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## ON A NEW SPECIES OF *ALPHEUS* (CRUSTACEA DECAPODA, NATANTIA) FROM THE EASTERN MEDITERRANEAN

by

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With 2 text-figures

From 30 October to 3 November 1975 an expedition, organized by the Department of Zoology of the University of Tel-Aviv, investigated the marine fauna of the Eastern Mediterranean north of Sinai Peninsula, R.V. "Shikmona" for this purpose was kindly placed at the disposal of the expedition by the Israel Oceanographic and Limnological Research Ltd.

The expedition worked on the continental shelf at depths of about 25 to 65 m and its stations (indicated with the letters SIM, for Sinai-Israel-Mediterranean) ranged from 32° 41' to 34° 11'E.

In the collections a species of *Alpheus* was found which proved to be different from any species so far reported from the Mediterranean. Therefore it was suspected that it was of Indo-West Pacific origin and had migrated from the Red Sea through the Suez Canal. Although a closer examination of the material showed that it indeed is closely related to several Indo-West Pacific species, it could not be assigned to any of the known species. Therefore it is described here as new.

Additional material of this new species, collected off the southern coast of Israel, was received from Mrs. B. Galil, and is also included in the present paper.

The abbreviation cl. is used for carapace length.

***Alpheus migrans* new species**

Mediterranean off the north coast of Sinai Peninsula: 31° 28' N 33° 22' E; depth 62.18 m (34 fathoms); 2 November 1975; SIM Sta. 18. — 3 specimens (cl. 5-6.5 mm). 31° 26' N 34° 11' E; bottom mud; depth 36.6 m (= 20 fathoms); 30 October 1975; SIM Sta. 2. — 23 specimens (cl. 4.5-7 mm). 31° 23' N 33° 22' E; bottom mud; depth 27.43 m (= 15 fathoms); 2 November 1975; SIM Sta. 16. — 4 specimens (cl. 4.5-5 mm).

Mediterranean off southern Israel: Off Palmahim, 31° 55' N 34° 35' E; depth 50 m; 2 May 1977; leg. B. Galil. — 1 male; 31° 55' N 34° 35' E; depth 50 m; 24 October 1977; leg. B. Galil. — 1 male. Off Nizanim, 31° 44' N 34° 31' 51" E; depth 35 m; 4 May 1977; leg. B. Galil. — 1 male; 31° 44' N 34° 27' E; depth 50 m; 26 October 1977; leg. B. Galil. — 1 male.

Description. — The rostrum is sharply pointed and reaches about 2/3 of the length of the basal antennular segment. It has a dorsal carina, which reaches posteriorly distinctly beyond the middle of the carapace (it measures about 0.6 times the total length of carapace and rostrum). In its anterior part the ridge is sharp and becomes lower and less distinct posteriorly; slightly behind its middle the carina shows a blunt tooth. A rather distinct cervical groove is present in the posterior half of the carapace, crossing the midline in the posterior third. A small median tubercle is placed just before the posterior margin of the carapace. A distinct broad posterior of marginal carina is present. The ocular hoods are unarmed, the anterior margin is broadly curved and merges with the rostrum in a broad concave arch. The upper surfaces of the hoods are separated from the rostrum by a distinct broad groove. Below the ocular hoods the anterior margin of the carapace is straight. The pterygostomial angle is broadly curved. The cardiac notches of the posterior margin of the carapace are distinct.

The abdominal somites are smooth. The pleura of the first five somites are broadly rounded, that of the sixth is bluntly triangular. The posterolateral angle of the sixth somite is rounded. The sixth somite is about 1.5 times as long as the fifth, and about 2/3 as long as the telson.

The telson is 1.6 times as long as broad at the base. It narrows distally. The upper surface bears two pairs of spines. The anterior pair is placed about halfway the anterior margin of the telson and the posterior pair. The distance between the two pairs is slightly shorter than that between either pair and the anterior, respectively posterior margin of the telson. The posterior margin of the telson is rounded and strongly produced posteriorly; it reaches far beyond the two pairs of posterolateral spines. As usual, the outer of these posterolateral spines are very much shorter than the inner. The lateral margin of the telson shows at the end of the basal third a blunt angular projection, which is curved down and fits before a transverse ridge on the dorsal surface of the uropodal endopod.

