

On the Brachyura of Christmas Island

By M. W. F. TWEEDIE, M.A.

No account of the marine crabs is given in the Monograph of Christmas Island (Andrews 1900), the first list published being that of Calman (1909) which deals with the collection made by Andrews on his second visit to the Island in 1908, and includes both littoral and terrestrial species.

A good many of the names used by Calman are no longer valid and so his list is reproduced in a revised form below. In every case where the name proposed differs from that used by him, the latter is placed after it in brackets.

Xanthidae

- Carpilodes rugatus* (H. M. E.).
C. bellus (Dana) [*C. vaillantianus*].
C. monticulosus A. M. E. [*C. cariosus*].
Zozymus aeneus (Linn.).
Lophozozymus dodone (Herbst).
Lachnopodus subacutus Stimp. [*Xantho bidentatus*].
Leptodius sanguineus (H. M. E.).
Leptodius cavipes (Dana).
Actaea tomentosa (H. M. E.).
A. rufopunctata (H. M. E.).
A. speciosa (Dana).
Daira perlata (Herbst).
Xanthias lamarekii (H. M. E.) [*Xanthodes lamarekii*].
Paraxanthias notatus (Dana) [*Xanthodes notatus*].
P. alcocki (Calman) [*Lioxanthodes alcocki*].
Chlorodiella nigra (Forsk) [*Chlorodius niger*].
C. laevissima (Dana) [*Chlorodius laevissimus*].
C. venusta (Rathbun) [*Chlorodopsis venusta*] (?).
Phymodius nitidus (Dana) [*Phymodius sculptus*].
Chlorodopsis areolata (H. M. E.).
Cyclodius gracilis Dana.
Cymo melanodactylus de Haan.
Eriphia laevimana Latr.
E. scabricula Dana.
Trapezia cymodoce (Herbst).
T. ferruginea Latr.
T. ferruginea areolata Dana.
T. digitalis Latr.
T. rufopunctata (Herbst).
Tetralia glaberrima (Herbst).
Domacia hispida Eyd. and Soul.
Lybia tessellata (Latr.) [*Melia tessellata*].

Portunidae

Thalamita sp. (juv.).

Ocypodidae

Ocyпода ceratophthalma (Pallas).

Grapsidae

- Grapsus grapsus tenuicrustatus* (Herbst) [*Grapsus grapsus*].
G. strigosus (Herbst).
Geograpsus grayi (H. M. E.).
G. crinipes (Dana).
Ptychognathus pusillus Heller.
Pachygrapsus minutus A. M. E. [*Sesarma murrayi*].
Percnon planissimum (Herbst) [*Liolophus planissimum*].

Gecarcinidae

- Cardisoma hirtipes* Dana.
Gecarcoidea humei natalis (Pocock) [*Gecarcoidea lalandii*].

Maiidae

- Achaeus spinosus* Miers (?).
Oncinopus aranea de Haan.
Camposcia retusa Latr.
Micippoides angustifrons A. M. E. [*Hyastenus andrewsi*].
Hyastenus uncifer Calman.
Tylocarcinus gracilis Miers.
Perinea tumida Dana.
Schizophrys aspera (H. M. E.).

Dynomenidae

- Dynomene* sp.

In 1934 two papers on crabs from Christmas Island appeared, one by Balss (Balss 1934) published in March and dealing with the material obtained by Prof. J. W. Harms on his visit in the winter of 1932/33 and the other, published in December, by Ward (Ward 1934), which dealt with the collection made by the present writer in the autumn of 1932.

Balss added the following species to the fauna of the island: *Liomera cinctimana* (White); *Actaea lata* Borr.; *Medaeus nudipes* (A.M.E.); *Pilodius harmsi* Balss; *Ocyropa cordimana* Desm.; *Pachygrapsus plicatus* (H.M.E.); *Varuna litterata* Fabr.; *Cyclograpsus longipes* Stimp.; *Sesarma obtusifrons* Dana; *S. jacksoni* Balss; *Plagusia depressa* Fabr. His claim to have added *Carpilodes bellus* to the fauna does not take account of Calmans record of *C. vaillantianus*, which, according to Odhner is synonymus with *bellus*. On the other hand he includes *Geograpsus lividus stormi* in the list of species recorded by Calman as well as by himself.

