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Report on the Crustacea Decapoda (Brachyura). [Suez Canal]

Trans. Zool. Soc. London, vol. 22, no. 2, pp. 211-219, 1927.

✓ CARDED 1927

INVERTEBRATE
ZOOLOGY
Crustacea

1927

XIII. *Report on the Crustacea Decapoda (Brachyura).* By W. T. CALMAN,
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[Received June 14, 1926: Read November 16, 1926.]

NEARLY all the Brachyura obtained by the Cambridge Expedition to the Suez Canal, 1924, belong to well-known species, the synonymy of which will be found in Nobili's * and Laurie's † papers on the Decapoda of the Red Sea, or in Heller's ‡ book on the Crustacea of the Mediterranean. Only in a few cases will it be necessary to give further references to literature or to comment on the characters of the specimens examined. No special effort has been made to attain correctness or even consistency in nomenclature, but the names used will, it is believed, leave no uncertainty as to the species indicated, and will permit of easy reference to the publications cited.

Mr. Robert Gurney, who gave special attention to the Crustacea while on the Expedition, has been good enough to give me notes on the occurrence of many of the species. Excerpts from these notes are given below enclosed in square brackets and followed by the initials R. G.

As far as I am aware, the only Brachyura hitherto recorded from the Canal (apart from "eine kleine Krabbe" mentioned by Keller §) are the two species *Lupa* (= *Neptunus*) *pelagica* and *Pilumnus vaquellii* (= *Heteropanope vaquellini*) found by Krukenberg || in the Bitter Lakes. The migration of the first-named species through the Canal into the Mediterranean has been discussed by Fox ('Nature,' May 17th, 1924).

LIST OF SPECIES.

The occurrence of the species in the Red Sea or Mediterranean is indicated in italics.

Family DROMIIDÆ.

1. DROMIDIA UNIDENTATA (Rüpp.). Stat. R. 6 (Gulf of Suez).¶ 1 ♀. *Red Sea*.

* Nobili.—Faune carcinologique de la Mer Rouge. Décapodes et Stomatopodes. Ann. Sc. Nat., Zool. (9) iv. pp. 1-347, 11 pls., 1906.

† Laurie.—Reports on the Marine Biology of the Sudanese Red Sea. XXI. On the Brachyura. Journ. Linn. Soc., Zool. xxxi. pp. 407-473, 4 pls., 1915.

‡ Heller.—Die Crustaceen des südlichen Europa. Crustacea Podophthalmia, 336 pp., 10 pls. Wien, 1863.

§ Keller.—Die Fauna im Suez-Kanal. Neue Denkschr. Schweiz. Ges. Naturwiss. xxviii. Abth. 3, p. 22, 1883.

|| Krukenberg.—Die Durchfluthung des Isthmus von Suez. Vergl. Physiol. Stud., 2 Reihe, 5 Abth., 1 Hälfte, p. 81, 1888.

¶ For detailed information regarding collecting stations see General Part, by H. Munro Fox, pp. 45-62.

Family LEUCOSIIDÆ.

2. *EBALIA GRANULATA* (Rüpp.). Stats. T. 8, T. 9 (Lake Timsah); K. 3, K. 0, K. 4, K. 12 (Bitter Lakes). [Very common on sandy shore in very shallow water north-west of Kabret; taken with push-net. The larvæ of a Leucosiid, probably of this species, were common in the plankton.—R. G.] *Red Sea*.

3. *MYRA FUGAX* (Fabr.). Stat. Km. 54. 1 ♂. *Red Sea*.

4. *LEUCOSIA SIGNATA* Paulson. Stats. Km. 54; T. 12, T. 7, T. 2, T. 4 (Lake Timsah). [On muddy bottom in relatively deep water in Lake Timsah, particularly at Station T. 4. Many dead specimens on shore, but live ones only taken with dredge.—R. G.] *Red Sea*.

Family MAIIDÆ.

5. *CAMPOSCIA RETUSA* Latr. Stat. R. 6 (Gulf of Suez). 1 ♀. *Red Sea*.

6. *HYASTENUS HILGENDORFI* de Man, Journ. Linn. Soc., Zool. xxii. p. 14, pl. i. figs. 3 & 4, 1887. Stats. Km. 46 (Kantara), Km. 64 (El Ferdan), Km. 72, K. 9 (Bitter Lakes), PT. 7 (Port Taufiq).

