THE BIOLOGY OF *LUPA PELAGICA* (LINNEAUS)

By

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Lupa pelagica (Linneaus)

The Swimming-Crab; *Chairman* (Photos. 1 and 2)

Syn. *Portunus* or *Neptunus pelagicus* (Linné, 1964).
Portunus hastatus Fabricius, 1798.
Portunus pelagicus Boss 1801.
Lupa pelagica Say 1811.
Lupa sanguinolenta Krauss 1843.
Lupa cranchiana Oeach 1847.
Lupa sayi Gibbs 1850.
Luva pudica Gerstaecker 1856.
Neptunus sayi A. Milne Edwards 1861.
Lupea parvula Desboune 1867.
Portunus sayi Rathbun 1897.

Habitat and Distribution :

L. pelagica, lives on the sandy or muddy sea bottom near the shore in shallow depths; either walking on it or swimming nearby using its fifth pair of walking legs or oar-feet.

Calman (1927), stated that *lupa* (= *Neptunus*) *pelagica* Linneaus is a Red Sea species. It has migrated through the suez Canal to the Mediterranean where it established itself and now forms a good fishery on the Egyptian Mediterranean Coasts.

Munro Fox (1927), mentioned that *Neptunus* 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 at (1924) 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 during four years later were common in the port.

Ramadan (1936), mentioned that swimming crabs (*F. portunidae*), were dredged from sandy bottom from the area of Al-Ghardaqa Marine Biological Station.

Although *Lupa pelagica* (Linneaus) is recorded in the Red Sea proper, its fishery exists in Suez Gulf only. It is fished from Suez Bay till El-Sochna on the western side of the Gulf and from Suez to Moussa Springs on the eastern side. It is fished mostly by crab nets and a small percentage by otter-trawls from depths ranging between $\frac{1}{2}$ to 30 or 40 fathoms and by purse-seine from the shore.

PHOTO 1.

V.V. ♂

Geographical Distribution :

Philippine Islands near Masbate in 20 fathoms (Miers, 1886). Mid-Atlantic Ocean especially along the Gulf Stream, North Atlantic Ocean from Nova Scotia (43°N. lat.) south Via Gulf of Mexico to Guiana, Brazil (Gerstaccker), Bermuda, Kerynelen Island, South Indian Ocean (Rathbun, 1930). East Coast of Africa, Mauritius, Indo-Pacific to China, Japan, Australia, New Zealand, through Suez Canal to Alex. and Syria.

PHOTO 2.

Food and Feeding Habits :

Lupa pelagica (Linneaus), like other crustaceans is nocturnal in habit. The Blue-Swimming Crabs are voracious and scavengers eating whatever kind of food they meet whether of animal or plant origin. They are also cannibalistic preying on each other.

Specimens kept indoors, were observed to feed during winter.

Stomach and intestine contents of some specimens fished by crab nets from Attaqa Area (Suez Gulf) and El-Anbak (Bitter Lakes) were examined and the following constituents are found; crustacean remains and chitinous exoskeletons (domenant), fragments of molluscan shells (common), diatoms which may be Coscinodiscaus (very common), sand particles (rare), scales of fishes (common), foraminifera (rare), fragments of filamentous green algae (rare) and organic debris mixed with mud (very common).

Spawning, Metamorphosis and Rearing :

Mating occured in exactly the same manner as Chhapgar (1959) described.

A number of specimens of both sexes were put in a large cement aquaria in which their habitat is matched.

The female is in a soft state during copulation i.e. it has just moulted. Before copulation, the male holds the female with the second pair of walking legs. The female is passive and with its back against the abdomen of the male. The male, on the contrary, is very active. When copulation begins, the male turns the female so that its abdomen is now opposed that of the male. The male then mserts the second pair of abdominal appendages inside the first, and both together acting as a penis are introduced into the female openings. The first pair is capable of very little motion, but the second pair of appendages can move freely up and down inside the first, forcing the sperms into the female. Copulation may last for three to four hours, after which the crabs separate.

Mature female *Lupa pelagica* (Linneaus), carries eggs on its abdomen from January. The number of ovigerous females increases until April, then begins to decrease from May, although during the summer months there are still females carrying eggs. In other words the breeding season of *Lupa pelagica* (Linneaus) is during the whole year; April being the peak period. This is in coencidence to some extent with what Chhapgar (1959) found in India. He stated "The breeding season of *Neptunus* (*Neptunns*) *pelagicns* Linneaus is irregular at different periods throughout the year". Female ovaries of *L. pelagica* (Linneaus) become well-developed and mature in winter.

Female *L. pelagica* spawns in deep water in the Navigation Channel in Suez Bay at depths ranging between 25 meters and 35 meters. After spawning, the spent females return back to the shore to feed and fatten. Also the very young crabs swim to the shore where they grow and feed.

The eggs are at first yellowish orange in colour, changir g into reddish orange or deep orange, then into olive green or blackish grey as they approach hatching

Three ovigerous females of *L. pelagica*, were kept in glass aquaria in which their habitat is matched to hatch their eggs. The eggs of one of the females hatched out on 20/5/1962 after passing 5 days in the laboratory. The temperature of water at 8 A. M. was 22.5°C. Some of the larvae were prezoeae and some were first zoeae. The second female, hatched out its eggs on 27/5/1963 i.e. after passing 13 days indoors. Unfortunately, the time the eggs take to hatch out could not be fixed as no spawning took place in the aquarium.

The life-history of *Lupa pelagica* (Linneaus), consists of a prezoea which is passed either in or outside the egg. The hatched prezoea is motionless and remains quiet on the bottom of the glass jars. The prezoea is transformed into the first zoea after about one hour. There are 5 zoeal stages. The first and second zoeae were obtained by hatching the eggs in the laboratory, while the last three zoeal stages were procured by towing in Suez Gulf both horizontally and vertically at dawn and dusk using silk townets of M.P.I. 129. In the sea, the first and second zoeae were found in surface towings. the third at both the surface and the bottom and the fourth and fifth at the bottom. In the laboratory the first zoea transformed into the second zoea after 3 days when the temperature of water at 11 A. M. was 26°C. The megalopa is usually found on the bottom. It was obtained indoors from a fifth zoea that moulted in the next day.

The zoeae of *Lupa pelagica* (Linneaus) were obtained by tow netting in Suez Bay from March, 1963 till September, 1963 i.e. during the summer months. The surface sea temperatures in the morning were from 25°C. to 29°C.

Geographical Distribution :

The places from which the zoeae of *Lupa pelagica* (Linneaus) were obtained in Suez Gulf are the following :

1) Infront Adabiah Port,
2) From Attaqa Oceanographic and Fisheries Institute to El-Adabiah Port,
3) From Attaqa Research Institute to the Governmental Petroleum Refinery.

Developmental Stages of Lupa pelagica (Linneaus)

Prezoea (Fig. 2)

Body-length : 1.23 mm.; carapace-length : 0.56 mm.; dorsal spine telescoped ; 0.11 mm.; antennule : 0.59 mm.; antenna : 0.11 mm.; first maxillipede, not including setae : 0.55 mm.; second maxillipede : 0.5 mm.