After the publication of Ward's paper, Dr. Balss had occasion to examine part of the material he reported on in the course of a general examination of the Xanthidae in the Raffles Museum collection, and made the following amendments (Balss, 1938 A, 1938 B and *in litt.*):—

- Kraussia proporcullana* Ward = *K. rugulosa* (Krauss).
Lioxantho laevidorsalis and *L. subacuta* should both be referred to *Lachnopodus subacutus* (Stimp.).
Atergatis tweediei Ward. Dr. Balss considers the specimens too young to merit description.
Leptodius planus Ward = *L. gracilis* (Dana).

Medaeus noelensis Ward = *M. granulatus* (Haswell).
Actaea suffuscula Rathbun = *A. consobrina* A.M.E.
Paraxanthias haematostictus -Ward = *P. ponapensis*
 (Rathbun).
Chlorodopsis natalensis Ward = *Pilodius harmsi* Balss.
Phymodius sculptus (A.M.E.) = *P. nitidus* (Dana).
Tweedieia noelensis Ward = *Phymodius odhneri* Gordon.
Pachygrapsus murrayi Calman = *P. minutus* (H.M.E.).

I have accepted all these amendments and furthermore I dissent from Ward in the following particulars: The specimen he identified as *Pseudograpsus crassus* belongs in fact to *P. albus* Stimp.; the name *Percnon demani* has no standing as the specimens in question are not *abbreviatus*, as defined by de Man, but *P. planissimum* (Herbst); *Pachygrapsus natalis* Ward is not separable from *P. plicatus* (H.M.E.). I place *Hylaeocarcinus natalis* Pocock (= *Gecarcoidea lalandii* of Calman's and Balss' lists) under a new combination, *Gecarcoidea humei natalis* (Pocock).

Taking into consideration the above amendments, the following species are added to the fauna by Ward; *Cryptodromopsis tridens* Borr.; *Hyastenus macrospinosus* Ward; *Proechinoecus sculptus* Ward; *Thalamita picta* Stimp.; *Kraussia rugulosa* (Krauss); *Pseudoliomera natalensis* Ward; *Atergatis tweediei* Ward; *Leptodius nudipes* (Dana)¹; *Leptodius gracilis* Dana; *Etisodes albus* Ward; *Actaea consobrina* A.M.E., *A. fossulata* (Girard); *Paraxanthias ponapensis* Rathbun; *Phymodius odhneri* Gordon; *Pseudozius caystrus* (Ad. and White); *Grapsus intermedius* de Man; *Pachygrapsus planifrons* de Man; *Pseudograpsus albus* Stimp.

Energetic collecting by Dr. C. A. Gibson-Hill has further increased our knowledge of the crabs of Christmas Island. In addition to securing good series of some of the rarer species already known from this locality, he has added the following species to the list: *Cryptodromia canaliculata* Stimp.; *Dynomene praedator* A.M.E.; *Atergatis latissimus* (H.M.E.); *Pseudoliomera granosimana* (A.M.E.); *Etisus demani* Odhner; *Trapezia guttata* Rüppell. *Daeryopilumnus eremita* Nob.; *D. rathbunae* Balss; *Metasesarma rousseauxi* H.M.E.; *Ocypoda kuhli* de Haan; *Micippa platipes* Rüppell.

There are also in his collection three species of the difficult genus *Pilumnus*. I am unable to assign any of them with confidence to described forms and do not propose to deal with them until access to authenticated material in European museums is easier than at present.

1. If this species is considered generically distinct from *Medaeus nudipes* (A. M. E.) there is no need to adopt Odhner's name *L. danae* for it.

The whole of Dr. Gibson-Hill's collection has been presented to the Raffles Museum.

Dynomene praedator A.M.E.

A. MILNE EDWARDS 1879, p. 8.
MIYAKE 1938, p. 194.
BUI TENDIJK 1939, p. 227.

Material.—Six males and four females were taken by Dr. Gibson-Hill at Flying Fish Cove.

Remarks.—This is possibly the *Dynomene* sp. of Calman's list.

Atergatis latissimus (H.M.E.).

H. MILNE EDWARDS 1834, p. 384 (*Zozymus latissimus*).
DE HAAN 1835, p. 46 (*Cancer (Atergatis) frontalis*).
WHITE 1847, p. 224 (*Atergatis sinuatifrons*).
ODHNER 1925, p. 83.
DE MAN 1926, p. 205 (*A. frontalis*).
SAKAI 1939, p. 448 (*A. latissimus frontalis*).