Although this species has not hitherto been recorded from the Red Sea, I do not think that anyone who has examined a fairly large collection of *Hyastenus* will attach much importance to the fact. Most of the Canal specimens agree closely with a syntype of de Man's species, except that the teeth on the dactyli of the walking-legs are less marked. One specimen has the carapace so smooth that it does not differ from specimens referred, in the Museum Collection, to *H. diacanthus* (de Haan). The genus is confined to the Indo-Pacific Region.

Family PORTUNIDÆ.

7. *PORTUNUS HOLSATUS* Fabr. P. 1, P. 3, P. 0 (Port Said). [Very abundant at Port Said, where great numbers are taken in the seine nets. Also common in the port itself on a rather foul muddy bottom.—R. G.] *Mediterranean*.

8. *CARCINUS MENAS* (Linn.). Stats. P. 0 (Port Said); Km. 5. [Common in Menzaleh near the lock, density 1018. Seen taken in nets in middle of Menzaleh together with *Pencæus*, December 23. Common on Mediterranean shore at Gamileh, December 21; females all berried, quite fresh eggs.—R. G.]

A. Milne-Edwards's record of a "variety" of this species from the Red Sea (Ann. Sci. Nat. Zool. (4) xiv. p. 221, 1860) appears to be that referred to by Alcock (Journ. Asiatic Soc. Bengal, lxxviii. pt. ii. p. 14, 1899). No doubt, like its occasional

occurrences at Ceylon, Hawaii, Panama, and elsewhere and its establishment at Port Phillip, its appearance in the Red Sea must have been due to accidental transport by ships. The species is abundant in the Mediterranean.

9. *PORTUMNUS LATIPES* (Penn.). Gamileh, on Mediterranean coast, west of Port Said. [Abundant along coast, where it lives in water about two feet deep and is taken in great numbers by fishermen catching *Donax* with a net which digs into the sand.—R. G.] *Mediterranean*.

10. *NEPTUNUS PELAGICUS* (Linn.). Port Taufiq; Suez Bay. *Red Sea*.

11. *THALAMITA POISSONII* (Aud.). Stats. K. 2, K. 13 (Bitter Lakes); Km. 152; Km. 157 (El Shatt); PT. 2, PT. 0, PT. 1 (Port Taufiq); R. 5, R. 6 (Gulf of Suez). Ovigerous at K. 13. *Red Sea*.

Family XANTHIDÆ.

12. *XANTHO MACGILLIVRAYI* Miers (= *X. neglectus* Balss = *X. distinguendus* *auctt. plur. nec* de Haan). The proper name of this well-known species is matter for debate (see Odhner, Göteborg Vet. Handl. (4) xxix. no. 1, p. 81, 1925). I have adopted, for the present, a name of which, having examined Miers's types, I can be quite sure. Stat. R. 5 (Gulf of Suez). *Red Sea*.

13. *XANTHO HYDROPHILUS* (Herbst). Port Said, Western Jetty. 1 ♂. *Mediterranean*.

14. *LEPTODIUS EXARATUS* (M.-Edw.). Stats. PT. 2, PT. 3, PT. 4 (Port Taufiq); R. 5 (Gulf of Suez). Ovigerous at PT. 4. This is said to be the commonest species of crab in the *Red Sea*.

15. *ACTÆA HIRSUTISSIMA* (Rüpp.). Stat. K. 13 (Bitter Lakes). 1 ♂. *Red Sea*.

16. *ACTÆA SAVIGNYI* (M.-Edw.) (= *Actæa granulata* (Aud.)). Stats. Km. 46 (Kantara), Km. 54; Km. 64 (El Ferdan); T. 0 (Lake Timsah); Km. 87 (Toussoum); K. 9 (Bitter Lakes); R. 6 (Gulf of Suez). *Red Sea*.

17. *CHLORODIUS NIGER* (Forsk.). Stats. R. 3, R. 6 (Gulf of Suez). *Red Sea*.

18. *CHLORODOPSIS ARABICA* Laurie. Stat. R. 3 (Gulf of Suez). 1 ♀, ovig. The specimen agrees well with Laurie's description and figures and with the two syntypes of the species in the Museum collection. *Red Sea*.

19. *CYMO ANDREOSSYI* (Aud.). Stat. R. 3 (Gulf of Suez). *Red Sea*.

20. *PILUMNUS SAVIGNYI*, Heller. Stats. Km. 149 (Kubri); Km. 157 (El Shatt); PT. 0 (Port Taufiq). *Red Sea*.

21. *HETEROPANOPE VAUQUELINI* (Aud.). Stats. P. 0 (Port Said); T. 12, T. 0, T. 8 (Lake Timsah); K. 9, K. 5, K. 13 (Bitter Lakes); Km. 149 (Kubri); Km. 152; PT. 4, PT. 1 (Port Taufiq). Ovigerous females from K. 13, Km. 149, and K. 152.

