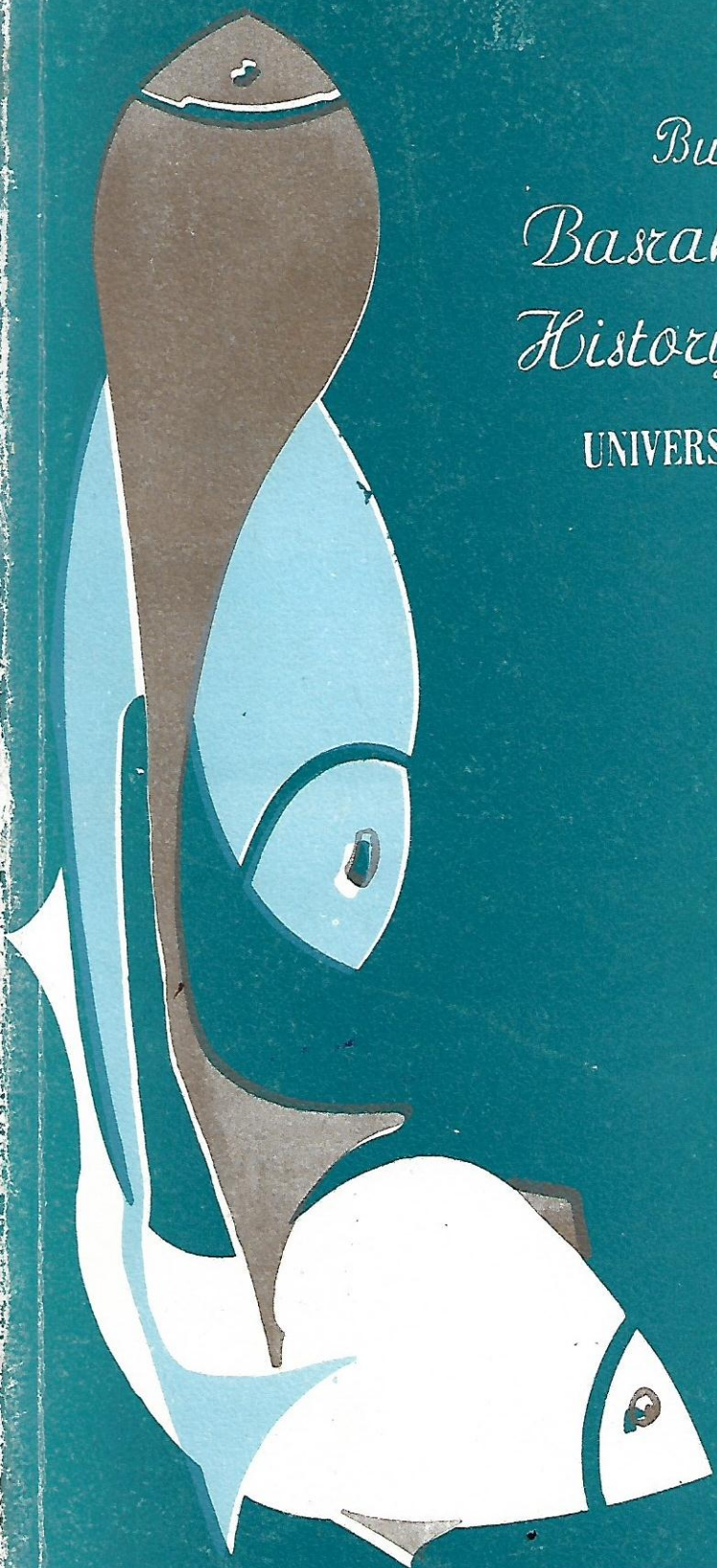

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هيئة تحرير المجلة

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THE EFFECT OF SOME EXPERIMENTAL CONDITIONS ON THE BEHAVIOUR AND SURVIVAL OF THE FRESH WATER SNALL Lymnaea auricularia (L.) FROM BASRAH, IRAQ

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Gastropod snails are medically and economically important group of molluscs as they are hosts for the sporocyst and redia generations of flukes parasitizing man and domestic animals.

Many species of Lymnaeidae are hosts of **Fasciola** (chandler and Read, 1970, smyth, 1976). **Fasciola gigantica** has been reported to be distributed in all areas of Iraq and sheep, goats and buffalos get infected by this parasite (Al- Mashhadani, 1970). **Lymnaea auricularia** (L.) and **Lymnaea truncatula** Muller are intermediate hosts for this parasite (AL- Mashhadani, 1970). very limited studies have been made on this species in this country, particularly on the morphology, ecology of the snails, diseases caused by the parasite **Fasciola** (Al- Mashhadani, 1970) and on the effect of some experimental temperatures on egg laying, hatching and embryonic development of **L. auricularia** (L.) (Ali, 1979).

Although the effects of environmental conditions on the survival rate and behaviour of many organisms have been studied extensively by many workers, for example, the influence of salinity on crabs (Dehnel, 1960, Laird and Haefner, 1976, Davenport, Busschots and Cawthorne, 1980; Sabourin and Stickle, 1980 and Venkachari and Vasantha, 1981) on amphipod (Lockwood, Inman and courtenay, 1973). on cephalopod (squid) (Hendrix, Hulet and Greenberg, 1981). snails (Ahmed and Al- salami 1975 and wells and shumway 1980). Bivalva (shumway and Youngson 1979; stickle and sabourin 1979 and Akberali and Davenport 1981).On the other hand the effect of temperature on development, growth and metabolism of some invertebrate species have been reported by some other workers (Ahmed and Al- Salami 1975; Ahamad chaplin 1979; Fusaro 1980; Vijverberg 1980; Holdich and Tolba 1981 and Navarro, Ortega and Madariaga 1981).

So far no work has been reported to date on the effect of the environmental conditions on behaviour and survival of L. auricularia (L.) However, Hussain and Ahmad (1983) found that the population of this species was twenty times higher in the polluted sample than in the non and they suggested that this could be due to the presence of organic decays which might serve as food for this animal. Therefore the present work deals with the effects of some physico- chemical conditions on the survival rate and behaviour of this species of snail.

MATERIALS AND METHODS

Experimental animals

The species L. auricularia (L.) was collected by dipnet either from the university fish ponds or from the shatt Al- Arab at Tannuma side (Basrah) during April- June. The animals were brought directly to the laboratory in a plastic container provided with sufficient quantity of ambient water (5 liters) and usually kept in this water before being subjected to the experimental conditions the snails were identified as described by Ahmed (1975). shatt Al-Arab water is of known salinity which is 0.6 PPT at the area of collection (Arndt and AL- saadi, 1975). This was taken into account when the salt water was prepared.