In the laboratory; this stage lasted about an hour and then the cuticle is shed.

The colour is greyish black. On the anterior ventral part of each abdominal segment, there is a mass of yellowish orange chromatophores. Also on the cephalothorax there are masses of yellowish orange chromatophores.

The prezoea is enclosed in a very thin transparent cuticle which fits closely. The cephalothorax is rounded and the abdomen is five segmented.

The antennule (Fig. 9) is short and curved downwards with an apical short spine and a hair.

The antenna (Fig. 16) is longer than the antennule with four long apical hairs.

The mandible, maxillule of maxilla (Fig. 2) are simple.

The first maxillipede (Fig. 35) is biramous with a five-segmented endopodite carrying 4 apical short hairs, and two-segmented exopodite carrying 4 apical setae.

The endopodite of the second maxillipede (Fig. 41) is three-segmented while the exopodite is unsegmented and has 4 apical setae.

The setae of both the first and the second maxillipedes are covered with the embryonic cuticle.

The abdomen with five segments and telson. There is a pair of small lateral spines on all except the two anterior abdominal segments. The telson is forked. On the outer sides there are two lateral spines. Between the two arms of the fork that is on the inner margin there are 3 + 3 spines. All the spines are covered also with the embryonic cuticle.

Few hours after hatching, the dorsal and lateral spines on the carapace getting erected i.e. taking their normal, constant shape and form of the later stages. The rostrum is stretched forward and attains its full length. The embryonic cuticle is shed and the first zoea appears. It begins its pelagic life very actively giving a positive response to the source of light.

First Zoea (Fig. 3)

Body-length (from anterior part of head to end of fork) : 1.83 mm.; body-width, between bases of lateral spines : 0.39 mm.; carapace-length : 0.75 mm.; eye-width : 0.21 mm.; dorsal spine : 0.93 mm.; lateral spines : 0.13 mm.; rostrum : - 0.52 mm.; antennule, including hairs : 0.23 mm.; antennae : 0.4 mm.; first maxil lipede, not including setae : 0.54 mm.; setae on maxillipedes : 0.31 mm.

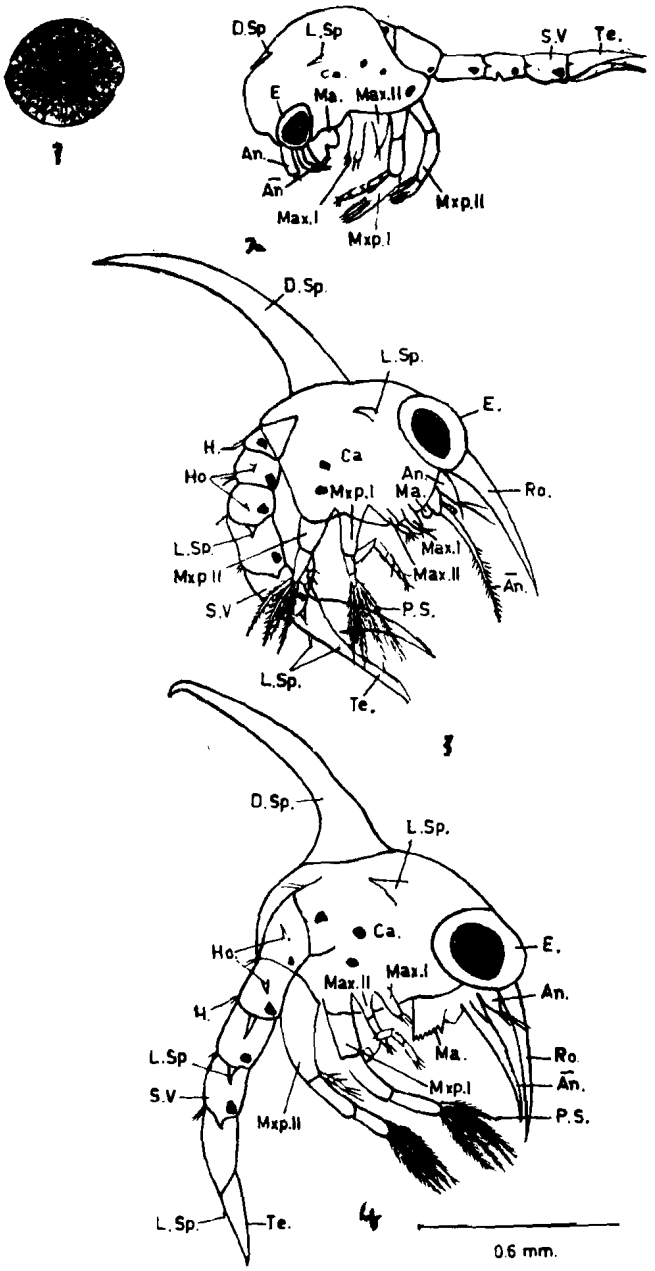
There is a mass of yellowish orange chromatophores on the anterior part of each abdominal segment. Also on the cephalothorax there are masses of yellowish orange chromatophores.

The cephalotorax is no longer rounded, the rostrum and the spines having expanded and assumed their characteristic positions.

The dorsal spine is longer than the rostrum and curued gently backward. The lateral spines of the carapace are somewhat depressed. The eyes are not stalked. The rostrum is straight and tapers to a point.

The antennule (Fig. 10) is short with three apical aesthetes.

The antenna (Fig. 11) is longer than the antennule. The base of the antenna is wide. The antennal spine is longer than the exopodite and serrated at its apical half.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The mandible (Fig. 23) consists of the molar process and the incisor process with one tooth. There is a big melanophore on it.

The maxillular endopodite (Fig. 28) is 3-segmented and its distal segment is carrying 4 apical plumose spines. The coxa carries 3 terminal spines and the basis carries 3 terminal plumose spines.

The maxilla (Fig. 33); its endopodite is unsegmented and carries 5 terminal plumose spines. The coxa is slightly bifurcated; its first or proximal segment carries 2 plumose spines and its second or distal segment carries also 2 plumose spines. The basis is also slightly bifurcated; its first or proximal segment carries 2 plumose spines, and its second or distal segment carries 3 plumose spines. The exopodite or scaphognathite is plate-like, oval in shape and carries 6 plumose setae around its edge.

The first maxillipede (Fig. 39) is produced into a two-segmented protopodite; the coxopodite and basipodite. From the basipodite arises a 5-segmented endopodite and a 2-segmented exopodite. The endopdoite carries 4 apical long hairs and several short ones on its inner and outer sides. The exopodite is provided with 4 apical long plumose setae.

The second maxillipede (Fig.45) is similar to the first except that the endopdite is three-segmented with 3 apical hairs and 2 outer ones. The exopodite is two-segmented and bears 4 long plumose setae as does the first.

The abdomen consists of 5 segments and a telson. The third, fourth, and fifth segments bear on their posterior margin, a pair of lateral spines which overlap somewhat over each succeeding segment. A short hooked lateral spine is observed on the second and third segments. 2 short dorsal hairs are found on each abdominal segment.

