

BORRADAILE'S MALDIVIAN COLLECTIONS REVISITED*

By JOHN S. GARTH

Allan Hancock Foundation

University of Southern California, Los Angeles, California, U.S.A.

THE writer was privileged to participate in 1964 as a member of the U.S. Programme in Biology in the International Indian Ocean Expedition. He spent three weeks in February at Central Marine Fisheries Research Institute, Mandapam Camp, South India, of which Dr. S. Jones was Director, before joining Stanford University's research vessel *TE VEGA* in Colombo, Ceylon, in March for a six-week cruise among the Maldivian Islands. This was broken by a two-week visit to the Indian Ocean Biological Centre at Cochin-Ernakulam, Kerala, in early April. At each of these localities he collected decapod Crustacea both intertidally and, where circumstances permitted, subtidally to moderate depths. These collections will be reported upon subsequently.

The writer's interest in studying the brachyuran crabs, particularly members of the family Xanthidae inhabiting reef-building corals, led to an early acquaintance with the papers of L. A. Borradaile, late of Selwyn College, Cambridge University, particularly those contained in J. Stanley Gardiner's 'Fauna and Geography of the Maldivian and Laccadive Islands.' These were based on collections made in 1899 at Minikoi in the Laccadives by Borradaile personally and continued in 1900 in the Maldives by Gardiner and C. Forster-Cooper, late of Trinity Hall, Cambridge University, who replaced Borradaile when the latter was obliged to return prematurely to England for reasons of health (Gardiner, 1901). In the course of *TE VEGA* Cruise B, many of Forster-Cooper's and Gardiner's Maldivian localities were re-collected. The writer, therefore, arranged to modify his return itinerary, already planned to include museums in Paris and London, to include a brief visit to the museum in Cambridge as well.

The University Museum of Zoology, which houses Borradaile's collections, is situated in Downing Street, Cambridge. At the time of the writer's first visit, in May of 1964, they were accommodated in the Old Museum Building, which has since been demolished to make room for a New Museum Building, recently occupied. Access to the collections was obtained through Dr. C. B. Goodhart, Curator of Invertebrates. These were found to be intact and in excellent condition, due to the devoted curatorial skill of Mr. R. D. Norman, Chief Assistant. Specimens were kept in long glass tubes, cork-stoppered and paraffined, and could be examined under the binoculars without removal, although permission to break the seals for closer examination and for measurement was graciously given. On a visit of one day's duration it was possible to examine only Borradaile's brachyuran types, which were all accounted for, and to verify the existence of the remainder of the collection and its availability for future study. A similar review of Borradaile's anomuran types by Dr. D. S. Johnson of the University of Singapore was then in progress.

*Allan Hancock Foundation contribution No. 334.

As the writer's work on *TE VEGA* collections progressed, and as a suite of decapod crustaceans commensal with branching corals was developed from the Maldivian Islands comparable to those earlier developed for the Marshall Islands (Garth, 1964) and for the Great Barrier Reef (Patton, 1966), it became evident that Borradaile's collection, having come from a wider variety of corals than those obtained by *TE VEGA* and examined by the writer, should have included a greater number of corallicolous species than Borradaile (1902) reported.¹ Thus, while the obligate commensal crabs of the genus *Trapezia*, now known to be restricted to living corals of the family Pocilloporidae, were fully elaborated with the aid of the then recently completed study of Ortmann (1897), the genus *Tetralia*, now known to occupy an analogous situation with respect to living corals of the family Acroporidae, was represented by the single species, *T. glaberrima*; while the genus *Domecia*, now known to be restricted in the Indo-Pacific to one species each in living pocilloporid and acroporid corals, was represented only by *D. hispida*, the species from pocilloporid corals. This posed an intriguing question: Could a complete suite of commensal crabs from acroporid corals be developed from Borradaile's materials, using the criteria recently formulated for *Tetralia* by Serène (1959) and by Patton (1966), and for *Domecia* by Guinot (1964b)?