Exerimental salinity

The required amounts of salt (Nacl) was weighed by using Metler balance and dissolved in the ambient water. Each jar of one liter capacity contained 500 ml of salt water. Three jars were used for each salinity. The dissolved oxygen was measured using oxygen electrode model (DKK) (General Kagaku co. Japan), before the snails were added. sixteen animals were kept in each container. However, another jar containing the same number of individuals kept with 500 ml of ambient water was used as control. The survival rate was observed over a period of 48 h. The dead animals were immediately removed. The experiments were conducted at temperature of 22 ± 1°c.

Temperature

The experimental temperatures were reached by using water bath (Gallenkamp, England), three jars were used for each temerature, the jars (each contains 500ml of amient water) were left in the bath until the required temperature was reached. Another jar containing the same quantity of ambient water was left at room temperature as control. Dissolved oxygen was measured as described and the animals were added (16 animals/ jar). The survival rate was observed at different periods of exposure during 48h.

Oxygen consumption

Each of Three jars contained the same volume of ambient water as described and the dissolved oxygen was measured at o time. The same number of snails were used in each jar. The reduction in the dissolved oxygen level was measured as PPM at different periods of time during 24 h.as described earlier. The experiment was conducted at temperature of 26 ± 1°c. However, another jar contaning the same volume of ambient water but with no animals was kept at the same temperature was used as control.

Aquatic plant

Two big jars of 2.51 capacity were used each was containing one liter ofg ambient water. To jar A aquatic plants **ceratophyllum demerssum** L. were adde Hoeever no aquatic plants were added to jar B. 16 snails were kept in each jar for 2 weeks. The survival and behaviour of snails were observed.

Results

Table (1) shows the effect of salinity on the survival rate of **L. auricularia (L.)**, during 48 h. It is obvious that this species is unable to live in environments of high salinities (2‰ and above). However lower salinities (below 2‰) showed no effect on the survival of this animal. 12.5% mortality rate was observed after 48 h at 2.2‰. However 100% mortality at different salinities was reached during time of intervals from 48 h to 1 h at salinity range 2.4‰- 5‰ respectively. This indicates that this species is a freshwater animal.

Experimental temperatures (Table 2) within the range of room temperatures (20- 30°C) showed no effect at all on the survival of the animals, they were active and normal during 48 h of experiment. However, as the temperature increased strong temperature stress was observed. The survival time of the animals was reduced. 100% mortality was observed within the

Table 1. Effect of salinity on the Survival of L. auricularia (L.).

Results are expressed as percentage of survival at different periods of exposure under different salinties. Each result is a mean of at least three observations.

Salinity	Time in Hours							
as g/1	0	1	2	3	4	6	24	48
2.0	100	100	100	100	100	100	100	100
2.2	100	100	100	100	100	100	100	87.5
2.4	100	100	100	100	100	100	62.5	0
2.6	100	100	100	100	75	5	-	-
2.8	100	100	100	87.5	50	0	-	-
3.0	100	100	100	62.5	0	-	-	-
4.0 100	75	0	-	-	-	-	-	-
5.0	100	0	-	-	-	-	-	-
Control	100	100	100	100	100	100	100	100

Experiment was conducted during spring, at 22 ± 1°C.

period of 1- 5 h at temperature range of 45°- 35°C respectively. It should be noted that this range of temperature is higher than the ambient temperature, which ranged from 7 to 32°C during 1980-1981 (Hussain and Ahmad, 1981). Therefore it is expected that the animals would not be able to survive at extremely high temperatures (40c and 45°C). It was difficult to maintain water at low temperatures (0°C) at the time of experiment without the non- availability of constant room temperature, therefore these were not included to avoid high experimental errors.

Table (3) shows the oxygen consumed at different periods of exposure. After 24 h the oxygen level in the water was 2.8 ppm) which is in the safe limits, however, most of the snails **Lymnaea** are capable of aerial breathing.
Therefore humidity is more essential for the survival of the animals than the dissolved oxygen.

Aquatic plants showed no effect at all on the survival of animals after 15 days of experiment, no animal was found dead and all animals were normal. However the only differences in the behaviour of the animals which as noted is that the plants provides an ideal aquatic environment for the attachment of the snails. Whilst they were attached to the glass wall of the jar in masses in the case of control group.

Discussion

Salinity is one of the important environmental factors which limits the occurrence of the aquatic components of the fauna (Newell, 1976). Kinne (1963, 1964, 1966) reviewed the importance of salinity in the survival of the aquatic organisms and he summarised the combined effect of temperature and salinity. It is clear that salinity variation alters the metabolic rate

Table 2. Effect of temperature on the survival of L. auricularia (L.) Results are expressed as percentage of survival at different periods of exposure under different temperatures. Each result is a mean of at least three observations.

Temperature	Time in Hours							
	0	1	2	3	4	5	24	48
20°C	100	100	100	100	100	100	100	100
25°C	100	100	100	100	100	100	100	100
30°C	100	100	100	100	100	100	100	100
35°C	100	100	100	100	100	0	-	-
40°C	100	100	100	0	-	-	-	-
Control	100	100	100	100	100	100	100	100

Experiment was conducted during spring,.

Table (3). Oxygen consumption by L. auricularia (L.) Results are expressed as ppm. Each is the mean of at least of at least three observations.

	Time in Hours			
Groups	**0**	**1**	**3**	**24**
A	6.1	5.3	3.8	2.7
B	6.1	5.0	3.6	2.9
Mean	6.1	5.15	3.7	2.8
Control	**6.1**	**5.8**	**5.6**	**5.6**

Experiments were conducted during spring at $26 \pm 1^{\circ}C$.

of most estuarine fauna. It was suggested that the time course of salinity interaction with animals must be considered in determining metabolic responses (Kinne, 1971). our results showed that L. auricularia (L.) is able to tolerate salinity of 2 g/1 which is about three times higher than the ambient salinity. This organism also showed that it had a higher tolerance ability to salinity than the other species Lymnaea truncatula as reported by Al-Mashhadani (1970). This could obviously be due to variations in the environment.