Each fork of the telson (Fig. 54) bears 2 spines. The spinal formula of the telson is 3 + 3. The innermost pair of spines; each bears 7 hairs on its inner side.

N.B. : The first zoea passes 3 days in the rearing dish after which it changes into the second zoea.

Second Zoea (Fig. 4)

It is obtained by hatching of eggs in the laboratory.

Body-length : 2.1 mm., body-width, between bases of lateral spines : 0.39 mm. ; carapace-length : 1.2 mm.; eye-width : 0. 25 mm. ; dorsal spine : 0.91 mm.; lateral spines : 0.14 mm., rostrum : 0.5 mm.; antennule, including hairs: 0.2 mm.; antenna : 0.37 mm.; first maxillipede, not including setae : 0.45 mm.; second maxillipede, not including setae : 0.5 mm.; setae on maxillipedes : 0.35 mm.

There are yellowish orange pigment masses on the anterior part of each abdominal segment. Also on the cephalothorax these masses are present.

In general there is no great change in shape from the first zoea, except th increase in size and the eyes began to be stalked.

The abdomen consists of 5 segments + telson. Each abdominal segment has 2 short dorsal hairs. The third, fourth and fifth segments, each with overlapping lateral spines on the posterior margin as in the first zoea. The second and thrid segments have hooked lateral spines as in the first stage.

The telson (Fig. 55) has acquired an additional pair of spines between the groups of threes in the forks, making 4 pairs in all. The two lateral spines on the forks of the telson still persist.

Third Zoea (Fig. 5)

It is obtained from plankton hauls.

Body-length : 2.58 mm; body-width, between bases of lateral spines : 0.4 mm.; carapace length : 0.78 mm.; eyewidth : 0.29 mm. ; dorsal spine : 1.43 mm.; lateral spines: 0.15 mm.; rostrum : 0.88 mm.; antennule, including hairs : 0.35 mm.; antenna: 0.45 mm.; first maxillipede, not including setae : 0.63 mm.; second maxillipede, not including setae : 0.68 mm.; setae on maxillipededs : 0.32 mm.

There are yellowish-orange pigment masses on each abdominal segment, on the carapace, mandible and first maxillipede.

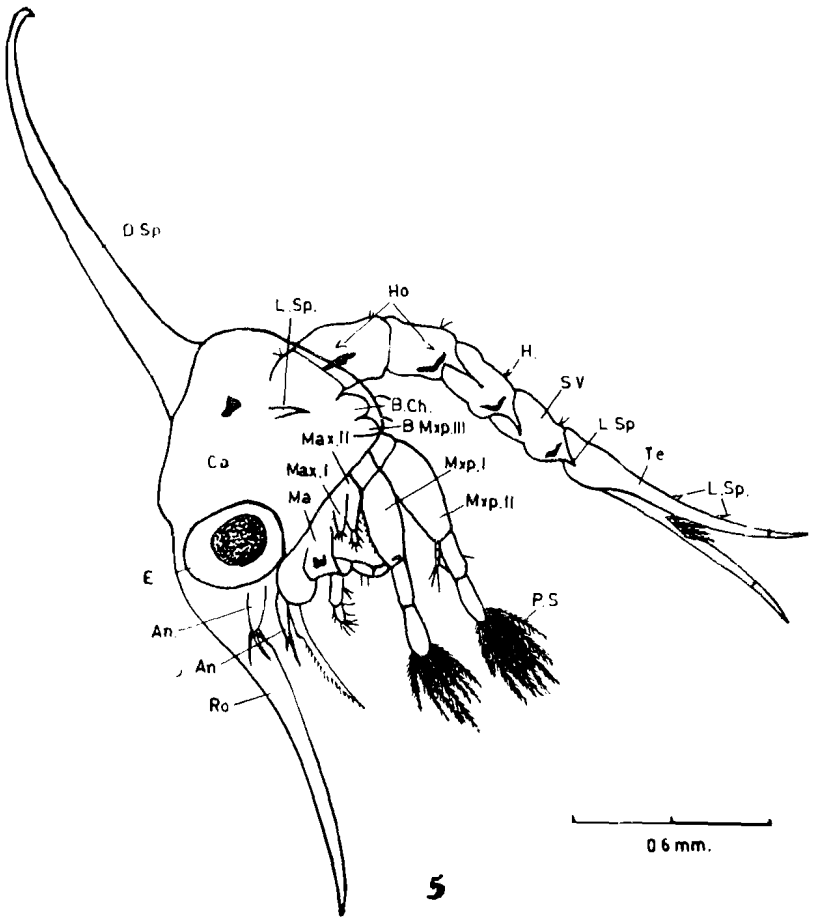
The general shape is the same as in the preceding stages. The eyes, however, have become completely stalked, and two buds presenting the third maxillipede and chela have appeared.

The first maxillipede (Fig. 41) is the same as in the previous stage, except that the endopodite bears more hairs along its posterior margin. The exopodite is provided with 7 apical long plumose setae.

The second maxillipede (Fig. 47) is the same as in the preceding stage. Its endopodite bears 4 apical hairs. The exopodite is provided with 8 apical long plumose setae.

The abdomen consists of 5 segments + telson. The third, fourth, and fifth abdominal segments, each bears lateral overlapping spines on the posterior margins. Each segment is provided with 2 short dorsal hairs. The second and third segments still have hooked lateral spines.

The telson (Fig. 57) resembles that of the second zoea in number and position of spines.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5

Fourth Zoea (Fig. 6)

It is obtained from plankton hauls.

Body-length : 3.1 mm.; body-width, between bases of lateral spines : 0.43 mm.; carapace-length : 0.73 mm.; dorsal spine : 1.25 mm.; lateral spines : 0.28 mm.; rostrum : 0.95 mm.; antennule, including hairs : 0.46 mm.; antenna : 0.45 mm.; first maxillipede, not including setae : 0.76 mm.; second maxillipede, not including setae : 0.81 mm.; setae of maxillipedes : 0.33 mm.

There is a yellowish-orange pigment mass on each abdominal segment. There are also yellowish chromatophores on the carapace and mandible.

No change in shape from the preceding stages occured. The bud of the third maxillipede persists and buds of 4 of the pereiopods appear.

The mandible (Fig. 26) consists of the molar process and the incisor process with 3 teeth. There is a blackish pigment mass on it.

The maxillular endopodite (Fig. 31) consists of 3 segments; its distal segment carries 4 apical plumose spines. Its proximal or basal segment carries 1 simple seta on its outer side. The coxa carries 5 apical and 1 basal plumose spines.

The maxillar endopodite (Fig. 36), is unsegmented and carries 5 apical plumose spines. The coxa is slightly bifurcated; the first or proximal segment carries 2 plumose spines and the second or distal segment carries 3 plumose spines and 1 non-plumose or simple spine. The basis is also slightly bifurcated; its first or proximal segment carries 2 plumose and 1 non-plumose spines. Its second or distal segment carries also 2 plumose and 1 non-plumose spines. The exepodite or scaphograthite is platelike and oval in shape and carries many plumose setae around its outer edge.