Material.—A large male measuring 122 mm. in carapace breadth.

Remarks.—Consideration of the literature of this species leads me to believe that *latissimus* and *frontalis* are synonymous, the former name having a year's priority.

The only significant difference noted by de Man (l.c.) between his specimen from Simalur, which he refers to *frontalis*, and the type of *latissimus* is the coarser pitting on the carapace of the former, which is considerably the larger of the two. Sakai records a series from Northern Daitozima of which he refers all but one to *frontalis* considered as a subspecies of *latissimus*, the remaining one, a small female, being referred to typical *latissimus* on account of the absence of pitting on the carapace.

Both his and de Man's findings suggest to me that only one species is in question, in which the carapace is more or less finely punctuate in the young and becomes increasingly coarsely pitted with age.

The present specimen, which agrees well with the photograph given by Sakai (l.c. plate 88, fig. 1), was collected on the fringing reef at Lily Beach about normal low tide level.

Pseudoliomera granosimana (A.M.E.).

RATHBUN 1911, p. 213; pl. 17, fig. 6 (*Liomera granosimana*).
ODHNER 1925, p. 79, figs. 5, 6.

Material.—One adult male, 28 mm. in carapace breadth and one young male 15.5 mm. broad, collection by Dr. Gibson Hill.

Remarks.—The larger specimen is in perfect agreement with Rathbun's description and figure (l.c.) of a specimen from the Seychelles. In the smaller specimen the fronto-orbital margin

is rather broader, the sulci on the carapace better defined and the fingers shorter, but I am convinced that it is the same species. As in the specimen figured by Rathbun the chelipeds are equal.

In colour the two specimens before me are orange, the legs and chelae brighter than the carapace and the fingers are pale brown with white tips. The dactyli of the legs are orange at the base and bright cerise distally with the terminal claw brown.

***Etisus demani* Odhner**

DE MAN 1891, p. 8 (*Etisodes, frontalis*), nec *E. frontalis* Dana 1852.
ODHNER 1925, p. 83.
BALSS 1938, p. 45.

Material.— Three males, the largest 18 mm. in carapace breadth, collected by Dr. Gibson-Hill.

Remarks.—I have nothing to add to de Man's careful description except that the two posterior antero-lateral teeth are sharper and more claw-like in the largest of these specimens than is shown in his figure, and are progressively less developed in the two smaller examples.

***Pilodius harmsi* Balss.**

? CALMAN 1909, p. 705 (*Chlorodopsis venusta* ?).
BALSS 1934, p. 228.
WARD 1934, p. 21 (*Chlorodopsis natalensis*).

Remarks.—This species is extremely common on the reef at Flying Fish Cove and elsewhere and is most likely to be present in any representative collection from the Island.

The fact, noted by Ward in his description of *C. natalensis*, that it approaches *C. venusta* Rathbun is strong presumptive evidence that the specimens doubtfully referred to *venusta* by Calman were really *harmsi*.

***Dacryopilumnus rathbunae* Balss.**

BALSS 1932, p. 515.
EDMONDSON 1935, p. 32 (*Nullierinis amplifrons*).
SAKAI 1939, p. 525 *ubi syn.*

Material.—Six males and nine females from Margaret Beach. The largest male is 7.7 mm. in breadth and the largest female 9.8 mm.

Remarks.—Dr. Gibson-Hill speaks of this and the next species as inhabiting abandoned mollusc and worm tunnels in rocks between tide marks, choosing one of a suitable width so that by turning one angle of the carapace and the adjoining chela towards the exit they can block it completely.

Edmondson's record from Christmas Island refers to the island of that name in the Pacific.

Dacryopilumnus eremita Nobili.

SAKAI 1939, p. 524 *ubi syn.*

Material.—Three males and ten females from Margaret Beach. The largest male is 4.4 mm. in breadth and the largest female 5.6 mm.

Ocypoda kuhli de Haan.

MIERS 1882, p. 384.

ORTMANN, 1897, p. 359, 364.

GORDON 1934, p. 9.

Material.—Five males and two females from Christmas Island, collected by Dr. Gibson-Hill, all sub-adult, the largest, a male, being just over, 20 mm. in anterior carapace breadth. Both the females are ovigerous.