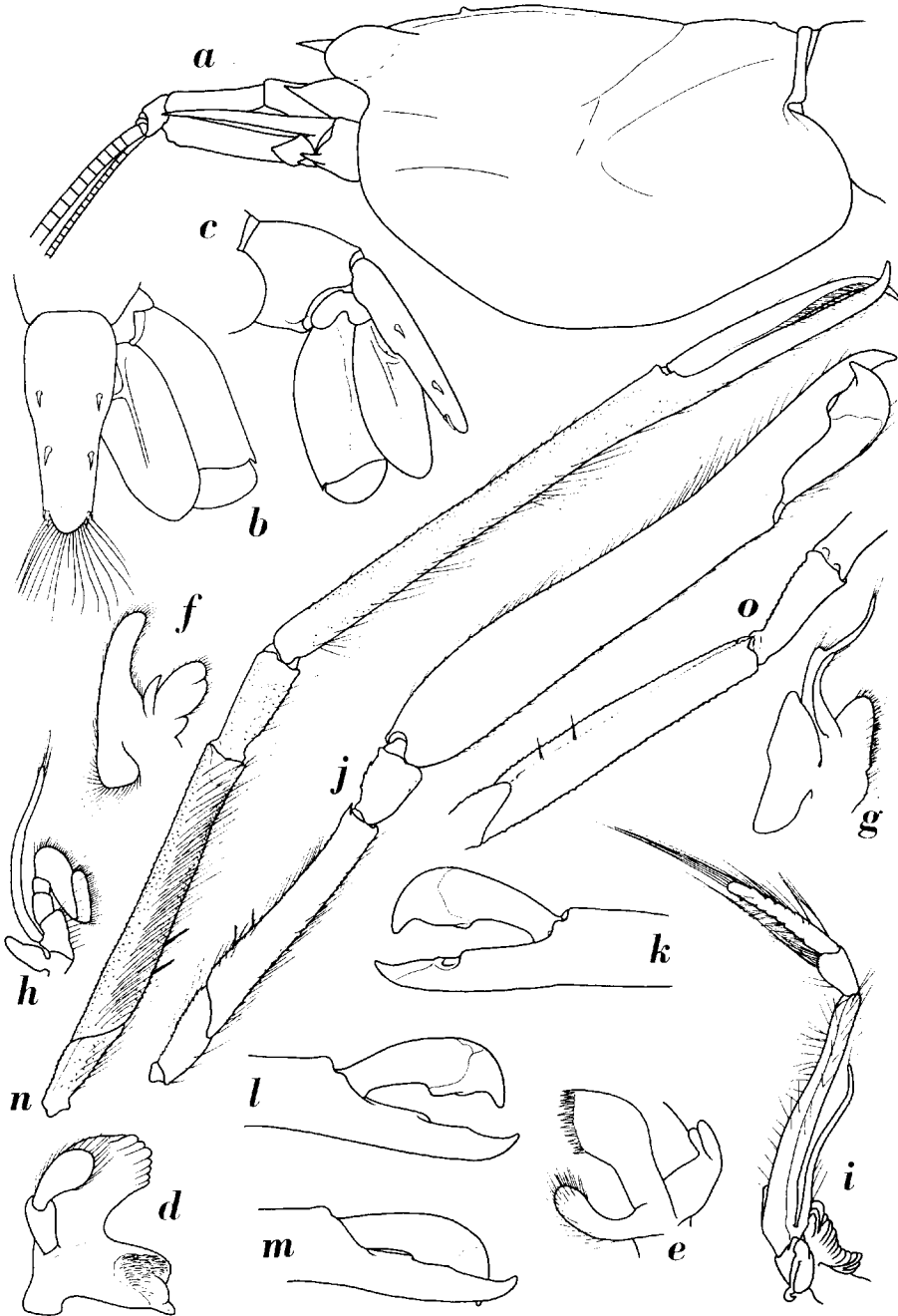


Fig. 1. *Alpheus migrans* new species, male from SIM Sta. 2. a, carapace in lateral view; b, telson and right uropod in dorsal view; c, telson and left uropod in lateral view; d, mandible; e, maxillula; f, maxilla; g, first maxilliped; h, second maxilliped; i, third maxilliped; j, larger first cheliped; k, fingers of larger first leg inside view; l, outside view of these opened fingers; m, outside view of same, closed; n, smaller first cheliped; o, carpus and merus of same, inside view. a-c, f-i,  $\times 10$ ; d, e,  $\times 20$ ; j-o,  $\times 5$ .