The localities given, from which adult or nearly adult specimens were obtained, are sufficient to show that this species is distributed throughout the whole length of the Canal. In addition, there are a number of small Pilumnids, mostly from the Gulf of Suez, which may be young specimens of this or the following species. Krukenberg records this species from the Bitter Lakes, and identifies with it the "kleine Krabbe" which Keller found in Lake Timsah. *Red Sea*.

22. *HETEROPANOPE LÆVIS* (Dana). Stats. P. 1, P. 0 (Port Said); Km. 25; Km. 46 (Kantara); Km. 72; Km. 76. Ovigerous from Km. 72.

This species closely resembles the preceding, from which it differs in the following characters:—The carapace, in specimens of similar size, is distinctly wider, with the antero-lateral margins more strongly curved and the postero-lateral more convergent. The line of the outer edge of the exorbital tooth, produced forwards, would touch or fall within the inner orbital angle; in *H. Vauquelini* this line runs well clear of the orbit. The lower margin of the orbit is more concave than in *H. Vauquelini*, and has a group of enlarged granules in the middle instead of being uniformly and very finely granulated. The carpal tooth of the larger cheliped is produced downwards as a prominent ridge.

The Suez Canal specimens agree closely with specimens from Karachi determined by Alcock (Journ. Asiatic Soc. Bengal, lxvii. pt. ii. p. 209, 1898) and lent for comparison by the kindness of Dr. Baini Prashad.

23. *TETRALIA GLABERRIMA* (Herbst). Stats. R. 6, R. 4 (Gulf of Suez). *Red Sea*.

Family GONOPLACIDÆ.

24. *EUCRATE CRENATA* De Haan. Stats. Port Said; Km. 14 (Ras-el-Ech); T. 12 (Lake Timsah); K. 9 (Bitter Lakes). [A rather large pinkish crab common in Lake Timsah (T. 12), where it burrows in mud in water about 18 inches deep. Also under stones at edge of water at Port Said.—R. G.] *Red Sea*.

Family PINNOTHERIDÆ.

25. OSTRACOTHERES TRIDACNÆ (Rüpp.). Stats. R. 4 (Gulf of Suez), from Clam; Suez, from *Tridacna*. *Red Sea*.

Family OCYPODIDÆ.

26. DOTILLA SULCATA (Forsk.). Stats. Km. 146; PT. 10, PT. 1 (Port Taufiq). [There are small colonies of this crab within the narrow intertidal strip by the coastguard pier at Port Taufiq and great numbers on the south side of the causeway to Suez. A great expanse of sand is exposed at low tide, but, so far as I know, the crabs only occur quite close to high-tide mark. Nothing could be seen of them when the tide covered their burrows. The burrows are short, going down only some four to six inches. The crabs cast pellets all round the opening of the burrows to a distance of about three inches.—R. G.] *Red Sea*.

27. PARACLISTOSTOMA LEACHII (Aud.). Stat. K. 0 (Kabret). [Two specimens only of this species were found among large numbers of *Macrophthalmus*.—R. G.] *Red Sea*.

28. MACROPHTHALMUS DEPRESSUS Rüpp. Stats. K. 4 (Kabret); PT. 1 (Port Taufiq). [Burrows in mud, generally under water. A few burrows were seen above water, but these may have been under water when occupied. The burrows run nearly horizontally. The crabs were only found (at Kabret, K. 4) in one spot, where there was a very shallow lagoon with a narrow opening to the lake and a soft muddy bottom largely covered with a thread-like weed (like *Ruppia*). Of 128 specimens picked up at random on October 20, only 16 were females, and 14 of these carried eggs in an early stage.—R. G.] *Red Sea*.

Family GRAPSIDÆ.

29. METOPOGRAPSUS MESSOR (Forsk.). Stats. Km. 149 (Kubri); Km. 157 (El Shatt); PT. 2, PT. 0, PT. 1 (Port Taufiq); R. 5 (Gulf of Suez). *Red Sea*.

30. BRACHYNOTUS SEXDENTATUS Risso (= *B. sexdentatus* Heller, p. 102, and *Heterograpsus lucasi* Heller, p. 105). Stats. P. 1, P. 0, P. 4 (Port Said); Lake Menzaleh; T. 12, T. 2, T. 4 (Lake Timsah and Lagoons).