Similarly, while the facultative commensal crabs of corals, as frequently found in dead as in living coral, were sporadically represented among Borradaile's collection, the most ubiquitous of them, *Pilodius areolatus*, was wanting, while of the four expected species of *Chlorodiella*, only three were reported, and of the three common species of *Phymodius*, only two were reported (although Borradaile confessed his inability to distinguish between *P. unguatus* and *P. monticulosus*). This raised the questions: Was *Pilodius areolatus* indeed present among Borradaile's material, but perhaps reported under an unrecognized name? And would it be possible, as in the case of the obligate coral commensals, to develop a full suite of the facultative ones, using the systematic criteria proposed for *Phymodius* by Gordon (1934) and for *Chlorodiella* by Forest and Guinot (1961)?

To answer these and other questions, as well as to compare *TE VEGA* specimens with those collected by Forster-Cooper and Gardiner and identified by Borradaile some 65 years before, the writer visited Cambridge University for a second time in May of 1966†, remaining ten days, during which the crab families Portunidae, Xanthidae, Majidae, and Parthenopidae were covered in detail, the oxystomatous and grapsoid families less extensively. Once again Mr. Norman assisted, this time by carrying the specimens for each day's study from the basement of the Zoology Building, where they were in storage, to a temporary 'hut' in the courtyard, where space was provided for their examination. When traditional 'June Week' festivities curtailed the writer's stay at the University Arms Hotel, arrangements were made by Dr. Goodhart for his accommodation in Gonville and Caius College, of which J. Stanley Gardiner was a Fellow, for the remainder of his stay.

¹ Borradaile's systematics should be considered in the context of the late nineteenth Century. His most recent reference was Alcock's (1898) 'Materials for a Carcinological Fauna of India,' which suffers from lack of illustration. He did not then have access to such important later works as Rathbun's (1911) Marine Brachyura of the Percy Sladen Trust Expedition to the Indian Ocean in 1905, also led by J. Stanley Gardiner, a set of whose specimens is also deposited at the University Museum, Cambridge, nor to Odhner's (1925) 'Monographierte Gattungen der Krabbenfamilie Xanthidae,' to name only two most useful subsequent papers. His important work on decapod classification was yet to come.

† Travel supported by NSF Grant No. GB-3849.

The results of these investigations, which produced evidence that the collection had been worked over by T. Odhner prior to his 1925 revision of the Xanthidae (as well as by Mme. D. Guinot in anticipation of hers), were highly satisfactory. Not only were the 'missing' species found to be present as anticipated, but other matters of concern to crustacean systematists were brought to light. One result was to demonstrate by reidentification the presence among Borradaile's collection of several coral-inhabiting crabs first reported for the Maldive Islands from among XARIFA collections (Guinot, 1962), among them *Chlorodiella cytherea* (Dana), *Pilodius areolatus* (Milne Edwards), and *Tetralia heterodactyla* (Heller), and to show by re-examination, rather than by supposition (Guinot, 1962, p. 239), that the *Domecia* obtained by Forster-Cooper and Gardiner at Goidu was *D. glabra* Alcock and not *D. hispida*. A further result was to resolve the uncertainty concerning some of Borradaile's identifications, including those that he himself questioned, thereby establishing a firm basis for the writer's own studies on Maldivian crabs. A final result, it is hoped, will be to enhance the value of Borradaile's collections to the scientific community as a primary resource for the study of the decapod crustacean fauna of the coral atolls and reefs of the Central Indian Ocean.

In view of the interest of a generation of zoologists who, like the writer, were nurtured on 'The Invertebrata' (Borradaile and Potts, 1935), and who consider Borradaile a master-teacher and, for his generation, a progressive systematist, it seems opportune to place these findings on record, thus bringing an excellent but dated work abreast of the times.