The eyes are completely covered by the ocular hoods.

The stylocerite is broadly oval and ends in a sharp spine which just fails to attain the end of the basal segment of the antennular peduncle, and slightly overreaches the rostrum. The second segment of the peduncle is long and slender, being about three times as long as wide and somewhat shorter than the basal segment. The third segment is slightly less than half as long as the second. The upper antennular flagellum has the basal 20 segments widened; this widened part is slightly longer than the peduncle and is followed by about 10 narrow segments, which together are about  $1/4$  as long as the widened part. The lower flagellum is narrow throughout and almost twice as long as the upper.

The scaphocerite reaches to or slightly beyond the end of the second segment of the antennular peduncle. It is about three times as long as broad, being broadest in the basal half. It narrows anteriorly and ends in a truncated distal margin, which is about half as wide as the widest part of the scaphocerite. The outer margin is regularly concave and ends in a large tooth, which reaches slightly beyond the anterior margin of the lamella. The end of the antennal peduncle (carpocerite) reaches to or slightly beyond the end of the scaphocerite. The basicerite carries a sharp slender tooth below the base of the scaphocerite; its anterior margin has a rounded dorsal lobe and shows no spine.

The mandible has the incisor process with many blunt teeth; the molar process shows a few blunt lobes and a field of hairs; the palp is two-segmented. The maxillula has the lower lacinia elongate and blunt, provided with hairs, the upper lacinia is broader, with denticles on the distal margin; the palp is bilobed. The maxilla has the lower lacinia consisting of a single distinct lobe, the upper lacinia is cleft; the palp is small but distinct, the scaphognathite is slender, being truncated below. All maxillipeds bear a well developed exopod. The two endites of the first maxilliped are separated by a small but distinct notch; the palp is slender; the caridean lobe is narrow but distinct; the epipod is large and bluntly narrowed at either end. The second maxilliped has the last segment applied lengthwise against the penultimate; an epipod but no podobranch is present. The third maxilliped reaches with half the distal segment or somewhat less beyond the scaphocerite. The distal segment is elongate and slightly narrowed towards the blunt apex; it is fringed with hairs, those of the posterior margin being placed in groups. The penultimate segment is broader than, but about half as long as the distal segment. The exopod is slender, an epipod and an arthrobranch are present.

The first and second pereopods reach with half the merus or somewhat less beyond the scaphocerite. The first pereopods are very unequal in shape.