Remarks.—Dr. Gordon's comments (l.c.) apply equally well to this series. I think it possible that more than one species may be included in the accepted synonymy of *O. kuhli*. Dr. Gordon notes a discrepancy between Mier's and Ortmann's figures of the species but I have no opportunity at present of examining a large enough series to settle the matter.

Pachygrapsus plicatus (H.M.E.).

TESCH 1918, p. 77 *ubi syn.*

WARD 1934, p. 25 (*P. natalensis*).

Material.—A female paratype of *P. natalensis* from Christmas Island; a good series of both sexes from the same locality, collected by Dr. Gibson-Hill; a male specimen from Hilo, Hawaii, lent by the U.S. National Museum.

Remarks.—The characters given by Ward (l.c.) to distinguish *natalensis* from *plicatus* are (a) greater breadth of the carapace in the latter and (b) greater inflation of the male chela in *natalensis*, comparison being made with *plicatus* from Hawaii. Exact measurements of length and breadth are not given.

The Hawaiian specimen at my disposal measures 15 × 12.5 mm., the breadth: length ratio being 1:0.83. The largest male from Christmas Island measures 13.5 × 10.8 mm., ratio 1:0.80. The latter therefore has the wider carapace. The paratype of *natalensis* is broken and distorted and the measurements cannot be obtained, but I am satisfied that it belongs to the same species as the rest of the Christmas Island series. Other ratios from that series range from 1:0.79 to 1:0.82, so that they have the carapace broader, not narrower than the Hawaiian specimen.

In any case I do not consider the difference that I find to be of specific significance and I can say the same for the slight difference in the inflation of the chelae, which is as recorded by Ward. In all other respects the Hawaiian specimen agrees with those from Christmas Island, including the form of the male abdomen and first pleopod.

Sesarma jacksoni Balss.

BALSS 1934, p. 230.

Material.—Three adult and one sub-adult females collected by Dr. Gibson-Hill. The smallest adult is ovigerous.

Remarks.—Judging from the size of these specimens the type and only previously recorded specimen was not yet adult: the author speaks of it as "a small male."

The species is well distinguished from *S. kraussi* by the following characters; the surface of the carapace is quite hairless, smooth and shining. It is everywhere very finely rugose but there are no distinct oblique lines on the posterior branchial regions. These are strongly marked in *kraussi*, the surface of whose carapace is rough and beset with small tufts of hair. The lateral borders of the carapace are more curved in *jacksoni* and the front is less deeply emarginate. There is no row of small spines on the outer side of the immoveable finger, and no anterior subterminal spine on the meri of the walking legs, both of which features are found in *kraussi*.

I have no specimen of the other closely allied species, *S. longipes*, but *jacksoni* appears to be sufficiently well distinguished from it by the presence of two epibranchial teeth behind the outer orbital angle, and by the absence of a row of tubercles on the under surface of the immoveable finger of the chela.

The carapace and legs of this specimen were dark red and the chelae yellow.

Measurements of the largest specimen:—

Carapace.—

Anterior breadth	..	..	13.5 mm.
Greatest breadth	..	..	19.5 "
Median length	..	..	15 "

Penultimate walking leg.—

Length of merus	..	..	17.6 "
Breadth of merus	..	..	5 "
Combined length of carpus and propodus	..	..	19.5 "
Length of dactylus	..	..	11.5 "

The species appears to be to a great extent terrestrial in its habits. All were taken on land and one is described as "found on the north coast shore terrace about a hundred yards from the sea climbing a wall at night."

Sesarma obtusifrons Dana.

DE MAN 1895, p. 161; 1898, pl. 29, fig. 31.

Material.—Three males and eight females.

Remarks.—De Man (l.c. p. 165) expressed some doubt that his specimens from Atjeh (Sumatra) were in fact this species.

A specimen from the present series has been compared by Dr. F. A. Chace with examples from Hawaii, which may be regarded as topotypical, the type locality being "Sandwich Islands." He states that the ambulatory legs of the Christmas Island specimen are rather more slender than those of most of the Hawaiian ones, but that it falls within the limits of variation of the latter series.

De Man's description and figure leave no doubt of the identity of his crab from Atjeh with the present series, and so his doubts are resolved and a very wide range established for the species.

Metasesarma rousseauxi H.M.E.