Marine Crustaceans. III. The Xanthidae and some other Crabs (Borradaile, 1902)

Names changed by Reidentification

Name used by Borradaile	Correct name and identifier
19. <i>Cymo andreossyi</i> (And.) [sic.], 1826 var. <i>melanodaetylus</i> (de Haan), 1833 part : the Minikoi specimen	<i>Cymo deplanatus</i> A. Milne Edwards, 1873 det. J. S. Garth
33. <i>Actaea affinis</i> , Borradaile, 1902 (not Dana, 1852)	<i>Pilodius areolatus</i> (Milne Edwards), 1834 det. J. S. Garth (see also Odhner, 1925)
34. <i>Actaea rufopunctata</i> (H. M.-Edw.), 1834 part : the N. Male specimen	<i>Actaea</i> sp., not <i>rufopunctata</i> , det. J. S. Garth
39. ? <i>Actaea pulchella</i> , Borradaile, 1902 (not A. M.-Edw., 1865)	<i>Actaea obesa</i> A. Milne Edwards, 1865 det. T. Odhner (see also Guinot, 1969)
55. <i>Phymodius unguatus</i> (H. M.-Edw.), 1834 part : the Fadiffolu specimens part : the Miladumadulu specimens	<i>Phymodius unguatus</i> (Milne Edwards) <i>Phymodius monticulosus</i> (Dana), 1852 det. J. S. Garth
59. <i>Chlorodius niger</i> (Forsk.), 1775 part : the Goidu specimen part : the Male specimens	<i>Chlorodiella cytherea</i> (Dana), 1852 mixed <i>C. cytherea</i> and <i>C. laevissima</i> (Dana), 1852, det. J. S. Garth

Name used by Borradaile	Correct name and identifier
63. <i>Carpilodes ruber</i> , Borradaile, 1902 (not A. M.-Edw., 1865)	<i>Carpilodes pediger</i> Alcock, 1898, det. T. Odhner = <i>Liomera pediger</i> (Alcock) (Guinot, 1966)
65. <i>Carpilodes monticulosus</i> , Borradaile, 1902 (not A. M.-Edw., 1873)	<i>Carpilodes rugatus</i> (Milne Edwards), 1834, det. T. Odhner = <i>Liomera rugata</i> (Milne Edwards), (Barnard, 1950)
67. <i>Carpilodes cariosus</i> Alc., 1899 part : the Miladumadulu specimens part : the remaining specimens	<i>Liomera monticulosa</i> (A. Milne Edwards), 1873 <i>Liomera caelata</i> (Odhner), 1925 det. J. S. Garth
74. ? <i>Chlorodopsis (Cyclodius) ornata</i> , Borradaile, 1902 (not Dana, 1852)	<i>Phymodius monticulosus</i> (Dana), and <i>Phymodius unguatus</i> (Milne Edwards), young, det. J. S. Garth
78. <i>Domecia hispida</i> Eyd. & Soul., 1841 var.? part : the Goidu specimens	<i>Domecia glabra</i> Alcock, 1899, det. J. S. Garth (see also Forest & Guinot, 1961)
85. <i>Tetralia glaberrima</i> (Hbst.), 1770 part : males and females from Goidu part : males and female from Goidu males and females from Male part : large male from Minikoi part : female from Felidu	<i>Tetralia glaberrima rubridactyla</i> Patton, 1966 <i>Tetralia glaberrima pullidactyla</i> Patton, 1966, det. J. S. Garth <i>Tetralia heterodactyla heterodactyla</i> (Heller), 1861 <i>Tetralia heterodactyla fusca</i> Scrène, 1959 det. J. S. Garth

Marine Crustaceans. III. The Xanthidae and some other Crabs (Borradaile, 1902)

Names placed in Synonymy or transferred to another Genus

Name used by Borradaile	Name in current use, and authority
1. <i>Pseudozius dispar</i> Dana, 1852	<i>Glabropilumnus dispar</i> (Dana) (Balss, 1932)
3. <i>Pseudozius coralliophilus</i> , n. sp.	<i>Liocarpilodes integerrimus</i> (Dana), 1852 (Balss, 1933)
4. <i>Pseudozius triunguiculatus</i> , n. sp.	<i>Maldivia triunguiculata</i> (Borradaile), (Guinot, 1964a)
5. <i>Pseudozius (Platyozius) laevis</i> , n. sp.	<i>Eucrate sulcatifrons</i> (Stimpson), 1858 (Barnard, 1950) (GONEPLACIDAE)