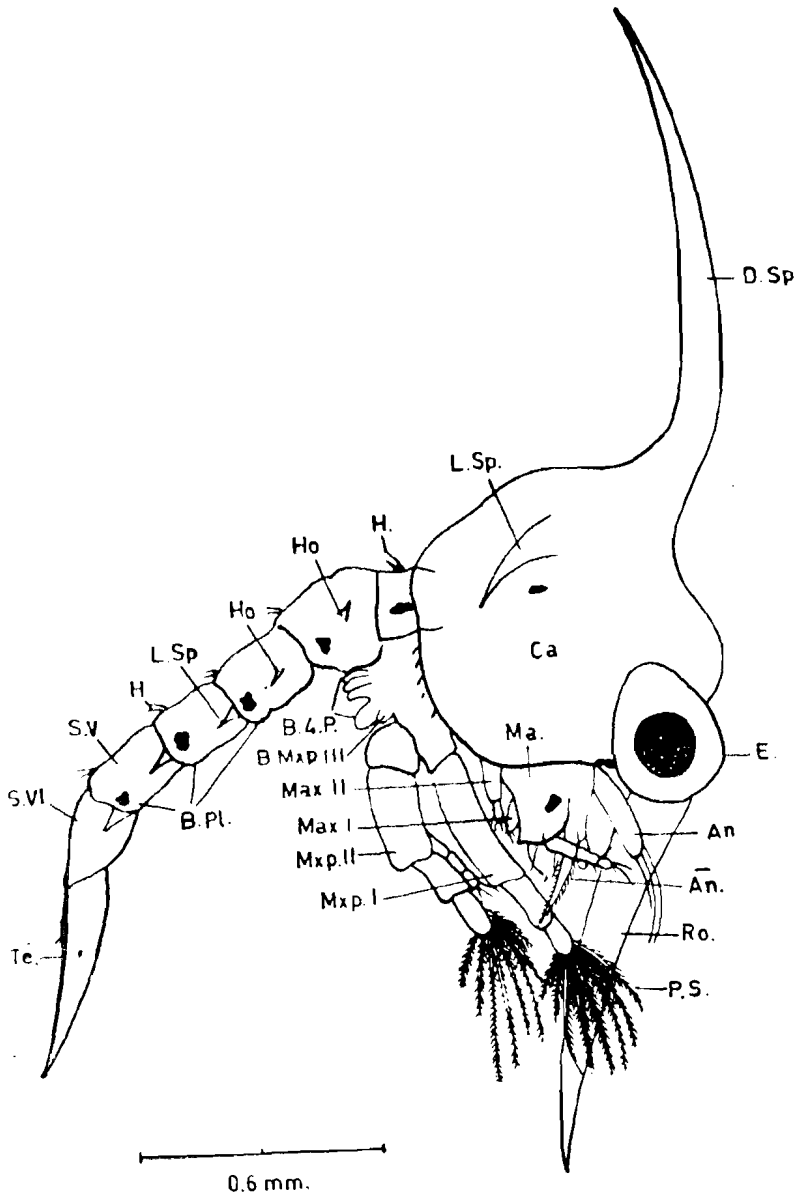
The first maxillipede (Fig. 42), has its endopodite provided with 4 apical hairs and its exopodite with 8 long plumose setae.

The second maxillipede (Fig. 48) its endopodite carries 3 hairs and its exopodite 8 long plumose setae.

The abdomen has acquired an additional segment. It consists of 6 segments + telson. Each segment, as in the preceding stage, bears 2 short dorsal hairs and the third, fourth and fifth segments carry lateral hooked spines.

Buds of the pleopods appear as rounded swellings on the ventral side of the abdominal segments from 2 – 5.

The telson (Fig. 56) is like that of the second and third zoeae, except that there appeared an additional pair of very small spines, 1 on the inner margin of each fork and far from the tip.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Fifth Zoea (Fig. 7)

It is obtained from plankton hauls.

Body-lenght : 3.68 mm.; body-width : 0.6 mm.; carapace length : 1.25 mm.; dorsal spine : 2.52mm.; lateral spines : 0.45 mm.; rostrum : 1.89 mm.; antennule, including hairs : 0.5 mm.; antenna : 0.65 mm.; first maxillipede, not including setae : 0,77 mm.; second maxillipede, not including setae : 0.92 mm.; setae on maxillipedes 0.45 mm.

The yellowish orange-ringed appearance of the abdomen, due to large pigment masses, is even more marked than in the fourth stage.

The general shape of the zoea is still the same, but due to still further increase in size, the rostrum and dorsal spine appear rather long.

There is a fringe of 16 plumose setae along the posterior dorsal and lower margins of the carapace.

The first maxillipede (Fig. 43), its endopodite bears 5 hairs on the apical segment, and several on the outer sides of the five segments. The exopodite carries 10 long apical plumose setae.

The second maxillipede (Fig. 49), its endopodite carries 5 - one very short - apical hairs. The exopodite is provided with 10 long apical plumose setae. Further back there are 4 somewhat short ones.

The buds of the third maxillipede (Fig. 7) and the pereiopods (Fig. 7) are large, and the chela shows a bifurcation at the end.

The abdomen consists of 6 segments + telson, as in the fourth zoea. Each segement carries 2 short dorsal hairs. The third, fourth and fifth segments bear the usual overlapping lateral spines on their posterior margins. The second and third have short hooked lateral spines. There are 3 hairs on the dorsal side of the first segment.

The buds of the pleopods (Fig. 7) have become quite large and conspicuous. They are present on the second, third, fourth, and fifth abdominal segments.

An additional innermost pair of small spines has appeared on the telson (Fig. 58). making six pairs in all between the forks. The remainder of the spines appear as in the fourth zoea.

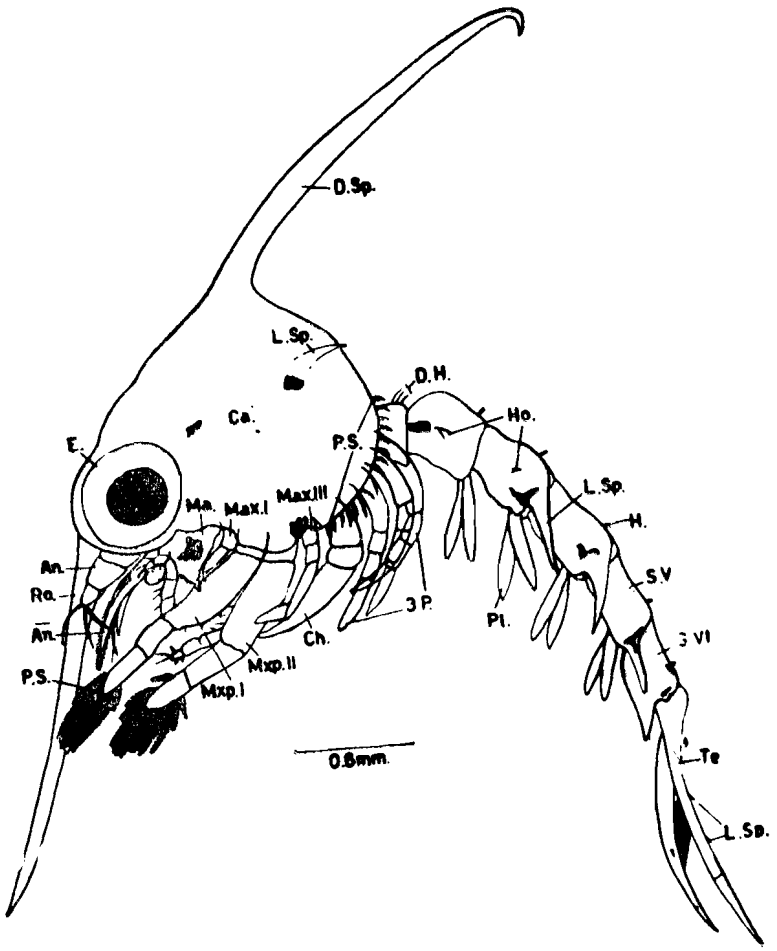
Megloapa (Fig. 8)

It is obtained by moulting of a fifth zoea in the laboratory.