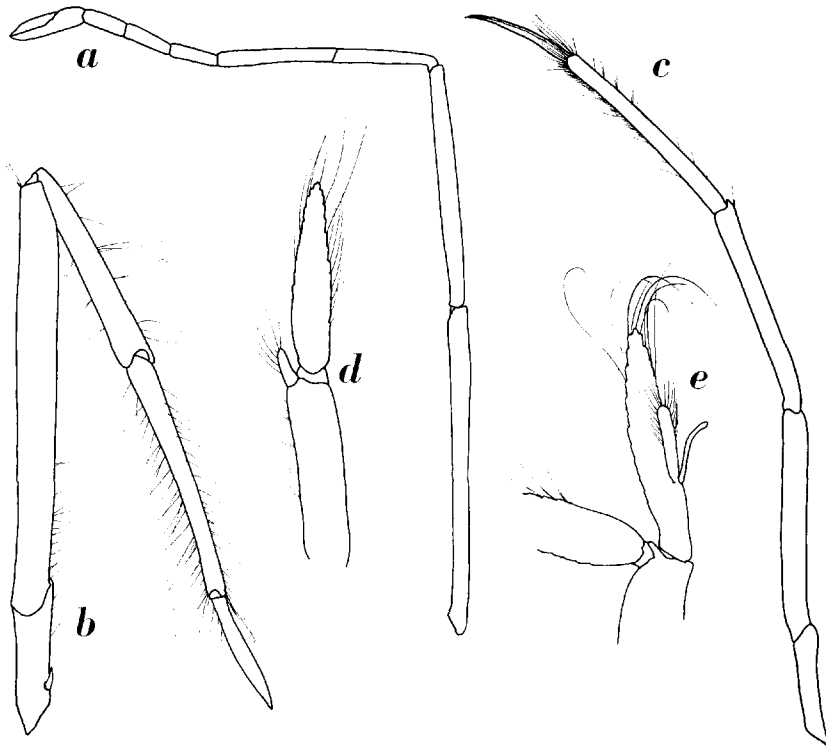


Fig. 2. *Alpheus migrans* new species, male from SIM Sta. 2. a, second pereopod; b, third pereopod; c, fifth pereopod; d, first pleopod; e, second pleopod. a-c,  $\times 10$ ; d, e,  $\times 20$ .

The larger leg has the chela about 6.5 to 7 times as long as high; the fingers being somewhat less than half as long as the palm. The fixed finger is slender and straight, it reaches somewhat beyond the end of the dactylus and ends in a slender slightly curved point. The upper surface of the fixed finger bears a concavity for the reception of the molar-like tooth of the dactylus. The dactylus is somewhat shorter and thereby somewhat more heavy than the fixed finger and has the apex curved down sharply, being hook-shaped. The cutting edge of the dactylus bears a blunt molar-like tooth in the middle, which fits snugly into the cavity of the fixed finger. The palm of the larger chela is elongate, it is about five times as long as high; it shows no distinct grooves or ridges, but there are some scattered small tubercles in the proximal part. The carpus is somewhat narrower than the palm and about  $1/5$  to  $1/6$  of its length; it is distinctly less than twice as long as wide. The merus is about three times as long as the carpus and 5 times as long as high; it shows a sharp, but not very large antero-ventral tooth on the inner surface; no

other teeth are present on the merus, except for two slender spines placed in the basal third of the inner ventral margin. Like the carpus and the basal part of the palm, the merus bears scattered minute tubercles, which sometimes resemble small spinules. These tubercles are more densely placed in the proximal part than in the distal part of the leg. The other first leg is narrower and more slender; its chela is about 15 times as long as high. The fingers are half as long as the palm, they are elongate and slender, of equal length and width; both have the tip sharp and strongly curved, so that, when the chela is closed, the finger tips are crossing. In the male the dactylus is "Balaeniceps"-shaped by the presence on either lateral surface of an oblique row of downward directed long hairs. The palm is about 10 times as long as high, and, like in the larger leg, it bears scattered hairs and minute tubercles or spinules. The carpus is relatively longer than in the larger leg, measuring about  $1/4$  of the length of the palm, and being more than twice as long as wide. The merus is about three times as long as the carpus and resembles that of the larger leg.

The second pereiopods have the carpus consisting of five segments, of which the first two are the longest, the first being only slightly shorter than the second. The third to fifth segments are of about equal length, measuring about half the length of the first segment. The chela is shorter than the distal two segments combined. The merus measures  $2/3$  of the length of the carpus and about  $4/5$  of that of the ischium. The third leg reaches with the greater part of the carpus beyond the scaphocerite. Like in the following legs, the dactylus is scoop-shaped, being dorsoventrally flattened; it has no teeth. The propodus is about twice as long as the dactylus and somewhat longer than the carpus; it carries no spines. The merus is twice as long as the carpus, and is unarmed. The ischium is slightly more than half as long as the propodus and bears a movable spine. The fourth leg reaches with part of the propodus beyond the scaphocerite and is similar to the third leg. The fifth leg is the shortest of all and reaches with part of the dactylus beyond the scaphocerite. The propodus is about twice as long as the dactylus, as long as the carpus and about as long as the merus. The ischium is half as long as the merus. None of the segments carries any spine.