Name used by Borradaile	Correct name and identifier
7. <i>Pilumnus andersoni</i> de Man, 1887	<i>Pilumnus longicornis</i> Hilgendorf, 1878 (Balss, 1933)
8. <i>Pilumnus hirsutus</i> Stimps., 1858	<i>Pilumnus minutus</i> (De Haan), 1835 (Sakai, 1939)
10. <i>Pilumnus dorsipes</i> , Borradaile, 1902 (not Stimps., 1858)	<i>Pilumnus sinensis</i> Gordon, 1930 (Balss, 1933)
15. <i>Actumnus globosus</i> (Dana), 1852	<i>Globopilumnus globosus</i> (Dana) (Balss, 1932)
17. <i>Actumnus tomentosus</i> Dana, 1852	<i>Actumnus setifer</i> (De Haan), 1835 (Balss, 1933)
18. <i>Melia tessellata</i> (Latr.), 1825	<i>Lybia tessellata</i> (Latreille) (Rathbun, 1906)
19. <i>Cymo andreossi</i> (And.) [sic.], 1826 var. <i>melanodactylus</i> (de Haan), 1833	<i>Cymo andreossi</i> (Audouin) <i>Cymo melanodactylus</i> (Dana), 1852 (Forest & Guinot, 1961)
21. <i>Xantho frontalis</i> , n. sp.	<i>Carpilodes lophopus</i> Alcock, 1898 (Odhner, 1925) <i>Liomera lophopa</i> (Alcock) (Barnard, 1950)
23. <i>Xanthias notatus</i> (Dana), 1852	<i>Paraxanthias notatus</i> (Dana) (Odhner, 1925)
24. <i>Leptodius nudipes</i> (Dana), 1852	<i>Xantho danae</i> Odhner, 1925 (but see Forest & Guinot, 1961, p. 60)
26. <i>Leptodius</i> (<i>Xanthodius</i>) <i>cristatus</i> , n. sp.	<i>Zozymodes pumilus</i> Jacquinet & Lucas, 1853 (Odhner, 1925)
28. <i>Lioxantho tumidus</i> , Alc., 1898	<i>Lachnopus subacutus</i> (Stimpson), 1858 (Odhner, 1925) (see also Forest & Guinot, 1961)
29. <i>Lioxantho punctatus</i> (H. M.-Edw.), 1834	<i>Xanthias punctatus</i> (Milne Edwards) (Odhner, 1925)
31. <i>Liomera spinipes</i> , n. sp.	<i>Liomera sodalis</i> Alcock, 1898 (Odhner, 1925) <i>Glabropilumnus sodalis</i> (Alcock) (Guinot, 1969)
34. <i>Actaea rufopunctata</i> (H. M.-Edw.), 1834	<i>Paractaea rufopunctata</i> (Milne Edwards) (Guinot, 1969)
35. <i>Actaea speciosa</i> (Dana), 1852	<i>Pseudoliomera speciosa</i> (Dana) (Guinot, 1969)