Body-length, from anterior tip of the carapace to the termination of the telson : 2.2 mm.; carapace-length; 1.28 mm.; carapace-width : 1.03 mm.

The body and legs are yellowish in colour with much orange reddish chromatophores on the whole carapace, legs or periopods and their bases.

The megalopa of the blue swimming-crab or *Lupa pelagica* (Linneaus), is distinguished by its conspicuous rostrum, and the lack of a dorsal spine. The cephalothorax is broad and flattened, the eyes are stalked, and there are a pair of chelae and four pairs of periopods.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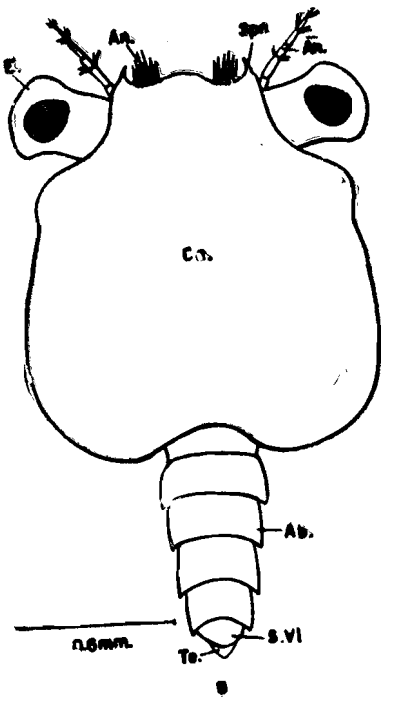
Two minute spinules are present at the outer extremeties of the rostrum.

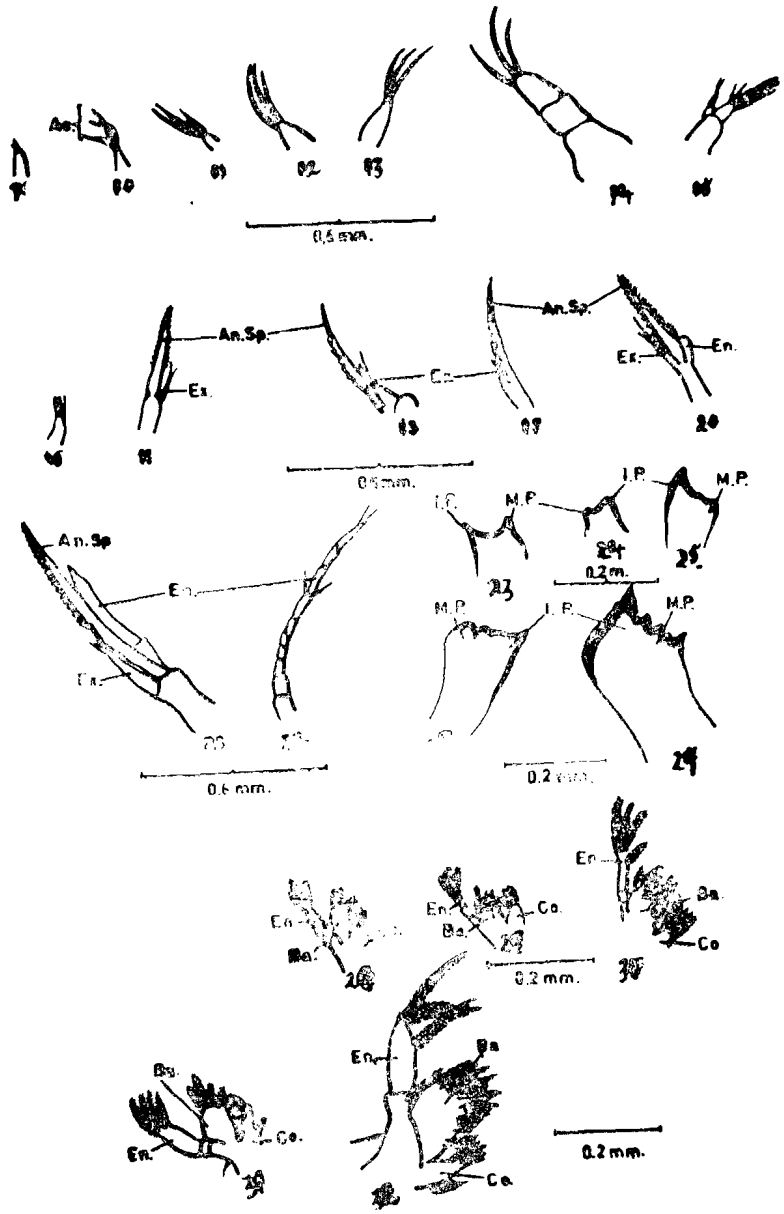
There is no cornua on the fifth thoracic segment.

There are 3 spines on each leg of the second, thrid, fourth and fifth pairs of legs (Fig. 50).

There are 2 hooks on the merus of each of the first pair of legs or chelae (Fig. 52).

The abdomen (Fig. 53) is depressed and consists of 6 segments + telson fringed with long hairs. The pleopods on the sixth abdominal segment (Fig. 51), each bears only 8 plumose setae (Prasad and Tampi (1953), have mentioned 20 setae on all the pleopods, and Chhapgar (1959), 12 setae for each of the pleopods on the sixth abdominal segment).