The observed effects of salinity on the survival of the snail might well be due to some disturbances in the physiological behaviours of this animal. For example, wells and shumway (1980) have studied the effect of salts on the haemocynin- oxygen binding in the marine snail Amphibola crenata. They showed that although the dilution of haemolymph increased the oxygen affinity of haemocynin down to 25% seawater the sigmoidal shape of the oxygen equilibrium curve was unchanged. On the other hand increasing the concentrations of various ions (cl^-, So^{-2}_4, Na^+, $Ca^{+2}$and Mg^{+2}) decreased the haemocynins oxygen affinity and augmented a reverse Bohr effect. They suggested that in such environment the reverse Bohr and salt effects might act in opposite directions to stabilise oxygen delivery under conditions of fluctuating salinity.

Other authors also emphasize the effect of salinity on the oxygen consumption by the organisms. Dehnel (1960) found that the oxygen consumption in different salintities is governed by osmotic gradient existing between the medium and the blood and increases with same in intertidal crabs. Davenport et al. (1980) demonstrated that the hermit crab Pagurus bernhardus ceased its ventilation at lower salinities and was unable to survive more

than 3 hrs in fresh water even though it had the ability to survive longer in oxygen free sea water.

Seasonal variations in the effect of salinity on the oxygen consumption ability of the hermit crab **Clibanarius vittatus** was suggested to be related to the seasonal variations in the osmoregulatory ability of the crab (Sabourin and Stickle, 1980). However, it was reported that the increase in oxygen consumption and the difference in the metabolic rate in freshwater crab **Barytelphusa guerini** were both dpendent upon the direction of the chloride gradient than on osmotic gradient (Venkatachari and Vasantha, 1981).

Stickle and Sabourin (1979) found that the respiration rate of both **Mytilus edulis** and **Katherina tunicata** declined as salinity deviated from the control salinity and increased as salinity returned to the controlled salinity.

Therefore, the observed effects of salinity on the survival of **L. auricularia** (L.) could well be dependent on the effect of salinity on its osmoregulatory ability or on its haemocynin-oxygen binding affinity which was found to be affected by salinity change as demostrated by various workers.

Experiments on the effects of temperature on the rate of survival have shown that the higher temperatures, 35°c and above, are lethal to the animals. Although 35°c is slightly higher than upper ambient temperature in summer which is 32°c, the results shows that rise in temperature in this range (32° to 35°c) effectively reduces the suryival time of this species . This may be due to the effect of temperature on the metabolic activities of the organism (Ahmad and Chaplin, 1979). It may also be due to the damage caused by the elevated temperature (Newell, 1976) or due to the effect on the aquatic respiration which showed stronger

dependance on temperature changes in Actinia equina Navarro et al.1981) or could be due to a combination of all these effects. However it has been reported that the upper lethal temperature for other intertidal gastropods is (39.5- 48.6°c) (see newell, 1976). This could be related to the zoogeographical distribution of this species in an area of relatively high temperature and also to the position on the shore in the intertidal zone as described by Newell (1976). However the zoogeographical significance of temperature has been reviewed by Vernberg (1970) who have shown that in general southern affinity species survives at higher temperatures than northerly located species. Similarly in species with overlapping distribution on shore, differences in the thermal tolerance are related to conditions in the microhabitat in which they live.

Newell (1976) pointed out the main problem in the interpretation of the ecological relevancee of the experimental temperatures and he explained that it was due to the following facts. Firstly, the heat- lethal temperatures obtained experimentally appeared to be much higher than environmental temperature which suggested that those might not limit the distribution on the shore. The environmental temperatures or the tissue temperatures on the other hand were not known in details under natural conditions. Secondly, the upper lethal temperature of the animals might be varied in air and water and that the mortality rate of intertidal animals was mostly caused by factors other than environmental and tissue temperatures.

The decrease in the levels of the dissolved oxygen with the increase in the exposure period indicated that this species is capable of utilising dissolved oxygen from the water. The animals also were observed to come to the surface of the water. It

is generally agreed that the snails are able to utilize atmospheric oxygen (air breathers) as they come to the surface of the water and breath in air into the mantle cavity and to expel air bubble (Kaestner 1967, Hickman 1973).

Lymnaea is reported to be strictly air breathing organisms (Hickman, 1973). More recently purchon, 1977 has show that L. **trunclata** is an air- breathing snail whilst other species are truly aquatic and these can breath either air or water. This could be applied to our observations on L. **auricularia** (L.). Therefore the observed mortality under both salinity and temperature was not due to the effect of oxygen leval but may solely be due to temperature and salinity.

The addition of the aquatic plants showed no effect on the survival rate of the animals which means that the quantity of oxygen supplied to the water due to the photosynthesis has no effect whatsoever on the animal which was on the surface capable to breath in fresh air. However, it provides a natural habitat for the attachment of the snails. This species was also observed to be able to resist starvation, no mortality could be observed in the control left for two weeks with out food. Therefore it is concluded that this species is capable to resist the changes in the natural environmental conditions to a limited extent which cannot happen quickly in their natural habitat but it may happen in course of time.

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Summary

The effects of salinity, temperature and the presence of aquatic plants on the survival rate and behaviour of the freshwater gastropod, snail **Lymnaca auricularia** (L.) were studied under laboratory conditions over 48 h period. It was found that the lower salinities (2‰ and below) had no efect on the animal. However, high salinities (above 2‰ to 5‰) showed variations in their effects as lethal salinities. The animal could live only 4, 2, 1 h at 3‰, 4‰, 5‰0 respectively. The results are discussed in relation to the effect of salinity on the oxygen consuption and osmoregulatory ability of the animal. The rate of oxygen consumption was also measured over 24 h period which indicates that this species is not strictly aerial breather. However, the animals exposed to different experimental temperatures show that 35°c and above are fatal to this organism. Aquatic plants have no effects on the survival rate of this snail.

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الخلاصـــة

لقد تمت دراسة تاثيرات الملوحة والحرارة ووجود النباتات المائية على بقاء قوقع المياه العذبة (L.) **Lymnaea auricularia**' تحت الظروف المختبرية لفترة ٤٨ ساعة. فوجد انه ليس هناك تاثيرات للملوحة الواطئة (٠٠٢ر٠ وتحتها) على الحيوانات. فيما اظهرت الملوحة العالية (اكثر من ٠٠٢ر٠ والى ٠٠٥ر٠) اختلافات في تاثيراتها كملوحة قاتلة. فوجد ان الحيوانات تستطيع البقاء فقط لفترة اربعة ساعات وساعتان وساعة واحدة تحت ملوحة ٠٠٣ر٠ و ٠٠٤ر٠ و ٠٠٥ر٠ وبالتناوب. وقد نوقشت النتائج استناداً الى تاثير الملوحة على استهلاك الاوكسجين وقابلية التنظيم الازموزي للحيوان. وقد قيس معدل استهلاك الاوكسجين لفترة ٢٤ ساعة. وقد اظهر ذلك ان هذا النوع ليس من الحيوانات ذات التنفس الهوائي المطلق. اما بالنسبة للحيوانات التي تعرضت لدرجات حرارية مختلفة فقد اظهرت ان درجة حرارة ٣٥ م وما فوقها تكون قاتلة بالنسبة لهذا الكائن. ولم تظهر النباتات المائية اية تاثيرات على معدل بقاء هذا القوقع.

