

MINISTERIE VAN ONDERWIJS, KUNSTEN EN WETENSCHAPPEN

# ZOOLOGISCHE MEDEDELINGEN

UITGEGEVEN DOOR HET

RIJKSMUSEUM VAN NATUURLIJKE HISTORIE TE LEIDEN

DEEL XXXIV, No. 21

18 December 1956

## TWO INTERESTING CRABS (CRUSTACEA DECAPODA, BRACHYURA) FROM MERSIN BAY, S. E. TURKEY

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In the collection of the Haifa Sea Fisheries Research Station, among material trawled in Mersin Bay, S. E. Turkey, two Brachyuran crabs were found which prove to be of great interest. One, *Actaea rufopunctata* (H. Milne Edwards), has a rather wide distribution in both the Atlantic and the Indo-West Pacific regions, but only very few records from the Mediterranean are known as yet. The other, *Ixa monodi*, a species of Indo-West Pacific origin, is new to science, while the genus to which it belongs is now reported for the first time from the Mediterranean.

### ***Actaea rufopunctata rufopunctata*** (H. Milne Edwards, 1834)

(pl. IV fig. 1)

An ovigerous female (cb. 20 mm)<sup>1)</sup> was trawled in Mersin Bay in August 1954. The specimen fully agrees with the published accounts of this species.

Odhner (1925, p. 60) in his revision of the genus *Actaea* distinguished two forms of *Actaea rufopunctata*, viz., the typical form and a variety *retusa* Nobili, 1905. *Actaea nodosa* Stimpson, 1860, was considered by Odhner as a full synonym of *A. rufopunctata*, but was later made by Rathbun (1930, p. 257) a subspecies of the latter species. Thus at present three forms of *Actaea rufopunctata* are recognized: *A. r. rufopunctata* (H.

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1) The abbreviations cb. and cl. are used here for carapace breadth and carapace length respectively.

Milne Edwards, 1834), *A. rufopunctata nodosa* Stimpson, 1860, and *A. rufopunctata retusa* Nobili, 1905.

Our Turkish specimen proves to belong to *A. r. rufopunctata*. The narrow tip of the carapace region 3M<sup>1</sup>) reaches beyond 2M as in the typical form, while in *A. r. nodosa* the tip of 3M reaches about to the middle of 2M. The frontal and lateral lobes of the carapace of our specimen are quite distinct, the granular area of the outer orbital angle is separated from that of the first antero-lateral tooth, and 5L shows a distinct anterior incision; these characters serve to distinguish the typical form from *A. rufopunctata retusa* in which the anterior and lateral lobes of the carapace are very shallow, while the granules of the outer orbital angle and those of the first antero-lateral tooth form an uninterrupted area, and 5L shows no anterior incision.

*Actaea rufopunctata rufopunctata* inhabits the larger part of the Indo-West Pacific area (from the Red Sea and Madagascar to Japan and Polynesia), and also occurs in the East Atlantic region (Mediterranean, Azores, Canary and Cape Verde Islands, Gulf of Guinea). *A. rufopunctata retusa* also is known from the Indo-West Pacific area (Red Sea to Polynesia) but has not been reported from the Atlantic. *A. rufopunctata nodosa* on the other hand is confined to the West Atlantic region (Florida to Brazil, Ascension Island). The Mediterranean records of *A. rufopunctata* all are from the north coast of Africa: Melilla, Spanish Morocco (Zariquiey Alvarez, 1948, p. 280, pl. 26 fig. 1; 1952, p. 44), off Algiers (Lucas, 1846, p. 11, pl. 2 fig. 1), Banc de Matifou, just E. of Algiers (Dieuzeide, 1950, p. 139, fig. 1), off Alexandria, Egypt (Balss, 1936, p. 37, fig. 36).