The endopod of the first pleopod of the male is very short and bluntly elongate. In the second pleopod of the male the appendix masculina is slightly longer than the appendix interna, it is of about the same width throughout, with a rounded apex. The protopod of the uropod ends in two blunt lobes dorsally. The outer margin of the exopod ends in a triangular tooth, which marks the end of the diaeresis. The endopod is oval, it bears a longitudinal median carina, from which a lateral carina branches off in the inner basal

half of the endopod; this lateral carina hooks behind the lateral projection of the telson described above.

Size. — The carapace length of the examined specimens varies from 2.3 to 7 mm. No ovigerous females are represented in the material.

Distribution. — It seems unlikely that this species with its many Indo-West Pacific affiliations should belong to the original Mediterranean fauna. It is more logical that it originally occurred in the Red Sea (and perhaps other parts of the Indo-West Pacific) and only recently has penetrated into the Mediterranean through the Suez Canal. Also the localities where it was found, all at a rather slight distance east of the northern end of the Suez Canal, support this. If this surmise is correct, *A. migrans* is the second species of this genus which, although originally Indo-West Pacific, was first described from the Mediterranean. The other species, *Alpheus inopinatus* Holthuis & Gottlieb, 1958, was originally described from the Mediterranean coast of Israel, and 11 years later reported from the coast of Pakistan (Tirmizi & Kazmi, 1969). The species most closely related to *Alpheus migrans* is *A. acutocarinatus* De Man, 1909, which is known from Thailand (exact locality unknown; Banner & Banner, 1966: 120, fig. 43) and from Indonesia: Kwandang Bay in North Celebes, Madura Strait near E. Java, and two localities in the Lesser Sunda Islands (off the west coast of Lombok, and Sapeh Bay, Sumbawa).

Ecology. — *Alpheus migrans* is known from depths between 15 and 34 fathoms (= 27.43 and 62.18 m), while in the two stations in which the nature of the bottom was noted this was mud. *Alpheus acutocarinatus* was found in depths between 18-27 m and 72 m on bottoms of grey mud with some Radiolaria; river mud, coral and coral sand; fine sand with mud; and mud and sand. The two species evidently live in similar habitats.

Remarks. — *Alpheus migrans* belongs to the "brevirostris" group of the genus *Alpheus* and very strongly resembles *Alpheus acutocarinatus* De Man, 1909. In most respects the two species resemble each other, e.g., in the characteristic long dorsal carina on the carapace, in the general shape of the pereopods, etc. However, *A. migrans* differs conspicuously from *A. acutocarinatus* in the shape of the first chelipeds. These are considerably more slender in the new species than in *A. acutocarinatus*, as is clearly shown when comparing our specimens with De Man's (1909: 104; 1911: 401; 1915: pl. 21 fig. 94, 94a-f, pl. 22 fig. 94g-j) descriptions and figures and with those given by Banner & Banner (1966: 120, fig. 43). The larger chela in *A. acutocarinatus* is 5 to 6 times as long as high, in the new species 6.5 to 7 times. The fingers of the large chela in *A. acutocarinatus* are distinctly more than half as long as the palm, in *A. migrans* they are decidedly shorter than half

the palm. The smaller chela in *A. acutocarinatus* also is less slender than in *A. migrans*; the fingers of this chela in *A. acutocarinatus* are very little shorter than the palm, while in *A. migrans* the fingers are half to  $3/4$  as long as the palm. These differences seem to be constant in the rather large material examined. De Man's type material of *A. acutocarinatus* consisted of 5 specimens (from 4 stations), and Banner & Banner (1966) figured a male.

It is possible that intermediate forms do occur between the Red Sea and Indonesia, and in that case *A. migrans* should be regarded a subspecies of *A. acutocarinatus*. For the time being, however, we prefer to treat it as a good species.

Types. — The holotype, a specimen from SIM Sta. 2, is preserved in the collection of the Rijksmuseum van Natuurlijke Historie, Leiden, under reg. no. Crust. D. 31732. Paratypes are in the same museum (reg. nos. Crust. D. 31733 and 31734), in the collection of the Zoology Department, University of Tel-Aviv, and in the National Museum of Natural History, Smithsonian Institution, Washington, D.C.

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