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The presence of Carasobarbus luteus (Heckel, 1843) and Heteropneustes fossilis (Bloch, 1797) in Khor al Zubair, North West of the Arabian Gulf, Basrah, Iraq.

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Khor al Zubair is a north west extension from the Arabian Gulf. The environmental characters of this area indicate a marine habitat. The annual changes in salinity and temperature ranges between 28- 47‰ and 12- 30c respectively.

Recently Khor al Zubair was connected by a waterway, Shatt al Basrah, to the greatest marsh area in the southern part of

Iraq that is Hor al Hammar. The latter, on the other hand is a freshwater environment where the salinity ranges between 1-2‰ annually.

The ichthyofauna of Khor al Zubair area is similar to that of the Arabian Gulf while ichthyofauna of the marsh area is a typical freshwater one and the species of fishes found in it are similar to those found in shatt al Arab, Euphrates and Tigris river with a minor difference in the species composition. The most important fish family found in the freshwater systems in Iraq, including the marsh areas, is the family cyprinidae and less importantly the family Heteropneustidae. The former family comprise over a fourty species and the genus **Barbus** alone contains over ten species. On the other hand, the family Heteropneustidae consists of one genus and species (Al- Daham, 1982).

Carasobarbus luteus (Heckel) was first described by Heckel in 1843 as **Systomus luteus** from Orontes and Tigris. Later this species was described from many localities such as Iraq (Mahdi, 1962; Khalaf, 1961) and Syria (Beckman, 1962). Recently, Karaman (1971) has revised the genus **Barbus** and new generic name, **Carasobarbus**, was assigned to this species.

Heteropneuetes fossilis (Bloch) was first described as **Silurus fossilis** by Bloch in 1797. Later the species was recorded in Iraq as **Heteropneustes fossilis** (Khalaf, 1961) and **Saccobranchus fossilis** (Mahdi, 1962).

Material and Method

Twenty speciemens of **Carasobarbus luteus** and ten speciemens of **Heteropneustes fossilis** were collected by a set net in Khor Al- Zubair area during January, 1985 where the fishes

make their first appearance. The morphometric and meristic characters of the two species were taken as shown in table 1.

Results and Discussion

The morphometric and meristic charactes of **C. luteus** and the **H. fossilis** appeared not differ significantly from those obtained from fishes collected from the marsh area and of the other freshwater systems in Iraq. The other morphological characters of the two species under consideration do not show much varation.

At the present, the two species **C. luteus** and **H. fossilis** are recorded for the first time from Khor al Zubair area. No. previous record for these species has been made from Khor al Zubair area. **C. luteus** observed as an active fish and appeared not affected by the high salinity in the area. On the other hand **H. fossilis** appeared to be moribund and was observed floating on the surface of the water with little movement.

In conclusion we may say that it is quite possible for the freshwater fauna of the marsh area to move acros the new water channel «Basrah river» and reach Khor al Zubair area, when salinity falls under the effect of the freshwater that enters the area during the low tide. Another possibility could happen the other way around in which we may find some marine fish species in the marsh area. The preliminary investigation revealed that some marine fish species have immigrated upstream through the Basrah river and reach the mid and northern extremities of the marsh areas in the last six months of 1985. This might indicate a future major changes to the ichthyofauna of both localities (Khor al Zubair & marsh area).

On a priori grounds it is likely that the freshwater immigrants are widely adaptable species. They should be euryhaline as well as eurythermal.

Acknowledgement

Our sincere thanks are due to Mr. A. Wheeler of British Museum, England for reading the manuscript and for his valuable advice and suggessions.

Table 1. The average morphometric and meristic measurements of **C. luteus** and **H. fossilis** taken from Khor al- Zubair area.

Morphometric characters	**C. luteus**	**H. fossili**
Total length	18.76	15.70
Standard length	13.99	14.00
Head length	3.50	2.50
Predorsal fin length	6.58	4.80
Postdorsal fin length	10.40	5.00
Prepectoral fin length	3.61	-
Preanal fin length	7.84	5.8
Preanus length	11.78	5.3
Body depth at the pectoral	3.90	2.20
Body depth at the anal	3.01	2.70
Caudal peduncle length	2.17	
Caudal peduncle depth	1.91	1.10
Meristic characters		
Dorsal fin- ray count	10.00	6.00
Pectoral fin- ray count	14.00	6.00
Anal fin- ray count	7.00	

Summary

Carasobarbus luteus and **Heteropneustes fossilis** were recorded for the first time from Khor al Zubair area, North West of the Arabian Gulf. Their presence in this area is unexpected since they are a purely freshwater species. The causes for finding those species in such an area are discussed.

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الخلاصة

لقد تم تسجيل لأسماك الحمري وأبو الحكم وهي من الأسماك النهرية في منطقة خور الزبير، شمال غرب الخليج العربي بالقرب من مدينة البصرة. ولما كانت تواجد مثل هذه الأسماك في المنطقة المذكورة غير متوقع عليه فقد تم مناقشة الأسباب التي دفعت بهذه الأسماك للتواجد في مثل هذه البيئة.

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New record for some Arab Gulf fishes in the freshwater systems of Iraq

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During 1984 four speciemens of **Thryssa hamiltonii** (Gray, 1835) and **strongylurus strongylurus** (Van Hasselt, 1823) were captured by a fisherman in the river Euphrates, south of Nasiria province, Iraq apprpximately 180 km north of Basrsh city. In addition two other species were caught in the lower reaches of Tigris river **Bathygobius fuscus** (Ruppell, 1828) (one speciemen) and

Euryglossa orientalis (Bloch & Scheider, 1801) (one specimen). They were subsequently debosited in the Marine Science Centre, Basrah, Iraq for preservation.

Identification

Thryssa hamiltonii (Gray, 1835)

Body oblong, compressed; abdomen keeled, serrated. Dorsal profile convex, convex, ventral more or less horizontal up to anal. Eyes with adipose lid. Upper jaw promissent. Cleft of mouth oblique; maxilla extending beyond gill opening. Teeth uniserial in jaws, smaler and in narrow band on palatine, non on vomer. A single dorsal fin; origin nearer to snout end than to caudal origin pectorals low, equal to head. pelvic is small. Anal moderate. caudal deeply forked, equal to head. No lateral line. A list of morphometric and meristic data for the speciemen is presented in Table 1.