Monod (1931) dealt with a collection of manuscripts of the well known naturalist A. Risso, who in the beginning of the previous century intensively studied the natural history of the region of his home-town, Nice, S. France. Among Risso's manuscripts Monod discovered a figure and a description of an unpublished species of Risso's, which that author had named *Xantho sculptus*. Monod (1931, pp. 117, 123, fig. 5) published Risso's figure of *Xantho sculptus* (see fig. 1) and considered that species to be identical with *Actaea rufopunctata*. According to Monod this constitutes the first record of *Actaea rufopunctata* from the French coast (cf. Monod, 1933, p. 71, and Bouvier, 1940, p. 270). Dr. Monod was so kind as to provide us with a copy of Risso's unpublished description of *Xantho sculptus*, which runs as

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1) The terms used here to indicate the various regions of the Xanthid carapace are employed and explained in several publications like those of Dana (1852, p. 29), Rathbun (1930, p. 6, fig. 3), and Barnard (1950, p. 199, fig. 37a).

follows: "*Xantho sculptus* N. *Xantho* testa ovata transversa, griseo fulvo brunneo commixto; sulcis tessellatisque impressis sculpta; manibus aequalibus tuberculatis. Je n'en temoigne pas moins ici ma reconaissance envers la personne qui m'a donné ce crustacé pêché dans nos mers, quoique je ne me rappelle plus de qui je le tiens & à qui la science en est redevable. L'aspect de ce Xanthe est vraiment singulier: son test est ovale en travers, tronqué sur les cotés inférieurs & en arriere, arqué sur le devant, assez relevé en dessus, d'un gris fauve mêlé de brunatre, profondement sculpté d'arabes-

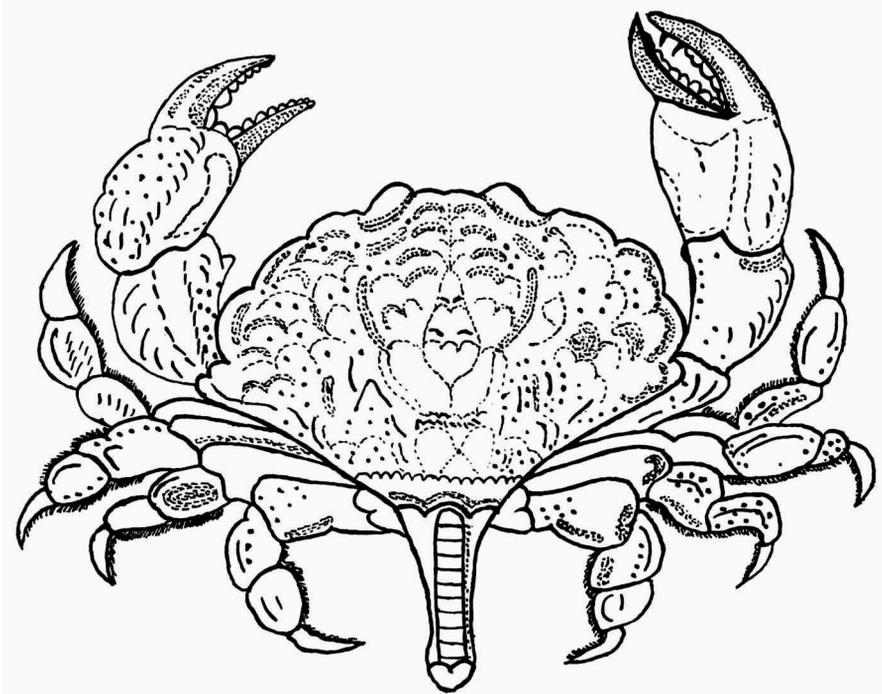


Fig. 1. *Xantho sculptus* (Risso MSS) Monod, 1931. Reproduction of Risso's original drawing (after Monod, 1931).

ques regulieres disposées sous toutes sortes de forme, traversé en tous sens par des sinus, dont les parties saillantes sont disposées comme en recouvrement sur le devant. Le front est entier, uni, ployé en arc entre les yeux; les bords latéraux sont ornés de chaque coté de quatre especes de festons irrégulièrement sinués; les antennes sont peu developpées, les exterieures plus longues que les interieures. Les mains sont grandes, épaisses, renflées, travaillées en relief, garnies en dessus de tubercules emoussés ou verrues arrondies, obtuses, armées de fortes pinces noiratres, à dents tranchantes. Les pattes sont aplaties, regulierement sinuées en dessus, amincies en lames sur