This species is uncommon in the Mediterranean, but it appears to be abundant in the northern part of the Canal. Tesch says (Decap. Brach., I. 'Siboga,' p. 102, 1918): "It is remarkable that this Pacific genus has one solitary species in the Mediterranean, whereas it is wholly absent in the Atlantic." The only species known from the Red Sea, *B. harpax* de Man, seems to be quite distinct. De Haan's note that Cantraine found this species "sub cauda Testudinis Midæ" suggests habits favourable to rapid spreading.

31. *PACHYGRAPSUS TRANSVERSUS* (Gibbes). Stat. P. 3 (Port Said). This species is found on both eastern and western coasts of America, Atlantic Islands (Madeira, Brit. Mus.) and W. Africa, and in the "Oriental Region." It has not been recorded from the Red Sea, but Catta records it, under the name of *P. advena*, at Marseilles on a vessel which had come from Pondicherry by way of the Cape (Ann. Sci. Nat., Zool. (6) iii. p. 7, pl. i. fig. 1, 1876).

REMARKS.

It will be seen from the particulars given above that the Brachyuran fauna of the Canal is almost wholly derived from the Red Sea. Three Erythræan (or Indo-Pacific) species were found at Port Said in addition to *Neptunus pelagicus*, the migration of which into the Mediterranean has been discussed by Fox. From Lake Timsah four species and from the Bitter Lakes nine species belong to the Red Sea fauna. On the other hand, only one Mediterranean species has penetrated as far south as Lake Timsah and none beyond it.

The causes of this predominantly northward migration cannot profitably be considered apart from the other elements of the fauna. It suggests a spread of drifting larvæ by a northward current, and, as the vast majority of marine crabs have pelagic larvæ, this may well be the way in which they have colonized the Canal. Many crabs are known to avail themselves of the opportunities of transport afforded by clinging to the hulls of ships, and accidental occurrences of exotic species attributed to this cause have been not infrequently recorded*. This mode of dispersal, however, would operate equally in both directions in the Canal.

As to the conditions favouring or hindering the migration or settlement of individual species we are almost without information, and the composition of the Brachyuran fauna throws little or no light on the subject. There are many obvious but unexplained gaps in the list. For example, *Leptodius exaratus*, which is stated to be the most abundant crab in the Red Sea, does not appear to enter the Canal.

* Among the more striking cases are the establishment of the European *Carcinus maenas* at Port Phillip, Australia (Fulton & Grant, Victorian Naturalist, xvii. p. 147, 1900), and the recent discovery of a colony of *Eriocheir sinensis* in the estuary of the Elbe (Schnakenbeck, Die Naturwiss. Berlin, xii. p. 204, 1924). See also Chilton, "Note on the Dispersal of Marine Crustacea by means of Ships" (Trans. N. Z. Inst. xliii. p. 131, 1911), and records quoted by him. Babić (Rad Jugoslav Akad. Zagreb, clxxxiii. p. 233, 1910) records the finding of a living specimen of *Neptunus sanguinolentus* at Fiume. Pesta, 'Die Decapodenfauna der Adria,' 1918, p. 457, records and discusses various "foundling" Crustacea from the Adriatic; he refers to Klunzinger's record (Nova Acta Acad. Cæs. Leop.-Carol. Halle, xc. p. 323, 1913) of *Pirimela denticulata* from Suez as evidence that this Mediterranean species has traversed the Canal. De Man (Bull. Mus. Hist. Nat. Paris, 1913, p. 9) found five species of Xanthidæ in empty shells of *Balanus* on the hull of a ship arriving at St. Vaast-la-Hougue from Madagascar. A Western American Crab, *Pilumnoides perlatus*, has occurred in similar circumstances at Queenstown and at Plymouth (Brit. Mus. and Mar. Biol. Ass. Plymouth).

Brachynotus sexdentatus, which is said to be rare in the Mediterranean, is evidently common in the northern part of the Canal, while its Red Sea congener, *B. harpax*, does not appear at all. As has been pointed out above, *B. sexdentatus* belongs to an Indo-Pacific genus and does not extend into the Atlantic, so that it may be conjectured to have reached the Mediterranean at some remote time from the Red Sea. When, or by what route, this migration was accomplished we have no means of guessing.

Appendix to the Report on the Crustacea Decapoda (Brachyura).

By H. MUNRO FOX.

Dr. Calman's Report shows that only two Mediterranean species have penetrated into the Canal, one of them (*Carcinus maenas*) no further than Km. 5, the other (*Brachynotus sexdentatus*) into Lake Timsah. Against this, 14 Red Sea species are found in the Canal, four of them having reached Port Said.