Other species of the genus **Thryssa** may occur in the lower reaches of Tigris and Euphrates and as it is most likely to be confused with T. **mystex**. The followingk ey to species that may found in the area is included.

1- Maxillary reaching pectoral base; abdominal scutes 25-27, the immaginary line of the snout pass through the middle of the eye ..... **Thryssa mystex**

2- Maxilla nearly reach base of pectoral fin, the immaginary line of the snout pass over the upper edge of the eye ..... **T.hamiltonii**

3- Maxilla long, to pectoral base or beyond 4

4- Anal with 43-49, dorsal with 12-14 rays; mouth oblique; pre-pelvic scutes 14-17 ..... **T. Purava**

strongylurus strongylurus (Van Hasselt, 1823)

Body elongated. Upper and lower jaws greatly elongated and a sharp teeth found on their margin; gill rakers absent. No spines in fins; anterior parts of dorsal and fins forming moderate lobes; pectoral fins not falcate. Caudal peduncle without lateral keels; caudal fin rounded or truncate, not emarginate or forked. Bases of dorsal and anal fins covered with scales.
colour: grenish above; silvery laterally, white ventrally. Some pigmentation are found on the dorsal and anal fins along middle of the rays. The black spot at base of the caudal fin the number of dorsal fin rays (12 to 15) make this species distinct from the remaining species of the genus **Strongylurus** (**S. leiura** and **s. incis**). Morphometric and meristic data for the speciemen are presented in Table II.

Bathygobius fuscus (Rupprll, 1828)

Body elongated, cylindrical anteriorly and compressed posteriorly. Head compressed. profile convex. snout obtuse, tip before lower margin of eye. Anterior nostril in a short tube. lips thick. Jaws subequal. Maxillary extends to below posterior part of eye, or not so far. Teeth in several rows; in upper jaw outter row enlarged. Tongue more or les bilobate. Scales of head, nape, breast and belly cycloid, on rest of body ctenoid. First dorsal fin lower than body pointed posteriorly. Anal fin shorter than second dorsal, pectoral fin rounded. Ventral fin obtusely rounded, caudal fin obtuse. The body proportions and the meristic date are shown in Table III.

Euryglossa orientalis (Bloch & Schneider, 1801)

Body flat and oval, both contours equally arched. Eyes on the right side separated by a rather wide scaly interspace. Cleft of

mouth extending to below middle of eye or not quite as far; lower lip feebly fringed. Two tubular nostrils on occular side in front of lower eye. Dorsal and anal fins joined to caudal fin; pectoral fin well developed, that on blind side somewhat shorter than that on eyed side; pelvic fins moderately Symmetrical, united basally. Scales on both sides ctenoid. This species may be distinguished from **Brachirus aspilos**, Bluker (**B. heterolepis**, Bluker) by the ctenoid scales on the blind side (Norman, 1910). A list of morphometric and meristic data for the speciemen is presented in Table IV.

Discussion

The natural range of the Arab Gulf fishes is restricted to the northern reaches of the Shat al Arab river and their presence northward to the Qarmat Ali which markes the junction of the two great rivers (Tigris & Euphrates) demonstrates their ability to penetrates the saline reaches of the rivers of lower Mesoptamia.

Recently AL- Hassan & Hussain (1985) have recorded the presence of some Arab Gulf fishes in the water of shatt al Arab. **Euryplossa orientalis** was included among the list of species from lower reaches of shatt al Arab river near Hamdan village close to Abu al-khasib city. The remaining three species under investigation were not on the list of Al- Hassan & Hussain (1985).

The works of Mahdi (1962) and khalaf (1961) were considered as the only work on the fish fauna of Tigris & Euphrates rivers and neither show the presence of any Arab Gulf fishes

During the last ten years a new channel (shatt al Basrah) was dug to join the greater marsh area of the southern Iraq with the North west head of the Arab Gulf (khor al - zubair). So there is now a possibility for fish to swim across the channel and enter

either the Euphrates orTigris which can tolerate low salinity. As far as the reasons behind their presence is concerned. This is the only explanation that can be given for their presence.

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Summary

The occurence in the Tigris and Euphrates rivers of a speciemens of **Thryssa hamiltonii** (Gray, 1835), **Strongylurus strongylurus** (Van Hasselt, 1823), **Bathygobius fuscus** (Ruppell, 1828) and **Euryglossa orientalis** (Bloch &Schneider, 1801) a fishes which are native to the Arab Gulf, is described. Some possible explanations were investigted.

الخلاصة

لقد تم تسجيل اربعة انواع من أسماك الخليج العربي في المياه الداخلية العراقية وقد وصفت وتم اعطاء بعض التعليلات حول تواجدها في المياه العذبة .

Table I. Morphometric and meristic data for

Thryssa hamiltonii (Gray, 1845)

Morphometric characters

Total length = 13.2 cm
standard length = 10.5 cm
pre orbital length = 0.4 cm
Head length = 2.2 cm
Inter orbital length = 0.7 cm
Eye diameter = 1.1 cm
pre pectoral length = 2.1 cm
post orbital length = 1.1 cm
pre dorsal length = 5.1 cm
post dorsal length = 6.0 cm
pre pelvic length = 3.7 cm
pre pelvic length = 5.7 cm
pre anus length = 5.3 cm

Meristic characters

Dorsal fin ray = 12
Pectoral fin ray = 13 + 13
Pelvic fin ray = 7 + 7
Anal fin ray = 42
Abdomenal Scuts = 26

Table II. Morphometric & Meristic data for
Strongylurus strongylurus (Van Hasselt, 1823).