les bords, garnies de poils touffus avec les crochets aigus. La pièce qui recouvre l'abdomen présente également des segments sculptés sous plusieurs formes. Long. 0062. Larg. 0080. Séj. Grandes profondeurs. Apar. Été. L'individu observé est mâle; je ne connois point la femelle." A careful examination of the description and the figure of *Xantho sculptus* brought forward several points which make it impossible for us to follow Monod in identifying this species with *Actaea rufopunctata*. Risso, namely, described and figured the sculpturation of the carapace in some detail, but he nowhere mentions the presence of the granules which are so characteristic of *Actaea rufopunctata*, furthermore the general pattern of the sculpturation in *Xantho sculptus* is quite different from that shown by *Actaea*; these differences are such that they can not be explained as to be due to inaccuracies of the artist. Also the shape of the antero-lateral teeth of the carapace, and especially that of the last, is quite different from what is found in *A. rufopunctata*. Though no tubercles are described from the dorsal surface of the carapace of *X. sculptus*, they are mentioned to be present on the chelae, while in *A. rufopunctata* the latter are hardly more conspicuous than the former. Furthermore Risso stated that the margins of the walking legs are laminate, which certainly is not true for *A. rufopunctata*. Finally, the dimensions given for *X. sculptus* (cl. 62 mm, cb. 80 mm) are never attained by *A. rufopunctata* as is clearly shown by the fact that Odhner (1925, p. 61) indicated a specimen of the latter species with cb. 41 mm as a "Riesenexemplar". In our opinion therefore *Xantho sculptus* Risso (MS) cannot be identical with *Actaea rufopunctata*; we have very little doubt that it actually belongs to *Zosimus aeneus* (L.) an Indo-West Pacific species of Xanthidae, which excellently fits Risso's description and figure. Risso's supposition that the specimen of his *Xantho sculptus* was "pêché dans nos mers" evidently is erroneous as *Zosimus aeneus* has never been found alive outside the Indo-West Pacific region; from Risso's own account it is clear that he was not very certain about the origin of his specimen. The present find of *Actaea rufopunctata* in Turkish waters thus is the first positive record of the occurrence of the species on the northern shore of the Mediterranean.

***Ixa monodi* new species**

(textfig. 2c, d, pl. IV fig. 4, pl. V fig. 2)

A male specimen (cl. 22 mm, cb. 59 mm) of a species of *Ixa* was collected June 12, 1955, in Mersin Bay, where it was trawled from a depth of 38 meters (= 21 fathoms).

As yet the systematics of the genus *Ixa* have not been straightened out in

a satisfactory manner, and there still is no certainty as to the exact number of species represented in it. Until now six species have been described, viz., *Ixa cylindrus* (Fabricius, 1777), *I. inermis* Leach, 1817, *I. tuberculata* König, 1825, *I. megaspis* Adams & White, 1848, *I. edwardsii* Lucas, 1858, and *I. investigatoris* Chopra, 1933. Two of these (*I. tuberculata* and *I. edwardsii*) are based on subfossil material.

An examination of the eight specimens of *Ixa* in the collections of the Rijksmuseum van Natuurlijke Historie, Leiden, and the Zoological Museum, Amsterdam, showed that this material can be divided into four distinct groups, which are distinguished by the following characters:

A. (Pl. IV fig. 2). The dorsal surface of the carapace with two deep and broad longitudinal grooves, which are filled with a distinct pubescence. Each of these grooves is sharply defined throughout and has the edges undermined, so that they are overhanging. Anteriorly the grooves show a single bifurcation, which is very distinct. The lateral projections of the carapace are cylindrical, in our specimens they are narrowing very abruptly at the top into a thin and slender spiniform point. The posterior margin of the carapace shows hardly, if at all, an indication of two submedian tubercles. The exopod of the outer maxilliped shows no, or very few scattered, tubercles, while on the outer margin of the endopod a narrow strip of low small flattened tubercles is visible. The antero-lateral margin of the oral field, distally of the end of the exopod of the third maxilliped, touches the margin of the orbit, so that it almost forms part of the orbital rim. The median portion of the anterior margin of the oral field is deeply sunken, lying distinctly deeper than the lateral parts. The upper surface of the sixth segment of the male abdomen is smooth, being without tubercles. This form is represented by two dry males (cl. 15 and 16 mm, cb. 45.5 and 49 mm respectively) from Mauritius (Museum Leiden), one dry female (cb. 60 mm) also from Mauritius (Museum Amsterdam), and a female (cl. 19 mm, cb. 52 mm) from Siglap, Singapore, June 1933, leg. M. W. F. Tweedie (Museum Amsterdam). De Haan (1844, pl. J) figured the first and third maxillipeds of one of the two above Mauritius males.