Name used by Borradaile	Correct name and identifier
37. <i>Actaea lata</i> , n. sp.	<i>Pseudoliomera lata</i> (Borradaile) (Guinot, 1969)
38. <i>Actaea variolosa</i> , n. sp.	<i>Pseudoliomera variolosa</i> (Borradaile) (Guinot, 1969)
49. <i>Lophactaea anaglypta</i> (Heller), 1861	<i>Platypodia anaglypta</i> (Heller) (Rathbun, 1911)
50. <i>Lophactaea cristata</i> A. M.-Edw., 1865	<i>Platypodia cristata</i> (A. Milne Edwards) (Rathbun, 1911)
51. <i>Lophactaea fissa</i> Henderson, 1893	<i>Platypodia fissa</i> (Henderson) (Buitendijk, 1941)
42. <i>Lophactaea granulosa</i> (Rüppell), 1830	<i>Platypodia granulosa</i> (Rüppell) (Rathbun, 1906)
53. <i>Lophactaea semigranosa</i> (Heller) 1861	<i>Platypodia semigranosa</i> (Heller) (Rathbun, 1906)
56. <i>Phymodius sculptus</i> (A. M.-Edw.), 1873	<i>Phymodius nitidus</i> (Dana), 1852 (Gordon, 1934)
57. <i>Chlorodius laevisimus</i> Dana, 1852	<i>Chlorodiella laevisima</i> (Dana) (Rathbun, 1906)
58. <i>Chlorodius barbatus</i> Borradaile, 1900	<i>Chlorodiella barbata</i> (Borradaile) (Rathbun, 1911)
59. <i>Chlorodius niger</i> (Forsk.), 1775	<i>Chlorodiella nigra</i> (Forskål) (Rathbun, 1906)
60. <i>Euxanthus exsculptus</i> (Hbst.), 1790 ; var. <i>rugosus</i> Miers, 1884	<i>Euxanthus rugosus</i> Miers (Rathbun, 1911)
61. <i>Carpilodes stimpsoni</i> , A. M.-Edw., 1865	<i>Liomera stimpsoni</i> (A. Milne Edwards) (Guinot, 1964a)
62. <i>Carpilodes pediger</i> Alc., 1898	<i>Liomera pediger</i> (Alcock) (Guinot, 1966)
64. <i>Carpilodes vaillantianus</i> (A. M.-Edw.), 1862	<i>Carpilodes bellus</i> (Dana), 1852 (Odhner, 1925) <i>Liomera bella</i> (Dana) (Barnard, 1950)
66. <i>Carpilodes pallidus</i> Borradaile, 1900	<i>Liomera pallida</i> (Borradaile) (Guinot, 1966)
67. <i>Carpilodes cariosus</i> Alc., 1899	<i>Liomera monticulosa</i> (A. Milne Edwards), 1873 (Barnard, 1950)
71. <i>Chlorodopsis woodmasoni</i> Alc., 1898	<i>Chlorodopsis spinipes</i> (Heller), 1861 (Balss, 1938)

Name used by Borradaile	Correct name and identifier
72. <i>Chlorodopsis frontalis</i> , Borradaile, 1902 (not Dana, 1852)	<i>Etisus demani</i> Odhner, 1925 (see also Guinot, 1964a, p. 54)
73. <i>Chlorodopsis espinosus</i> , n. sp.	<i>Pilodius espinosus</i> (Borradaile) (McNeill, 1968) not <i>Etisus laevimanus</i> (Randall), young (Odhner, 1925)
79. <i>Eriphia laevimana</i> Latr., 1817	<i>Eriphia sebana</i> (Shaw & Nodder), 1803 (Rathbun, 1907)
81. <i>Trapezia ferruginea</i> Latr., 1825	
(i) Var. <i>typica</i> Ortm., 1897	<i>Trapezia ferruginea</i> Latreille
(ii) Var. <i>dentata</i> (Mackay) [sic.], 1838	<i>Trapezia cymodoce</i> (Herbst), 1801 (Barnard, 1950)
(iii) Var. <i>guttata</i> Rüppell, 1830	<i>Trapezia guttata</i> Rüppell
(iv) Var. <i>maculata</i> (Mackay) [sic.]	<i>Trapezia rufopunctata</i> (Herbst), 1801 (Barnard, 1950)
83. <i>Trapezia digitalis</i> Latr., 1825	
(i) Var. <i>typica</i> [Ortm.], 1897	<i>Trapezia digitalis</i> Latreille
(ii) Var. <i>formosa</i> Smith, 1869	<i>Trapezia formosa</i> Smith
86. <i>Quadrella coronata</i> Dana, 1852	<i>Quadrella maculosa</i> Alcock (Rathbun, 1911)
Var. <i>D. maculata</i> [sic.] Alc., 1898	

The following biographical notes on persons mentioned in the text as either formerly or presently connected with Cambridge University were provided by Dr. C. B. Goodhart :

L. A. Borradaile, sc.D. University Lecturer in Zoology, and Fellow of Selwyn College. Died 1941.

C. Forster-Cooper, sc.D., F.R.S. Director of the University Museum of Zoology, 1914-1937, and Fellow of Trinity Hall (not Trinity College, which is a different foundation). From 1938 Director of the British Museum (Natural History) and, later, Sir Clive Forster-Cooper. Died 1947.