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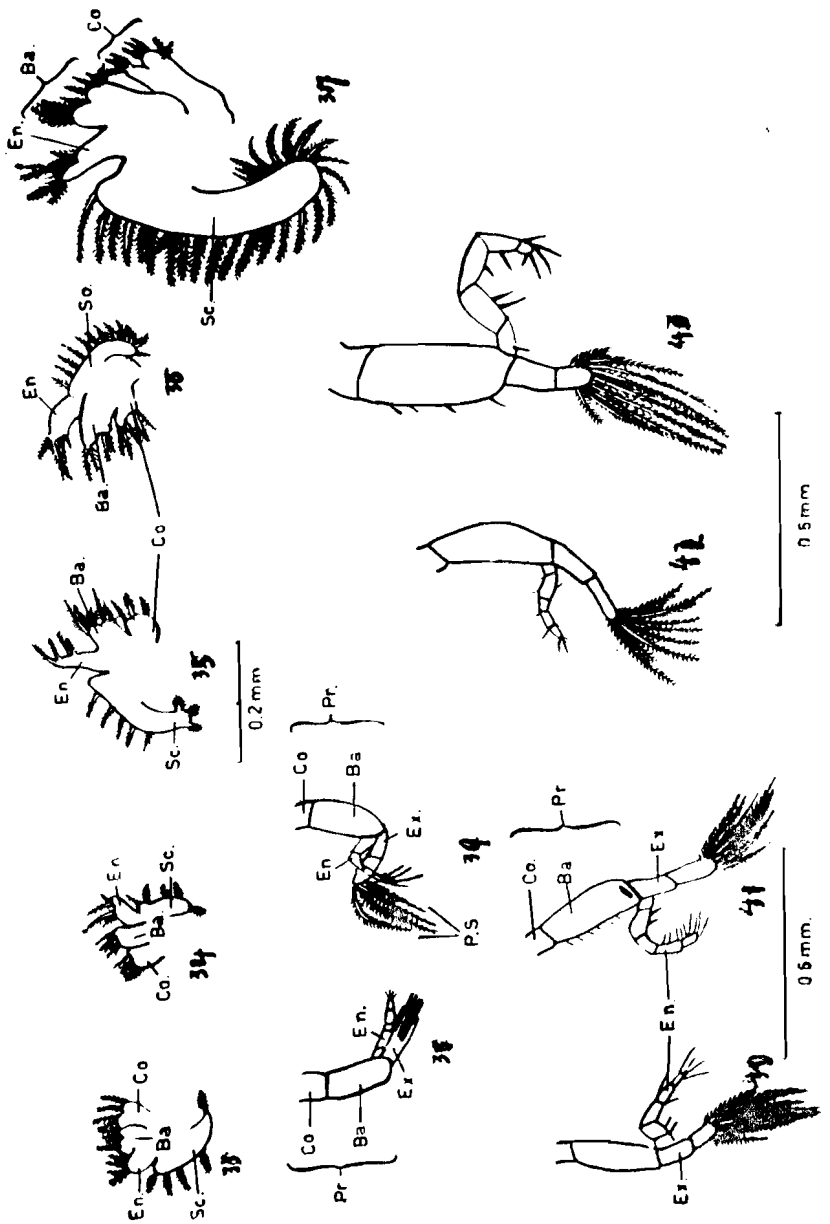
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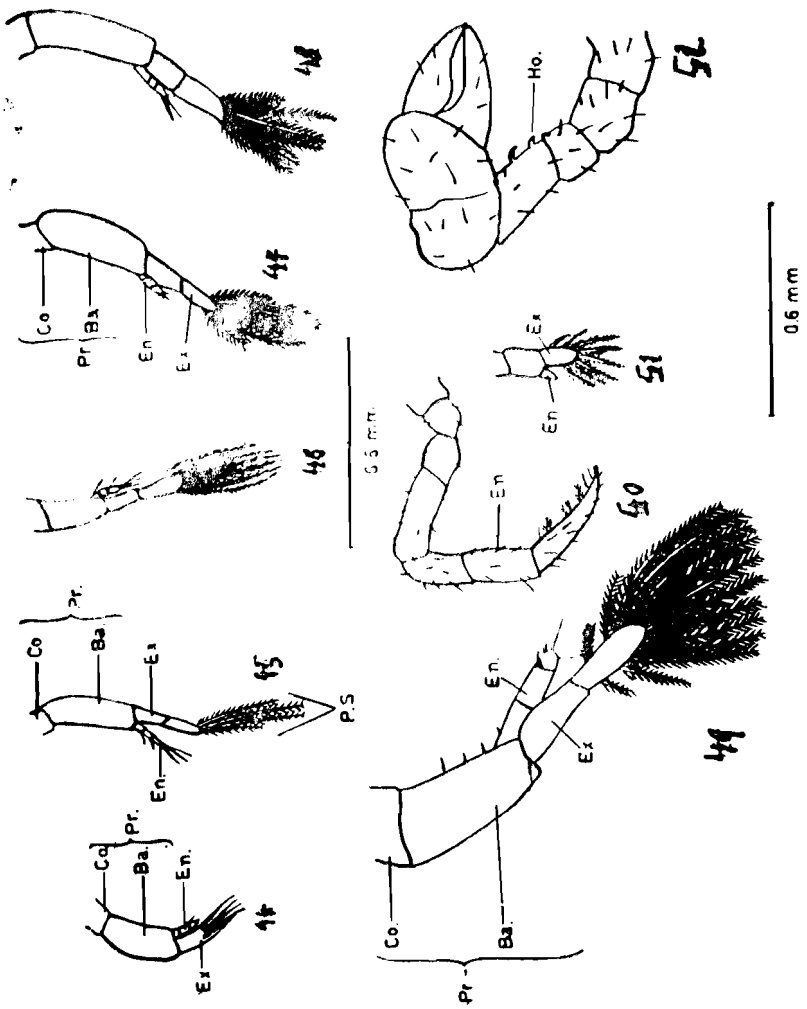
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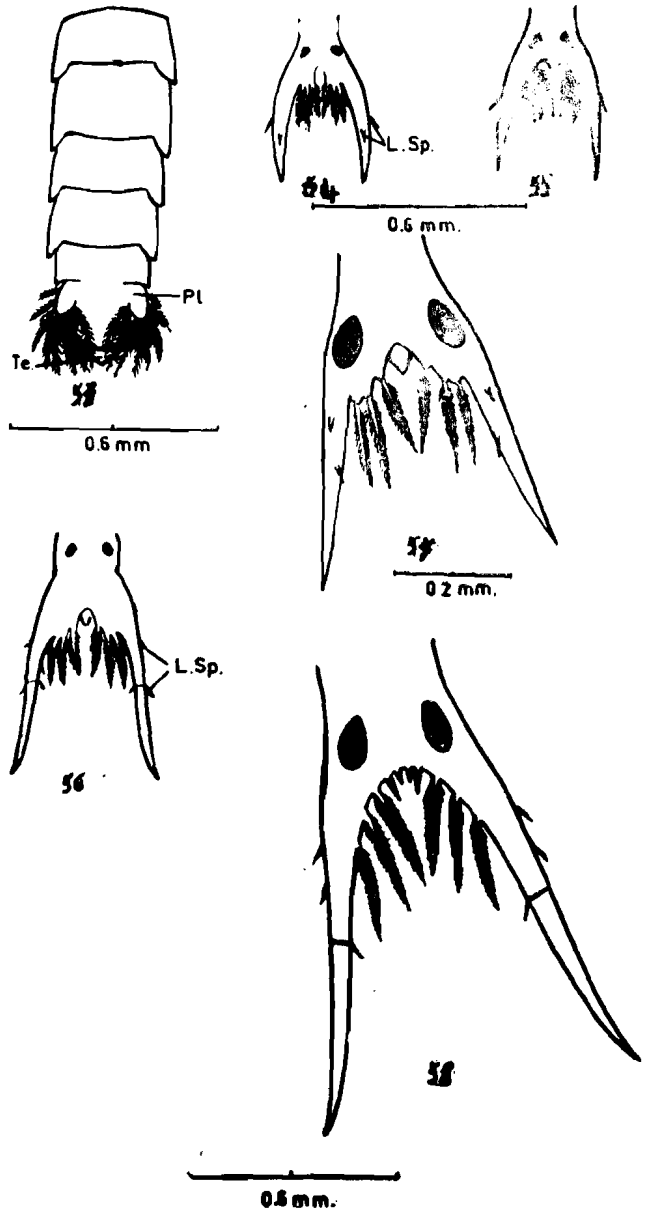
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Fishing Gears and Methods

Lupa pelagica (Linneaus) is fished in Suez Bay by :

1.— Crab nets.