B. (Pl. V fig. 1). The dorsal surface of the carapace with two deep and broad longitudinal grooves, each of which, though distinct and filled with a tomentose pubescence, is not sharply delimited as the edges are rounded and gradually merge with the dorsal surface of the carapace. The grooves show a single rather indistinct anterior bifurcation. The lateral projections of the carapace are cylindrical, narrowing rather abruptly at the top, but not as abruptly as in the specimens of Form A, while the tip is less slender, being in the form of a rather blunt and short tubercle. The posterior

margin of the carapace shows two distinct submedian granular tubercles. The third maxilliped and the oral field show no appreciable differences from those of Form A. The upper surface of the sixth segment of the male abdomen bears several distinct granules. To this form belong two males in the collection of the Leiden Museum, one (cl. 18 mm, cb. 48 mm) from Amboina, 1863, leg. D. J. Hoedt, and one (cl. 19 mm, cb. 59 mm) from an unknown locality.

C. (Pl. IV fig. 4, Pl. V fig. 2). On the dorsal surface of the carapace the two longitudinal grooves are very shallow and naked, being especially inconspicuous in the anterior half of the carapace, where they are hardly noticeable; a very faint indication of two bifurcations may be seen in the anterior part of each of the grooves. The lateral projections of the carapace are very similar to those of Form B; they are cylindrical, being slightly less so than in Form A, have the tips rather abruptly narrowed and end in a rather blunt tubercle. The posterior margin of the carapace shows two distinct submedian granular tubercles. The shape of the third maxilliped and the oral field is like in the two previous forms. The sixth segment of the male abdomen is distinctly granular. The male specimen from Mersin Bay, Turkey, belongs to the present form.

D. (Pl. IV fig. 3, Pl. V fig. 3). The dorsal surface of the carapace shows two shallow, poorly defined longitudinal grooves, which show no pubescence and are twice forked in the anterior half; the additional bifurcation lying behind the one seen in Forms A and B and slightly before the level of the lateral projections of the carapace. The inner branch of the additional bifurcation runs towards the middle of the front. The anterior bifurcation is far less distinct than in Form A, but both bifurcations are far more marked than those in Form C. The lateral projections of the carapace taper gradually towards the tip and show a constriction in the basal part. Their tips end in a conical point which is not set off from the rest of the projection. There are two distinct submedian granular tubercles on the posterior margin of the carapace. The larger part of both the exo- and endopod of the third maxilliped is covered with large polygonal white tubercles, which are placed so close together that they form a most conspicuous slightly swollen pavement-like structure. The antero-lateral margin of the oral field distally of the end of the exopod of the third maxilliped distinctly fails to reach as far as the orbital margin. The median part of the anterior margin of the oral field is not noticeably more sunken than the lateral parts. An ovigerous female (cl. 27 mm, cb. 59 mm) from off Oleh, north point of Sumatra, depth 20 to 29 m, bottom sand, trawled with otter trawl, Gier Expedition, Sta. 9 Exp. 7, June 11, 1908 (Museum

Amsterdam) belongs here. The specimen has already been mentioned by Ihle (1918, p. 267); it was erroneously reported by that author as originating from the Java Sea.

Form A is the typical form, as there can be little doubt that Fabricius's type belongs here. Also the specimens figured by Herbst (1783, p. 108, pl. 2 figs. 29-31), Leach (1817, p. 26, pl. 129 fig. 1), Desmarest (1825, p. 171, pl. 28 fig. 3), H. Milne Edwards (1837, pl. 24 fig. 1), and Chopra (1933, p. 45, fig. 6) distinctly show the characters of this form, to which also Miers's (1886, p. 301) and Alcock's (1896, p. 271) *Ixa cylindrus* belong. Chopra (1933), who had at least six specimens of this form at his disposal, noted that the lateral prolongations of the carapace do not always end as abruptly as is shown in most figures: there seems to be some variation in this character, which therefore cannot be considered to be of specific value.