Prof. J. Stanley Gardiner, M.A., F.R.S. Professor of Zoology and Fellow of Gonville & Caius College. Died 1946.

C. B. Goodhart, M.A., Ph.D. University Lecturer in Zoology, and Curator of Invertebrates in the Museum of Zoology. Fellow of Gonville & Caius College.

R. D. Norman, Chief Assistant in the University Museum of Zoology.

F. R. Parrington, sc.D., F.R.S. Director of the University Museum of Zoology.

REFERENCES

- ALCOCK, A. 1898. Materials for a carcinological fauna of India. No. 3. The Brachyura Cyclo-metopa. Part I. The Family Xanthidae. *J. Asiat. Soc. Beng.*, **67** (2) : 67-233.
- BALSS, H. 1932. Über einige systematisch interessante Xanthidae (Crustacea Decapoda Brachyura) der Harnsschen Reisen nach dem Sundaarchipel. *Z. wiss. Zool.*, **142** : 510-519, text-figs. 1-4.
- . 1933. Beiträge zur Kenntnis der Gattung *Pilumnus* (Crustacea Dekapoda) und verwandter Gattungen. *Capita Zool.*, **4** (3) : 1-47, pls. 1-7, text-figs. 1-7.
- . 1938. Die Dekapöda Brachyura von Dr. Sixten Bocks Pazifik-Expedition 1917-1918. *Goteborgs K. Ventensk.—o. VitterhSamh. Handl.*, (B) **5** (7) : 1-85.
- BARNARD, K. H. 1950. Descriptive catalogue of South African decapod crustaceans. *Ann. S. Afr. Mus.*, **38** : 1-387, text-figs. 1-154.
- BÖRRADAILE, L. A. 1902. Marine Crustaceans. III. The Xanthidae and other crabs. In : J. S. Gardiner (ed.), *Fauna and Geography of the Maldive and Laccadive Archipelagoes*, **1** (3). 237-271, text-figs. 41-60. The University Press, Cambridge, England.
- , & F. A. POTTS, 1935. *The Invertebrata, a manual for the use of students*. 2nd ed. (xv) + 725 pp. The University Press, Cambridge, England.
- BUITENDIJK, ALIDA, M. 1941. Biological results of the Snellius Expedition. XIII. On some Xanthidae, chiefly of the genus *Platypodia* Bell. *Temminckia*, **6** : 295-312, pl. 4, text-figs. 1-3.
- FOREST, J., & DANIELE GUINOT. 1961. Crustacés Décapodes brachyours de Tahiti et des Tuamotu. Expédition française sur les récifs coralliens de la Nouvelle-Calédonie. Volume préliminaire. (xi) 1-195, pls. 1-18, text-figs. 1-178. Paris.
- GARDINER, J. S. 1901. Introduction : Narrative and route of the expedition. In : J. S. Gardiner (ed.), *The fauna and geography of the Maldive and Laccadive Archipelagoes*, **1** (1) : 1-11, 2 maps. The University Press, Cambridge, England.
- GARTH, J. S. 1964. The Crustacea Decapoda (Brachyura and Anomura) of Eniwetok Atoll, Marshall Islands, with special reference to the obligate commensals of branching corals. *Micronesica*, **1** : 137-144, text-figs. 1, 2.
- GORDON, ISABELLA. 1934. Résultats scientifiques du voyage aux Indes Orientales Néerlandaises. Crustacea Brachyura. *Mém. Mus. r. Hist. nat. Belg.*, Hors Sér., **3**(15) : 1-78, text-figs. 1-37.
- GUINOT, DANIELE. 1962. Sur une collection de Crustacés Décapodes brachyours des Îles Maldives et de Mer Rouge (Expédition 'Xarifa' 1957-1958). *Kieler Meeresforsch.*, **18**(2) : 231-244, pls. 1-5.
- . 1964a. Crustacés Décapodés brachyours (Xanthidae) des Campagnes de la Calypso en Mer Rouge (1952), dans le Golfe Persique et à l'Île Aldabra (1954). *Mém. Mus. natn. Hist. nat., Paris*, Sér. A, Zool., **32** (1) : 1-108, pls. 1-12, text-figs. 1-57.
- . 1964b. Les trois espèces du genre *Domecia* (Decapoda, Brachyura) : *D. hispida* Eydoux & Souleyet, *D. glabra* Alcock et *D. acanthophora* (Desbonne & Schramm). *Crustaceana*, **7**(4) : 267-283, text-figs. 1-17.
- . 1966. Réunion de spécialistes C.S.A. sur les Crustacés, Zanzibar 1964. La faune carcinologique (Crustacea Brachyura) de l'Océan Indien occidental et de la Mer Rouge. Catalogue, remarques biogéographiques et bibliographiques. *Mém. Inst. fond. Afr. noire*, No. 77 : 235-352.
- . 1969. Sur divers Xanthidae, notamment sur *Actaea* De Haan et *Paraactaea* gen. nov. (Crustacea Decapoda Brachyura). *Cah. Pacif.*, **13** : 223-267, text-figs. 1-36.
- MCNEILL, F. A. 1968. Crustacea, Decapoda & Stomatopoda. *Scient. Rep. Gt. Barrier Reef Exped.*, **7** (1) : 1-98, pls. 1, 2, text-figs. 1, 2.