Morphometric characters

Total length = 34.9 cm
standard length = 31.2 cm
Pre orbital length = 7.2 cm
Head length = 10.7 cm
Head width = 1.3 cm
Inter orbital length = 1.0 cm
Eye diameter = 0.9 cm
Post orbital length = 2.5 cm
Pre pectoral length = 11.2 cm
Pre dorsal length = 25.5 cm
Post dorsal length = 29.4 cm
Pre pelvic length = 19.3 cm
Pre anal length = 24.5 cm
pre anus length = 23.8 cm

Meristic characters

Dorsal fin ray = 15
Pectoral fine ray = 11 + 11
pelvic fin = 6
Anal fin ray = 17

Table III. Morphometric & Meristic characters of **Bathygobius fuscus** (Ruppell, 1828)

Morphometric characters

Total length = 50.65 cm
Standard length = 40.60 cm
Pre dorsal 2 length = 22.40 cm
Pre dorsal I length = 14.40 cm
Head length = 11.40 cm
Pre ventral = 12.50 cm
Pelvic origin = 11.35 cm
Pre anal length = 23.10 cm
Pre anus length = 25.05 cm
Caudal length = 9.75 cm
Body depth at pelvic fin = 7.10 cm
Body depth at Anal fin = 7.05 cm

Meristic characters

Dorsal fin 1 = VI
Dorsal fin 2 = 1.9
Anal fine = 1.8
Pectoral fine = 19

Table IV. Morphometric & Meristic characters of *Eurygenys orientalis* (Bloch & Schneider, 1801).

Morphometric characters

Total length = 13.0 cm
Standard length = 11.2 cm
Head length = 2.4 cm
Pre orbital orbital = 0.7 cm
Post orbital length = 1.3 cm
Pre pectoral length = 2.6 cm
Pre pelvic length = 2.3 cm

Meristic characters

Dorsal fine rays = 65
Pectoral fin rays = 8
Anal fin rays = 52
Caudal fin rays = 16

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A COMPARATIVE STUDY ON THE PHYTOPLANKTON OF THE SHATT AL-ARAB ESTUARY UP AND DOWNSTREAM BASRAH CITY CENTRE, IRAQ

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The phytoplankton are the major primary producers in many aquatic environments especially the estuaries. The Shatt al-Arab estuary is the only source of water supply to the city of Basrah of about one million inhabitants. It receives the untreated sewage of the city by many canals. Several studies have been made on the composition, distribution and ecology of phytoplankton in the Shatt al-Arab (Kell & Saad. 1975; Saad & Kell, 1975; Huq et al. 1978; Al-saadi et al. 1979 and 1981; Schiewer et al 1982; Hameed et al. 1982, Hadi et al. 1984). Few studies were also made on the limnology, primary productivity, phytoplankton composition and pollution status in some of the major sewage- discharging canal of Basrah city (Sarker et al. 1980; Al-Issa 1981; Al- Saadi and Antoine 1981; Antoine and Al-Saadi 1982, Antoine 1983). The effect of sewage input of Basrah city on the phytoplankton of the Shatt al- Arab has received little attention. The present study was planned to show the effect of the sewage input of Basrah city centre on

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phytoplankton composition of the Shatt al- Arab estuary. Enrichement of water samples of the Shatt al- Arab with the major nutrients and its effect on the phytoplankton composition was also included as a preliminary attempts on the assesment of the factors likely to be limiting the growth of phytoplankton in the estuary.

Materials and Methods

The study area

The Shatt al- Arab is the most important source of water in the arid surroundings of southern Iraq. Several hundreds canal empty into the Shatt al- Arab from its origin at Garmat Ali upstream of Basrah city to its end in the Arab Gulf. Most of the domestic sewage and industrial effluents are disposed into the estuary by four highly polluted canals namely Al- Rabat, Al-Khandak, AL- Ashar and Al- Khora (Fig. 1). Two stations were selected up and downstream of Basrah city centre. Station I was located about 2Km upstream of city centre and station II was located about 2Km downstream of the city centre. The distance between the two stations is about 5Km. The water level in the Shatt al- Arab is affected by a semi- diurnal tides of the Arab Gulf with an average range of about 1.7m. The mean current velocity is about 0.8ms^{-1} and the water discharge range between 300- 2500 ms^{-1} during low flood period (september to December) and between 2600- 6000 ms^{-1} during high flood period (March to May) (Al- Saadi and Antoine 1981).

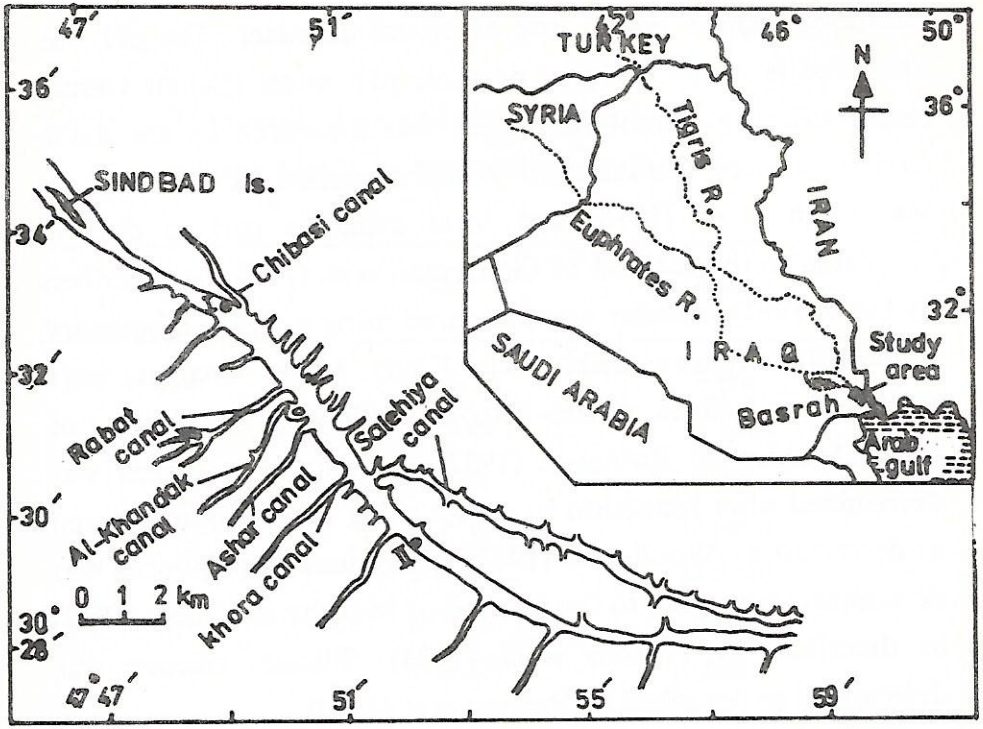

Fig 1, The study area showing the selected stations, I upstream and II downstream Basrah City Centre, Iraq.