*Ixa megaspis* Adams & White, 1848, shows most of the characters of

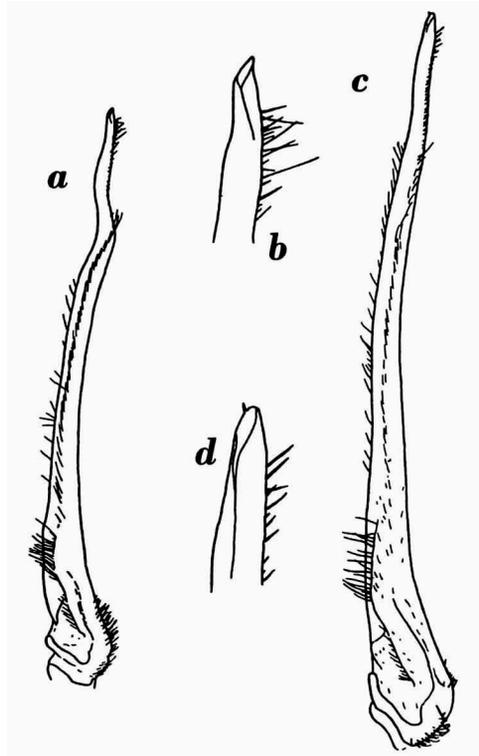


Fig. 2. *Ixa inermis* Leach, specimen from Amboina. a, first pleopod of male; b, tip of first pleopod of male. *Ixa monodi* new species, holotype. c, first pleopod of male; d, tip of first pleopod of male. a, c,  $\times 7$ ; b, d,  $\times 28$ .

Form A, from which, according to Miers (1886, p. 301) it seems to differ only in that the inner edge of the longitudinal grooves on the carapace is not incised but straight. Miers regarded *Ixa megaspis* as a variety of the typical *Ixa cylindrus*.

Form B probably is identical with Leach's (1817) *Ixa inermis*, though in our specimens the anterior part of the dorsal grooves of the carapace is more distinct than in Leach's figure of the type of *I. inermis*; Bell (1855, p. 312), however, states that the difference between Leach's specimens of *I. canaliculata* (= *I. cylindrus*) and *I. inermis* "is really less on examining the actual specimens, than appears to be the case from merely a comparison of the figures", so that Leach's figure evidently does not give an altogether correct impression. A re-examination of the type is very much desired here. Some of the specimens reported upon in the literature as *Ixa inermis* prove to belong to Form D (see there), while of several others too little information is available to ascertain their identity with any of the forms distinguished here.

The Turkish specimen brought here to Form C undoubtedly belongs to the same species as the specimen from the Gulf of Suez reported upon under the name *Ixa cylindrus* by Monod (1938, p. 97, fig. 2).

Form D is mainly characterized by the peculiar tuberculation of the third maxillipeds. This feature was described for the first time by Alcock (1896, p. 272), who observed it in a specimen from the Orissa coast, India; this specimen was doubtfully referred by Alcock to *Ixa inermis* Leach. Nobili (1906, p. 171) mentioned similar specimens, a male and a female from Massaua, Red Sea, which he likewise referred to Leach's species. Neither Alcock nor Nobili mentioned the presence in their specimens of a constriction in the basal part of the lateral processes of the carapace. Chopra (1933, p. 48, fig. 7) gave a good description and excellent figures of the present form, which he also gave the name *Ixa inermis* Leach. His material, which includes Alcock's specimen, came from the east coast of India and the Persian Gulf. According to his figure the basal part of the lateral processes of the carapace is constricted; also in the other respects his material checks perfectly with our Sumatra animal and there cannot be the least doubt that they belong to the same species. In our opinion it is very well possible that *Ixa edwardsii* Lucas, 1858, belongs to this form with which it agrees as far as the shape of the carapace is concerned, though the basal constriction of the lateral processes is not clearly indicated in Lucas's figure. The type of Lucas's species is only known from a specimen lacking all appendages, part of the sternum and the entire abdomen, so that there is no possibility of ascertaining whether or not the third maxillipeds had the granulation

typical of Form D. A. Milne Edwards's (1865, p. 156, pl. 6 fig. 1) description and figure of a specimen of *Ixa edwardsii* Lucas from Zanzibar makes the identity of this specimen with Form D very probable, though no information is given by that author concerning the tuberculation of the third maxilliped, while also no constriction of the lateral prolongations of the carapace is shown in the figure. A re-examination of A. Milne Edwards's specimen therefore remains desirable.