I was able in 1923 to fix the dates of the various stages in the migration northward through the Canal of the Red Sea Crab (*Neptunus pelagicus*), and to trace the apparent limits of its present distribution along the Mediterranean coast ('Nature,' May 17, 1924). This crab is fished for food in Egypt, so that when in abundance in any place its presence is noted. My information regarding the dates of arrival of the crab from the south at various points along the Canal was obtained from certain of the Canal Company employés, who were enthusiastic amateur fishermen. *Neptunus pelagicus* was first seen in numbers in the Canal between 1889 and 1893, although Krukenberg records one specimen from the Bitter Lakes in 1886. In 1889 this crab was not known at Km. 133, although to-day it is common there. By 1893, however, it had become common at Kabret, and in the same year the crabs were observed for the first time at Toussoum. In 1898 they arrived at Port Said, and four years later were common in the port. To-day *Neptunus pelagicus* is fished for sale in the markets at Alexandria and at Haifa.

Many more males than females of *Neptunus pelagicus* were caught at Kabret by the Expedition. Between November 1st and 19th, 188 males and 12 females were taken. The reasons for this inequality are twofold. The females do not swim up to the bait, nor to a lamp, as the males do. Further, the females are sand-coloured, not blue like the males, and the females lie half buried in the sand, whereas the males walk about on its surface. Consequently, when the crabs are taken by spearing, the females are much more difficult to see and to catch. At Station K. 4, 110 males and 16 females of *Macrophthalmus depressus* were caught. The reason for the sex inequality in this case was not investigated.

The following Table shows the localities at which those species of Brachyura were found which have penetrated into the Canal between Km. 5 and Km. 157.

TABLE 23.—Distribution of *Brachyura* within the Canal.

| | Mediterranean species. | | Red Sea species. | | | | | | | | | | | | | | |
|---------------------|------------------------|----------------------------------|----------------------------|-----------------------------|---------------------------------|-------------------------|--------------------------------|-------------------------|--------------------|--------------------------|--------------------------|----------------------------------|----------------------------------|-----------------------------|-------------------------|------------------------------|---------------------------|
| | <i>Carcinus menas.</i> | <i>Brachynotus scindentatus.</i> | <i>Neptunus pe'ajicus.</i> | <i>Heteropanope laevis.</i> | <i>Heteropanope euquelinii.</i> | <i>Eucrete crevata.</i> | <i>Hysteronus hilyandorfi.</i> | <i>Actaea Savignyi.</i> | <i>Mypa fugax.</i> | <i>Leucosia signata.</i> | <i>Ebobia granulata.</i> | <i>Paracleistostoma leachii.</i> | <i>Macrophthalmus depressus.</i> | <i>Actaea hirsutissima.</i> | <i>Dotilla sulcata.</i> | <i>Metopograpsus messor.</i> | <i>Pilumnus savignyi.</i> |
| Port Said. | P. 1. | + | + | + | | | | | | | | | | | | | |
| | P. 0. | + | | + | + | + | | | | | | | | | | | |
| | P. 4. | + | | | | | | | | | | | | | | | |
| Km. 5. | + | | | | | | | | | | | | | | | | |
| Km. 14, Ras-el-Ech. | | | | | | + | | | | | | | | | | | |
| Km. 25. | | | | + | | | | | | | | | | | | | |
| Km. 46, Kantara. | | | | + | | | + | + | | | | | | | | | |
| Km. 54, Ballah. | | | | | | | | + | + | + | | | | | | | |
| Km. 64, El Ferdan. | | | | | | | + | + | | | | | | | | | |
| Km. 72. | | | | + | | | + | | | | | | | | | | |
| Km. 76, Ferry Post. | | | | + | | | | | | | | | | | | | |
| Lake Timsah. | T. 12. | + | | | + | + | | | | + | | | | | | | |
| | T. 0. | | | | + | | | + | | | | | | | | | |
| | T. 7. | | | | | | | | | + | | | | | | | |
| | T. 9. | | | | | | | | | | + | | | | | | |
| | T. 8. | | | | | + | | | | | + | | | | | | |
| Timsah Lagoons. | T. 2. | + | | | | | | | | + | | | | | | | |
| | T. 4. | + | | | | | | | | + | | | | | | | |
| Km. 87, Toussoum. | | | | | | | + | | | | | | | | | | |
| Great Bitter Lake. | K. 9. | | | | + | + | + | + | | | | | | | | | |
| | K. 5. | | | | + | | | | | | | | | | | | |
| | K. 3. | | | | | | | | | | + | | | | | | |