TESCH 1917, p. 212 *ubi syn.*

Dr. Gibson-Hill collected a good series of this widely distributed species and comments on its habits in his paper on the terrestrial crabs (*infra* p. 43). It has not been recorded from Christmas Island before.

Varuna litterata (Fabr.).

TESCH 1918, p. 85 *ubi syn.*

Material.—Two males and a sub-adult female collected by Dr. Gibson-Hill.

Remarks.—One of the males is unusually large, being 54 mm. in greatest breadth and in both the proportions of the abdominal segments are different from those of specimens from Singapore. The difference is most marked in the 5th and 6th segments which are relatively broader in the crabs from Christmas Island. The breadth: length ratio of the 6th segment in both these specimens is 1.9:1; in a series from Singapore it is 1.65–1.8:1. I cannot discover any other peculiarities in the Christmas Island specimens.

Pseudograpsus albus Stimpson.

TESCH 1918, p. 99.

WARD 1934, p. 26 (*P. crassus*).

Remarks.—A good series collected by Dr. Gibson-Hill, obviously conspecific with the single female taken by me in 1932, includes several males which confirm my contention (Tweedie, 1936, p. 50) that the species is *albus* and not *crassus*.

Percnon planissimum (Herbst).

DE MAN 1902, p. 544.

TESCH 1918, p. 130.

WARD 1934, p. 24 (*P. demani*).

SCHMITT 1939, p. 24.

Material.—Paratypes of *P. demani* Ward from Christmas Island comprising an adult male and four juveniles; an adult

female and a series of sub-adults and juveniles of both sexes from the same locality collected by Dr. Gibson-Hill.

Remarks.—All these specimens exhibit the characters of *P. planissimum* and not of the form that de Man (l.c.) doubtfully referred to *P. abbreviatum* (Dana.). Schmitt (l.c. p. 23, footnote) noted that Ward's figure of *demani* depicts a species in which the second lateral tooth is not reduced, and the adult paratype of *demani* has the spines on the epistome as de Man describes for *planissimum*, a large central and two small lateral spines (de Man's description and figure (l.c.) are at variance in this respect). Finally all the Christmas Island specimens have the groove on the chela rudimentary, whereas in *abbreviatum* of both Dana and de Man it is well developed.

I have examined specimens of *abbreviatum* (Dana) from Cocos-Keeling Islands, and find their characters in agreement with the species as originally described and not with the form doubtfully referred to *abbreviatum* by de Man. The carapace of the Cocos-Keeling specimens is as broad as long and the epistomial border carries three spines of about equal size.

It would appear therefore that de Man's species is not *abbreviatum* (Dana) and probably requires a new name. It cannot, however, be called *demani* as this is a *nomen nudum* founded on specimens of *planissimum*.

Planissimum has been recorded both by Calman and Balss from the Island.

Cardisoma hirtipes Dana.

ALCOCK 1900, p. 447 *ubi syn.*

Alcock (l.c.) says of this species (referring to specimens from the Andamans and Nicobars) that the carapace in life is dark violet and the chelae bright cinnabar red. I have seen the species living on Christmas Island and recently received a series of freshly killed specimens from there from Dr. Gibson-Hill; the colour of the carapace of these crabs is light bluish grey and of the claws pale horn colour.

I sent the specimens to Dr. B. N. Chopra of the Indian Museum for comparison with the material reported on by Alcock. He replied that the difference in colouration noticed by me could be seen even in specimens that had long been preserved in spirit, but that he could detect no significant morphological differences.

In the absence of such I am not prepared to separate the Christmas Island form by name, but the matter is of considerable interest and observations on the living colours of this crab in others of the numerous localities where it occurs might furnish material for study of a form of geographical differentiation unusual in Crustacea.

Genus *Gecarcoidea* H. Milne Edwards.

- H. MILNE EDWARDS 1837, p. 25.
 H. MILNE EDWARDS 1853, p. 203 (*Pelocarcinus*).
 WOOD MASON 1873, p. 258 (*Hylaeocarcinus*).
 DE MAN 1879, p. 65 (*Limnocarcinus*).
 POCOCK 1888, p. 561 (*Hylaeocarcinus*).
 ORTMANN 1894, p. 738.
 ALCOCK 1900, p. 448 (*Pelocarcinus*).
 CALMAN 1909, p. 710.
 RATHBUN 1918, p. 364.
 WARD 1934, p. 26 (*Hylaeocarcinus*).