Air and water temperatures were measured in situ using a thermometer accurate to the nearst 0. 1°C. Light penetration was estimated using a Secchi disc of 30 cm diameter. The pH was measured in situ by a digital portable pH- meter (Schatt Gerate model CG817). Dissolved oxygen was measured by the azide modification of the standard Winkler method as described by Mackereth et al. (1978) and total available carbon dioxide according to the method of Golterman et al. (1978) as described by Hadi (1981). Salinity was measured using a digital laboratory salinometer (Tsuruni Seiki model E202). Major nutrients were measured as follows, nitrite- nitrogen following the method of Bendschneider ad Robinson (1952) and nitrate- nitrogen was determined after reduction to nitrite using a cademium column as described by Wood et al. (1967). Phosphate- phosphorus was determined according to the method of Murphy and Riely (1962) as described by Parsons et al. (1984). Silicate- silicone was determined as described by Parsons et al. (1984).

Water Samples used for the study of phytoplankton were collected from both stations. Seven wates samples were collected from each station at selected levels of tide (Table 1). Phyto-plankton counting and identification were made as described by Hadi (1981). Entrichment of water samples with the major nutrients was made. The nutrients studied were PO_4- P, NO_3-N and SiO_3-Si; which were added at a rate of 5,50 and 200 umol l^{-1}, respectively. Water samples were taken into Erlenmyer flasks (ca 3 litres). After enrichment; flasks were placed in an illuminated cabinet (6000 lux) at 20 ± 2^0 C. They were shaken and randomized three times a day. Experiment was terminated five days from inoculation. At the end of the experiment;

Table 1: Tide level, date and time selected for the collection of water samples from the stations studied.

tide level	date	time
Low	28- 2- 85	4 pm
high	2- 3-85	8 am
	3-3-85	8 am
Initial low	2- 3- 85	12 noon
	3- 3- 85	12 noon
low	2- 3- 85	4 pm
	3- 3- 85	4pm

phytoplankton counting and identification were made as described previously.

Results and discussion

Ecological conditions

The results of the ecological conditions of the Shatt al-Arab estuary in the two stations studied are shown in Table 2. The results are within the range of the previous studies (Hameed 1977, Al- Saadi et al. 1976; Maulood et al. 1979; Al- Saadi and Antoine, 1982; Antoine 1983; Al- Asadi 1983). Little variation can be seen between the two stations. Several investigators have found that the Shatt al- Arab estuary is a well mixed ecosystem (Mohammed 1965; Hameed 1977). Other investigators have found that sewage input of Basrah city by one or two of the canals is slight and masked by the dilution and tidal effect (Antoine and Shihab 1977; Al- Saadi et al. 1979; Al- Saadi and Antoine 1981; Antoine and Al- Saadi 1982; Saad and Antoine 1983; Al- Asadi 1983).

Phytoplankton composition

A total of sixty- seven taxa were identified in both stations (Table 3). The number of taxa in station I (58) is higher than that of station II (52). The species diversity indices at the stations studied determined by Shannon's formula as described by Wetzel (1983) showed that the species diversity at station I (2.88) is also higher than the species diversity at station II (2.58). Much higher numbers of phytoplankton taxa were recorded in the stations upstream of Basrah city (Saad and kell 1975; Pankow et al. 1979; Maulood et al. 1981; Al- Saadi et al. 1981; Al- Zubaidy, 1985).

Table 2. Ecological conditions of the Shatt al- Arab estuary at stations studied (Values are mean of seven replicates)

	Station			
	Mean	95% condfidence	Mean	95% confidence
Temperature (^{0}C)				
air	12.23	9.39- 15.07	12.56	10.04- 15.08
Water	12.14	11.89- 12.39	12.24	12.05- 12.43
Secchi dise readings (cm)	79.29	73.67- 84.91	85.14	79.01- 91.27
pH*		7.87- 8.29		8. 10. 8.23
salinity (‰)	1.51	1.48- 1.54	1.51	1.49- 1.53
Dissolved oxygen (mgl^{-1})	9.59	9.43- 9.75	9.55	9.43- 9.67
Percent O_2 saturation (%)	89.31	87.70- 90.92	89.07	87.93- 90.21
Total available Co_2 (mgl^{-1})	220.74	216.27- 225.21	220.73	214.34- 227.12
No_2-N ugat l^{-1}	0.11	0.091- 0.13	0.11	0.082-0.14
NO_3- N ugat l^{-1}	6.53	5.96- 7.10	6.67	6.29- 7.05
PO_4- P ugat l^{-1}	0.32	0.26- 0.39	0.49	0.34- 0.64-
Sio_3- Si ugat l^{-1}	92.45	87.17- 97.73	92.26	87.86- 96.66

* Range of seven replicates, no mean was calculated because the values are log data.

Table 3. Phytoplankton taxa identified in the Shatt al- Arab estuary up and downstream of Basrah City center with their saprobic indecies. (a = ∝- mesosaprobic, b = ß-mesosaprobic, O = oligosaprobic. x = xer osaprobic, + = <100 cell ml^{-1} + + => 100 <500 cell ml^{-1}, + + + => 500 <1000 cell ml^{-1}, - = not recorded).

Taxa	Station 1	Station 11	Saprobic index
Cyanophyta			
Anabaena sp.	+	+	
Oscillatoria sp	+	+	b
Spirulina platensis	+	+ +	
Chrysophyta			
Bacillariophyceae (Centrales)			
Chaetoceros sp.	+	+ +	
Coscinodiscus sp.	+	+	x- b
Cyclotella meneghiniana	+	+ +	b- a
C. striata	+	+	
Cyclotella sp.	+	+ +	
Melosira italica	+ +	+	O-b
Stepanodiscus sp.	+	+	
Thalassiosira fluviatilis	+	+	
Bacillariophyceae (Pennales)			
Achnanthes lanceolata var. rostata	+ +	+	x- b
A. minutissima	+ +	+ + +	O- b
Amphipleura pellucida	+	+ +	
Amphiprora alata	+	+	b

Amphora sp.	+	+	x- o
Anomoeoneis exilis		+	x- a
Bacillaria paradoxa	+	+ +	b
Cocconeis placentula var. euglypta	+	+ +	b
Cylindrotheca gracilis	+	+ +	
Cymatopleura solea	+	-	b- a
Cymbella affinis	+	+	o- b
C. microcephala	+ +	+ +	
C. turgida	+	+	
Denticula rainierensis	+	-	
Diatoma tenue var. elongatum	+ +	-	
Diploneis ovalis var. oblongella	-	+	b
Epithemia zebra	+	-	o- b
Fragilaria pinnata	+	-	
Fragilaria sp.	+ +	+ +	
Gomphonema gracile	-	+	
Gomphonema sp.	+	-	
Navicula buccela	+	-	
N. cincta	+	-	b- a
N. cuspidata	-	+ +	b- a
N. inflata	-	+	
N. punctata var. coarctata	+	-	
N. pygmaea	-	+ +	a
N. radiosa	+	+	o- b
N. radiosa var. tenella	+	-	x- o
N. spicula	+	+	b- a
N. viridula var. rostellata	+	-	
Navicula sp.	+ +	+ + +	
Nitzschia acicularis	+ +	+ +	a