2. – Shore-seines, and

3. – Otter-trawls.

Most of the catch is by crab nets. A very small percentage is caught by shore-seines and otter-trawls.

Fishing by crab nets is carried out during the warm months of the year.

The fishing season of *Lupa pelagica* (Linneaus) in Suez Bay is during summer i.e. during the warm months of the year.

Although *Lupa pelagica* (Linneaus) is recorded in the Red sea proper, no fishing is practiced and its fisheries exist only at suez Gulf. The main fishing places are from Suez to El-Sochna in not deep water.

The number of crab boats at Suez is from 10 - 15 boats and these are rowing or sailing boats. On every boat there are 3 or 4 men.

As a new device for fishing *Lupa pelagica* (Linneaus), pots or traps were tried in the Red sea proper for the first time in the area of Al-Ghardaqa. Four models were used. The first model (Photo. 3) is rectangular in shape. It has two openings in the form of funnels for the animal's entrance. They are on opposite sides of the pot but not opposite each other. The crabs enter the pot through the funnels to get the bait and are then unable to find their way out. The bait consisted of fresh fish and sepia hanged from the roof of the trap.

The second model (Photo. 4) is pyramidal in shape. The funnel is on the upper side only.

The third model (Photo. 5) is semi-circular in shape. The lower side is rectangular in shape. The two other opposite sides are semi-circular. Their base is 40 cm., their height is 55 cm. and having two funnels which are not opposite each other.

The fourth model (Photo. 6) is S-shaped. There are two funnels on the rounded sides and they are not opposite each other.

The pots are laid either on the coral reefs, islands or nearbye or on the sea bottom.

PHOTO 3.

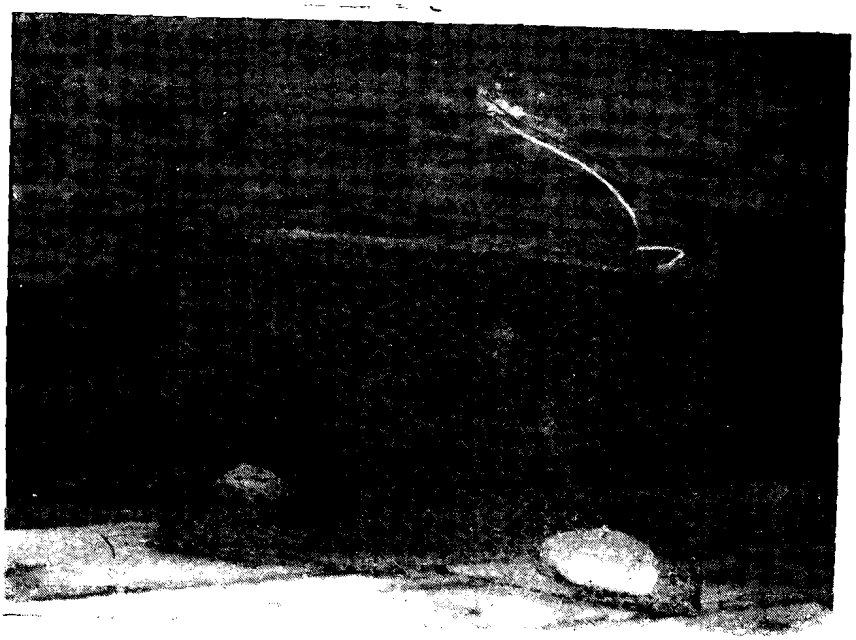

PHOTO 4.

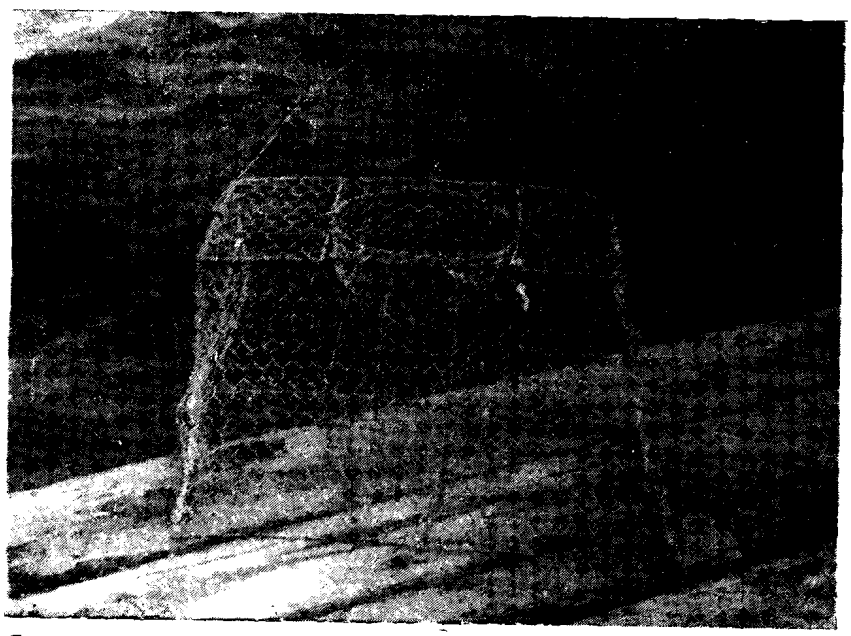

PHOTO 5.

PHOTO 6.

The experiment is still going on to examine the fishing capacity of these different traps and this needs a long time to conclude if these traps can be considered successful, in the Red Sea, or not. The slight indication of good hope is the presence of *Lupa pelagica* (Linneaus) in the pyramidal pot from the area infront of Al-Ghardaqa Oceanographic and Fisheries Reasearch Centre and which was laid on the sea bottom.

So whether the pots help in fishing crabs, any, will suffice the effort spent to moderinize the fising gears.

DISCUSSION

Lupa pelagica (Linneaus) lives on the sandy or muddy sea bottom near the shore in shallow depths; either walking on it or swimming nearbye using its fifth pair of walking legs or oar-feet.