The genus *Gecarcoidea* was founded by H. Milne Edwards in 1837 for the species *G. lalandii* and renamed *Pelocarcinus* by the same author in 1853, the type locality cited being Brazil. In 1873 Wood Mason described *Hylaeocarcinus humei* nov. gen. et spec. from the Nicobars and in 1879 de Man erected a new genus for a land crab from Celebes, *Limnocarcinus intermedius*. Pocock in 1888 referred a land crab from Christmas Island, Indian Ocean, to *Hylaeocarcinus*, naming it *natalis* and giving good reasons for regarding *Limnocarcinus* as identical with *Hylaeocarcinus*. A. Milne Edwards described two new species under the generic name *Pelocarcinus* (*P. marchei* and *P. cailloti*) in 1890. In 1894 Ortmann reduced all the species referred to above to the synonymy of *Gecarcoidea lalandii* (mis-spelt *lalandei* in his paper) with the exception of *H. natalis* Pocock, whose paper he probably overlooked. Alcock in 1900 recorded the genus under the name *Pelocarcinus humei* from the Nicobars and Andamans, but Calman referring to the Christmas Island form in 1909 followed Ortmann and further reduced Pocock's species *natalis* to the synonymy of *G. lalandii*. In 1934 Ward recorded specimens from Christmas Island under the name *Hylaeocarcinus natalis*, giving reasons for regarding the species as distinct but none for rejecting Milne Edwards' generic name.

Ortmann was the first to question the correctness of the type locality of *lalandii*, Brazil, in view of the fact that subsequent records were all East Indian. Doubt was thrown upon it again in 1909 by Calman and in 1918 by Rathbun, who included the species in her account of the Grapsoid crabs of America with a query, and recorded that the type specimen had been destroyed. I suggest that the anomalous type locality can be discarded without question. Other instances of animals obtained by the early French collectors being wrongly localised are not lacking, one of the best known being that of *Leptocoma braziliana* (Gm.), a most

distinctive and purely Malaysian sunbird, which was described as coming from Brazil.

It seems probable that Ortmann and Calman were right in placing all the records under Milne Edwards' original genus (his amendment to *Pelocarcinus* has no standing), but not in disregarding all the distinctions on which the subsequent genera and species were based. Specimens from Christmas Island can be easily distinguished from examples from the Andamans, and, in view of the wide range over which the crab is found and its predilection for small islands I have no doubt that other forms could also be separated. On this basis *G. lalandii* must be regarded as indeterminable as the type locality is unknown, the type destroyed and the description too generalised for precise determination. The generic description of *Gecarcoidea* is recognisable, and I consider that a reasonable way out of the difficulty is to substitute *humei* for *lalandii* as the genotype and to regard *natalis* from Christmas Island and any other variant forms which can be recognised as subspecies of *humei*.

The species is recorded from the Nicobar Islands (type locality), Andaman Islands (Alcock); New Britain (Ortmann); Gorontalo, Celebes (de Man); Christmas Island, Indian Ocean (Pocock); Philippine Islands and Loyalty Islands (A. Milne Edwards); Berhala Island, Malacca Strait (de Man); Clipperton Island (Lenz); Formosa (Sakai); Talaut Islands and Pulu Weh (Tesch).

Gecarcoidea humei (Wood-Mason).

WOOD-MASON 1873, p. 258 (*Hylaeocarcinus humei*).

G. humei natalis (Pocock).

POCOCK 1888, p. 561 (*Hylaeocarcinus natalis*).

CALMAN 1909, p. 710 (*Gecarcoidea lalandii*).

WEBB 1922, p. 350 (*G. lalandii*).

WARD 1934, p. 26 (*Hylaeocarcinus natalis*).

Material.—Nine adult and sub-adult males and three females, the largest a male, 97 mm. in carapace breadth; a series of juveniles; a large number of early post-larval crabs, presumed to be this species, taken at the annual migration from the sea to the land in 1904, all from Christmas Island. Two adult males and a female of *G. h. humei* from the Andaman Islands were kindly lent by the Indian Museum, Calcutta. Except for the position of the sub-orbital lobe, a feature which seems to me to

be subject to aberration, Dr. Chopra tells me that there is no difference between specimens from the Andamans and Nicobars.