- ODHNER, T. 1925. Monographierte Gattungen der Krabbenfamilie Xanthidae. *Goteborgs K. Vetensk.-o. (VitterhSamh) Handl., f. f.*, 29 (1): 1-92, pls. 1-5, text-figs. 1-7.
- ORTMANN, A. E. 1897. Die geographische Verbreitung der Decapoden-(Familie Trapeziidae.) *Zool. Jb., Syst.*, 10: 201-216.
- PATTON, W. K. 1966. Decapod Crustacea commensal with Queensland branching corals. *Crustaceana*, 10 (3): 271-295, text-figs. 1-3.
- RATHBUN, MARY J. 1906. The Brachyura and Macrura of the Hawaiian Islands. *Bull. U.S. Fish Comm.*, 23 (for 1903) (3): 827-930, pls. 1-24, text-figs. 1-79.
- . 1907. Reports on the scientific results of the expedition to the tropical Pacific . . . by the U.S. Fish Commission Steamer 'Albatross,' . . . from August, 1899, to March, 1900. IX. The Brachyura. *Mem. Mus. comp. Zool. Harv.*, 35(2): 21-74, pls. 1-9.
- . 1911. The Percy Sladen Trust Expedition to the Indian Ocean in 1905, under the leadership of Mr J. Stanley Gardiner. No. 11. Marine Brachyura. *Trans. Linn. Soc. Lond.*, (2), *Zool.*, 14(2): 191-261, pls. 15-20, 2 text-figs.
- SAKAI, T. 1939. Studies on the crabs of Japan. IV. Brachygnatha, Brachyrhyncha, 365-741, pls. 42-111. Yokendo, Tokyo.
- . 1965. The crabs of Sagami Bay. (xvi)+206 pp., 100 pls., 27 text-figs. Maruzen Co., Ltd., Tokyo.
- SERÈNE, R. 1959. Note sur les espèces de *Trapezia* du groupe *digitalis* et sur leurs relations avec les espèces de *Tetralia*. *Treubia*, 25(1): 127-157, pls. 1, 2, text-figs. 1-6.
- , & PHAM THANH DAT. 1957. Note sur *Tetralia nigrifrons* Dana 1852. *Contr. Inst. océanogr. Indochine*, No. 27: 1-27, pls. 1, 2, text-figs. 1-4.