Concerning its geographical distribution; it is recorded in the Philippine Islands near Masbate in 20 fathoms (Meitrs, 1886), Mid Atlantic Ocean especially along the Gulf Stream, North Atlantic Ocean from Nova Scotia (43-N. lat.) south Via Gulf of Mexico to Guiana, Brazil (Gerstaecker), Bermuda, Kerguelen Island, South Indian Ocean (Rathbun, 1930), East Coast of Africa, Mauritius, Indo-Pacific to China, Japan, Australia, New Zealand, through Suez Canal to Alex. and Syria.

Lupa pelagica (Linneaus), like other crustaceans is nocturnal in habit. The Blue-Swimming Crabs are voracious and scavengers eating whatever kind of food they meet whether of animal or plant origin. They are also cannibalistic preying on each other.

Mature female *Lupa pelagica* (Linneaus), carries eggs on its abdomen from January. The number of ovigorous females increases until April, then their number begins to decrease from May, although during the summer months there are few ovigorous females. In other words the breeding season of *Lupa pelagica* (Linneaus) is during the whole year; April being the peak period. This is in coencidence to some extent with what Chhapgar (1959) found in India. He stated "The breeding season of *Neptunus* (*Neptunus*) *pelagicus* Linneaus is irregular at different periods throughout the year". Female ovaries of *L. pelagica* (Linneaus) become well developed and mature in winter.

The complete life-cycle of *L. pelagica* (Linneaus) was studied. There are : a prezoea, 5 zoeal stages and a megalopa stage. They were obtained by hatching and to wing in Attaqa area (Suez Gulf).

The zoeae were obtained by tow-netting in Suez Bay from March till September, 1963 i.e. during the summer months. The surface sea temperatures in the morning were from 25°C to 29°C.

The places from which the zoeae of *Lupa pelagica* (Linneaus) were obtained in Suez Gulf are the following:

(1) Infront Adabiah Port,

(2) From Attaqa Oceanographic Research Centre to El-Adabiah Port,

(3) From Attaqa Research Centre to the Governmental Petroleum Refinery.

The Prezoea :

The first maxillipede bears an exopodite with four setae covered with the embryonic cuticle. The second maxillipede bears an exopodite with four setae. There is a pair of small lateral spines on all except the two anterior abdominal segments. There are two lateral spines on each fork of the telson and three spines on the inner margin of each fork.

The first zoea : is characterised by the presence of four long plumose setae on the exopodite of each of the first and second maxillipedes. In addition to the lateral spines on the 3rd to the 5th abdominal segments of the prezoea, there is a short hooked spine on each side of the second and third segments. The innermost pair of spines present on the inner margin of each fork of the telson, each bears seven hairs on its inner side.

The second zoea : is distinguished from the first by having seven plumose setae on each exopodite of the first and second maxillipedes. The telson has acquired an additional pair of spines between the groups of threes in the forks, making four pairs in all.

The third zoea : is distinguished from the second by the appearance of two buds representing the third maxillipedes and the chela. The exopodite of the first maxillipede has seven long plumose setae, while that of the second maxillipede bears eight long plumose setae.

The fourth zoea : is distinguished from the third by the appearance of buds representing four of the pereiopods. The exopodites of the first and second maxillipedes; each bears eight long plumose setae. The abdomen has acquired an additional segment; there is now six segments and a telson. The pleopods began to appear on the ventral side of the abdominal segments. The telson has acquired an additional pair of very small spines; one on the inner margin of each fork.

The fifth zoea : is characterised from the fourth by the exopodites of the first and second maxillipedes; each bears ten long plumose setae. That of the second maxillipede bears in addition, four somewhat short ones further back. The buds of the third maxillipede and the pereiopods are large, and the chela shows a bifurcation. The buds of the pleopods on the second to fifth abdominal segments have become large and conspicuous. An additional innermost pair of small spines has appeared on the telson, making six pairs in all between the forks.

The megalopa : is characterised by having a rostrum which is conspicuous and projecting straight forward. Two minute spinules are present at the outer extremities of it. There is no cornua on the fifth thoracic segment (contrary to Chhapgar, 1959). The pleopods on the 6th abdominal segment, bear only 8 plumose setae each (Prasad and Tampi (1953), have mentioned 20 setae on all the pleopods and Chhapgar (1959), 12 setae on the pleopods of the sixth abdominal segment).

Although *Lupa pelagica* (Linneaus) is recorded in the Red Sea proper; its fishing exists in Suez Gulf only. It is fished from Suez till El-Sochna on the wes tern side of the Gulf and from Suez to Moussa Springs on the eastern side. It is fished mostly by crab nets and a small percentage by ottertrawls from depths ranging between 1/2 fathoms and 30 or 40 fathoms and by purse-seines from the shore.

Fishing by crab nets is carried out during the warm months of the year.

The fishing season of *Lupa pelagica* (Linneaus) in Suez Bay is during summer.

Concerning the new gears for the development and increase of catch of *Lupa pelagica* (Linneaus); pots or traps were tried in the Red Sea proper for the first time in the area of Al-Ghardaqa. Four models were used. The first model is rectangular in shape. The second is pyramidal, the third is semi-circular and the fourth model is S-shaped. Each trap has two openings in the form of funnels for the animal's enterance. They are on opposite sides of the pot but not opposite each other.

The experiment is still going on to examine the fishing capacity of these different traps and this needs a long time to conclude if these traps can be considered successful, in the Red Sea, or not. The slight indication of good hope is the fishing of *Lupa pelagica* (Linneaus) by the pyramidal pot from the area infront Al-Ghardaqa Oceanographic and Fisheries Research Centre.

The catch of *Lupa pelagica* (Linneaus) can be increased by using the metallic crab pots or traps as they proved to be successful in the Red Sea proper. It can also be increased by the establishment of a close season during April and May; the peak of the breeding season of the species.

CONCLUSIONS

1. *Lupa pelagica* (Linneaus), lives on the sandy or muddy sea bottom near the shore in shallow depths.

2. Like other crustaceans it is nocturnal in habit. The Blue-Swimming Crabs are voracious and scavengers eating whatever kind of food they meet whether of animal or plant origin. They are aslo cannibalistic preying on each other.

3. The breeding season of *Lupa pelagica* (Linneaus) is during the whole year; April being the peak period.

4. The life-cycle of *Lupa pelagica* (Linneaus) consists of a prezoea, 5 zoeal stages and a meagolopa. They are obtained by hatching and by towing in Attaqa area (Suez Gulf). The zoeae were obtained by tow-netting during the summer months.

5. *Lupa pelagica* (Linneaus) is fished from Suez Bay mostly by crab-nets, while a very small percentage is caught by shore-seines and otter-trawls.

6. The fishing season of *Lupa pelagica* (Linneaus) in Suez Bay by crab-nets is during summer.

7. For the development and increase of catch of *Lupa pelagica* (Linneaus) metallic pots are tried in the Red Sea proper, for the first time. Four models are used. The pyramidal pots succeeded to fish *Lupa pelagica* (Linneaus) from the area infront Al-Ghardaqa Oceanographic and Fisheries Research Centre.

8. The catch of *Lupa pelagica* (Linneaus) in Suez Gulf, can be increased by using the metallic crab pots, in addition to crab nets. It can also be increased by the establishment of a close season during April and May; the peak of the breeding season of *Lupa pelagica*.

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