 36 mm. in breadth.

The species was first found on the Japanese coast and was redescribed by Alcock from a single specimen obtained at the mouth of the Irrawaddy delta in 20 fathoms and from eight specimens from Hongkong. It has since been recorded by Miss Rathbun [3] from Kii, Japan, and by Parisi [4] from China. Four additional specimens have also been obtained by the R.I.M.S. 'Investigator' at the upper end of the Persian Gulf, 29° 59′ N., 50° 3′ E., in 20 fathoms.

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[1] Semper, in Nauck, *Zeitsch. wiss. Zool.* XXXIV, pp. 60, 67 (1880).

[2] Rathbun, *Kong. Danske Vidensk. Selsk. Skrifter*, 7 Raekke, *naturvid. og math.*, V, p. 363 (1910).

[3] Rathbun, *Proc. U. S. Nat. Mus.* XXVI, p. 24 (1902).

[4] Parisi, *Atti Soc. Ital. Sci. Nat.* LV, p. 178 (1916).

On comparison with the examples from Hongkong the only noteworthy difference is that in Indian specimens and in those from the Persian Gulf the antero-lateral margins are obscurely divided into four blunt lobes. In those from Hongkong no trace of this is apparent and de Haan in his original description [1] says of the carapace "latera integerrima."

All the specimens are completely bleached with the exception of that recently collected by the S.S 'Fraser' and in this example the red spots are considerably larger than indicated in de Haan's figure. I take this opportunity of giving a fresh figure of the species.

[1] De Haan, in Siebold's *Fauna Japonica, Crust.*, p. 49, pl. V, fig. 1 (1835).