König's (1825) publication in which *Ixa tuberculata* is described is not available to us so that we cannot give any information on the status of this species. *Ixa investigatoris* Chopra is a quite distinct species, differing so much from the other *Ixa* forms that it perhaps even cannot be kept in that genus.

We entirely agree with Chopra (1933) in considering Forms A and D different species. Form A, as already pointed out above, is the true *Ixa cylindrus* (Fabricius, 1777). To Form D the name *Ixa edwardsii* Lucas, 1858, probably has to be given, it certainly is not *Ixa inermis* Leach, 1817, as was supposed by Alcock (1896) and Chopra (1933). For the time being *Ixa cylindrus megaspis* Adams & White may be considered a good subspecies, till more material is available to make its taxonomic status certain. Form B may be given the name *Ixa inermis* Leach, though here too examination of more material (including the type) is necessary before final certainty can be obtained. Form C certainly is distinct from the other three species and since no name is available for it the name *Ixa monodi* new species is proposed here. This name is given in honour of Dr. Théodore Monod, director of the Institut Français d'Afrique Noire at Dakar, who was the first to publish a figure of this species. The present specimen from Mersin Bay, Turkey, is the holotype of *Ixa monodi*; it is preserved in the collection of the Rijksmuseum van Natuurlijke Historie in Leiden.

The first male pleopods of *Ixa inermis* and *I. monodi* could be examined. No male of *I. edwardsii* is at our disposal, while the male material of *I. cylindrus* is dried and not fit for dissection. The first pleopods of the two male specimens of *I. inermis* (textfig. 1a, b) are perfectly similar, that of the specimen from Amboina being figured here. The pleopod of this species differs from that of the holotype of *I. monodi* (textfig. 1c, d) in that its distal half is more sinuous, being almost S-shaped, while the pleopod of *I. monodi* is practically straight. The distal part of the pleopod in *I. monodi* tapers gradually to a truncated tip, on the inner side of which a minute spinule is visible. In *I. inermis* the tip of the pleopod is more narrowly pointed, the apex being directed outwards; no spinule was seen here. Whether or not these differences are constant can only be ascertained with

a larger material than that which is at our disposal. It also would be interesting to know the shape of the first male pleopod of the other species of the genus.

The probable status of the genus *Ixa* and its species is given in the following summary:

***Ixa* Leach, 1815, p. 334**

Type species: *Cancer cylindrus* Fabricius (1777, p. 248), by monotypy.  
Gender: feminine.

***Ixa cylindrus* (Fabricius, 1777)**

Synonyms: *Cancer Cylindrus* Fabricius, 1777, p. 248; *Cancer cylindricus* Herbst, 1783, p. 108, pl. 2 figs. 29-31 (substitute name for *Cancer cylindrus* Fabricius, 1777); *Leucosia cylindrus* Weber, 1795, p. 92; *Ixa cylindrus* Leach, 1815, p. 334; *Ixa canaliculata* Leach, 1817, p. 26, pl. 129 fig. 1 (substitute name for *Cancer cylindrus* Fabricius, 1777); *Ixa cylindrica* White, 1847, p. 50. Described above as Form A.

Type locality: Tranquebar, east coast of India.

Distribution: ?E. Africa, ?Reunion, Mauritius, India, Singapore, ?Siam, ?Queensland (Thursday Island).

***Ixa cylindrus megaspis* Adams & White, 1848**

Synonym: *Ixa megaspis* Adams & White, 1848, p. 55, pl. 12 fig. 1; *Ixa cylindrus* var. *megaspis* Miers, 1886, p. 301.

Type localities: Tampasook, Borneo, and Bohol, Philippines.

Distribution: Philippines (Bohol, Manila), Borneo (Tampasook).

***Ixa inermis* Leach, 1817**

Synonym: *Ixa inermis* Leach, 1817, p. 26, pl. 129 fig. 2. Described above as Form B.

Type locality: Unknown.

Distribution: Malay Archipelago.