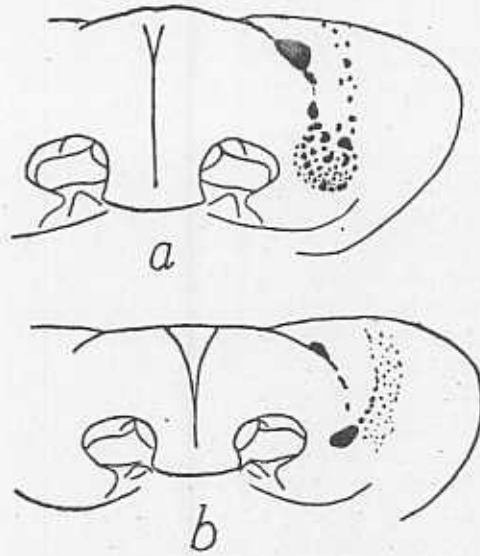


Fig. 1. Fronto-dorsal views of carapace of (a) *G. h. natalis* and (b) *G. h. humei*. The pale scars are shown in negative, i.e. black on white, whereas they are actually lighter than their background.

Remarks.—The most obvious feature distinguishing *natalis* from *humel* is in the development of the light coloured, depressed markings on the carapace, conveniently referred to as scars, developed on the metagastric and urogastric areas and along, and external to, the cervical groove. In *natalis* these scars are very much larger and more diffuse; those at the anterior ends of the cervical groove, external to the orbits each consist of a roughly circular depressed area, only slightly less than the orbit in diameter, and covered with numerous light coloured spots (fig. 1, a). In the specimens of *humel* which I have these scars are each represented by a single oval or reniform marking, uniformly light in colour and less than half the diameter of the orbit in length (fig. 1, b). Wood-Mason's description and figure indicate that this single scar may be supplemented by one or two others in *humel*, and in both races an irregular series of small spots leads upwards and backwards from the extra-orbital scar towards the branchial lobe. About half way along the course of the cervical groove, another smaller scar is seen which is also larger in *natalis* than in *humel* and shows a tendency to be broken up

into small spots in the former. The scars on the posterior part of the gastric region are similarly larger and more diffuse in *natalis*.

Another important morphological difference is in the proportions of the distal segments of the male abdomen, most clearly shown by examining the ratio between the median length and basal breadth of the sixth segment. In the two specimens of *humei* this is 1:1.75 and 1:1.77; in a series of nine *natalis* it ranges from 1:1.58 to 1:1.68 with an average of 1:1.63. The narrower abdomen of *natalis*, indicated by these figures, is a noticeable feature when the two races are compared by inspection.

The characters of the ambulatory legs as cited by Ward (1-c) do not afford a reliable distinction between *natalis* and *humei*. There is no difference in the proportions of the legs, and specimens of *natalis* occur with six fully developed rows of spines on the dactyli. There is, indeed, a tendency in *natalis* for the ridges on the upper and lower surfaces of the dactyli to be spinate only at their distal ends. Examining the adult series I find occasionally only one spine at the distal ends of these ridges and frequently as few as two or three, but in several specimens one or more of the legs, but never all, has a complete row of spines occupying the whole length of the ridge, the maximum number observed being eight. In the three specimens of *humei* which I have the ridges are spinate throughout their length, the number of spines ranging from six to twelve. By counting all the spines on the superior dactylar ridges of all eight legs I find that the sum of them is 75 in one of the males of *humei* and 81 in the female, the other male has two legs missing and the dactylus of a third mutilated. In *natalis* the maximum figure thus obtained is 51 and the minimum 12, the average for the series of adults being 33.

The position of the tooth or lobe standing in the sub-orbital hiatus I consider to be an unreliable feature. In the series of *natalis* it is nearer to the external margin of the hiatus in some and to the edge of the front in others. In *humei* it is generally nearer to the edge of the front, with which it may or may not be in contact (c.f. Alcock, 1900, p. 448). Tesch (1918, p. 138) also records variability of this feature in a series from the Talaut Islands.

The colour is quite distinct in the two forms. *Natalis* is predominantly scarlet, the chelipeds rather brighter than the rest. *Humei* is described by Wood-Mason as having the upper surface of the carapace and legs red-violet and the claws white-brown faintly tinged with reddish violet. The scars on the carapace are yellow or yellowish white in both forms.

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