***Ixa edwardsii* Lucas, 1858**

Synonyms: *Ixa Edwardsii* Lucas, 1858, p. 184, pl. 4 fig. 3; ? *Ixa inermis* Alcock, 1896, p. 272 (not Leach, 1817); *Ixa inermis* Nobili, 1906, p. 171, and Chopra, 1933, p. 48, fig. 7 (not Leach, 1817). Described above as Form D.

Type locality: Unknown.

Distribution: Zanzibar, Red Sea (Massaua), Persian Gulf, India (Orissa coast and mouth of Hughli River), N. point of Sumatra.

***Ixa monodi*** new species

Synonym: *Ixa cylindrus* Monod, 1938, p. 97 fig. 2 (not *Cancer cylindrus* Fabricius, 1777). Described above as Form C.

Type locality: Mersin Bay, S. E. Turkey.

Distribution: Red Sea (Gulf of Suez), E. Mediterranean (Turkey).

***Ixa investigatoris*** Chopra, 1933a

Synonym: *Ixa investigatoris* Chopra, 1933a, p. 78, pl. 3 fig. 4.

Type locality: Mergui Archipelago, 12° 14' 30" N 98° 15' 30" E.

Distribution: Known only from the type locality.

Incertae sedis: *Ixa tuberculata* König, 1825.

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## EXPLANATION OF THE PLATES

## PLATE IV

Fig. 1. *Actaea r. rufopunctata* (H. Milne Edwards), specimen from Mersin Bay, in dorsal view.

Fig. 2. *Ixa cylindrus* (Fabricius), specimen from Siglap, Singapore, in dorsal view.

Fig. 3. *Ixa edwardsii* Lucas, specimen from Oleleh, oral field in ventral view.

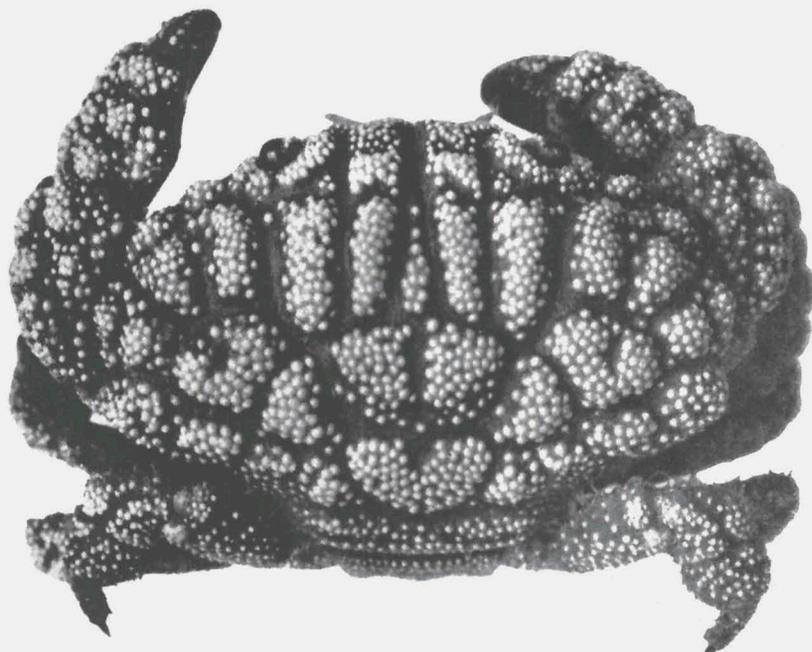
Fig. 4. *Ixa monodi* new species, holotype, oral field in ventral view.

## PLATE V

Fig. 1. *Ixa inermis* Leach, specimen from Amboina, in dorsal view.

Fig. 2. *Ixa monodi* new species, holotype, in dorsal view.

Fig. 3. *Ixa edwardsii* Lucas, specimen from Oleleh, in dorsal view.



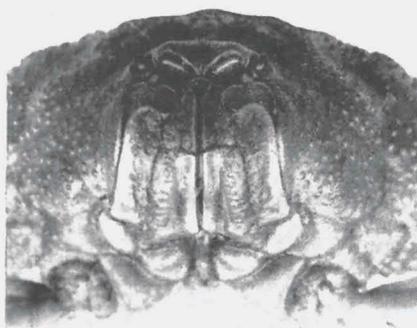
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