N. amphibia	+ +	-	
N. apiculata	+	+ +	a
N. closterium	+	+ +	
N. gracilis	-	+	
N. granulata	+	-	
N. hungarica	-	+	a
N. kuetzingiana	+ +	+	b
N. longissimia	+	+ +	
N. palea	-	+	
N. punctata var. coarctata	+ +	+	
Nitzschia sp.	+ + +	+ + +	
Pleurosigma delicatulum	+	+	
Surirella sp.	+ +	-	b
Synedra acus var. radians	+	+	b
S. fasciculata	+ +	+	
S. ulna	+	+	b
Synedra sp.	+ +	+ +	
Chlorophyta			
Chladophora glomerata	+	+ + +	b
Chlamydomonas sp.	+	+	
Scenedesmus quadricauda	+	+	b
Spirogyra sp.	+	+	c- a
Ulothrix sp.	+	+	c- b

However thirteen taxa were present in station II in number higher than in station I. This may be due to the input of the canals which are characterized by a high number of phytoplankton (Hameed 1977; Al- Saadi and Antoine 1981; Antoine and Al- Saadi 1982; Antoine 1983; Saad and Antoine 1983). The phytoplankton taxa of the two stations were dominated by diatoms. Similar results were found by others (Kell and Saad 1975; Huq et al. 1978; Al- Saadi et al. 1979; Al- Saadi and Antoine 1981). Attempt was made for the distribution and abundance of the taxa in the two stations according to the saprobic index. The indecies of Sladecek (1973) as cited by Hadi (1981) for freshwater algae and of Al- Saadi et al. (1979) were followed. five taxa belong to - mesosaprobic group; 11 ß-mesosaprobic group; the rest range between xenosaprobic and - mesosaprobic groups. Hameed (1977) reported 26 taxa of the phytoplankton in the Shatt al- Arab estuary as a ß- mesosaprobic indicators. In the present study 4 out of 5 taxa of - mesosaprobic group are present in station II in a number higher than their number in station I. Application of F- test as described by Elliot (1977) showed that the differences are highly significant (F = 9.39 at 0.01 level of probability). As was mentioned earlier this may be due to the effect of the sewage- input of Basrah city.

Enrichment study

Addition of selected nutrients to samples of water from any ecosystem and following the response of its phytoplankton community is one of the several approaches for the assessment of the growth- limiting nutrient (Goldman 1961; Healey 1973 and 1978). Unfortunately, no previous attempt was made for the assessment of the growth- limiting nutrients in the Shatt al- Arab

or any other Iraqi ecosystems. Almost all of the previous studies on the Shatt al- Arab were based on the water chemistry for the assessments of its trophic conditions (Antoine and Shihab 1977; Maulood et al. 1979; Al- Saadi and Antoine 1981; Al- Issa 1981; Antoine and Al- Saadi 1982; Antoine 1983). The data are highly variable (Talling 1980; Al-Asadi 1983). However, Hameed (1977) and Al- Saadi et al. (1979) have used the saprobic indices as indicators of the trophic condition of the Shatt al- Arab. They came to conclusion that the presence of phytoplankton taxa of high saprobic index in the Shatt al- Arab complicated its trophic condition. They have attributed the presence of these taxa to the effect of sewage- discharging canals of Basrah city. In the present study an attempt was made for the determination of the nutrients likely to be limiting for the growth of phytoplankton in the Shatt al- Arab. The results showed that severval taxa responded positively for the nutrients added (Table 4). However, the response was obvious for some taxa (e.g. **Cyclotella spp.**) in samples enriched with a combination of nitrogen and phosphorus. On the other hand, most of the taxa of the station I responded more than those of station II. This may indicate that nitrogen and phosphorus are likely to be the nutrients limiting the growth of phytoplankton in the Shatt al- Arab. It may also indicate that the phytoplankton in the Shatt al- Arab estuary upstream Basrah city suffer more than those of downstream. Further studies are required to clearify this point.

Table 4. Effect of addition of major nutrients on phytoplankton taxa of the Statt al-Arab up and downstream Basrah City Centre. (+ = <100 cell ml^{-1}, ++ = >100<500 cell ml^{-1}; +++ = >500<1000 cell ml^{-1}; ++++ = >1000 cell ml^{-1}).

Taxa	Inoculum		Control		Treatment									
					+N		+P		+N+P		+Si	
	Station		Station		Station		Station		Station		Station	
	I	II	I	II	I	II	I	II	I	II	I	II
Cyanophyta												
Oscillatoria sp.	+	+	+	+	++	++	+	+	++	+++	+	++
Spirulina platensis	+	++	+	++	+	+++	+	+	++	+++	+	++
Chrysophyta												
Bacillariophyceae (centrales)												
Chaetoceros sp.	+	++	+	++	+	++	++	+	+	++	+	++
Cyclotella meneghiniana	+	+++	+++	++++	++++	++++	++++	++++	+	++	+	++
Kuetz.												
C. Striata	+	+	+	+	+	++	+++	+	++++	++++	+++++	++
Cyclotella sp.	++	+++	++++	++++	++++	++++	++++	++++	++++	++++	++++	++
Bacillariophyceae (Pennales)												
Achnanthes minutissima	++	+	++	++	+	+	+	+	+	+	+++	+
Denticula rainierensis Sov.	+	+	+	+	+	++	+++	+	++	+	+	+
Diatoma tenue var. elongatum	+	+	+++	+	+	+++	+++	++	++	++	++++	++
Fragilaria sp.	++	+	++	+	++++	+	++++	+	+	+	+	++
Navicula acicularis W. Sm.	+	+	+++	+	+	++	+++	+	++++	+++	++++	++
N. apiculata	+	+	+	+	+	++	++++	+	+++	+	+	+
N. hungarica	+	+	+	+	+	++	+	++	+	++	+	+
N. kuetzingiana Hisle	+	+	+	++	+	+	+	++	+	++	+	+
N. longissima (Breb) Ralfs	+	+	+	++	+	+	+++	+	++++	+	+	+
N. palea	+	+	+	+	+	++	+++	+	++++	+	+	++
N. punctata var coarctata	+	+	+	++	+	+	++	+	+	+++	+	+
Grun												
Navicula sp.	+	+	+	+	+	+	++	+	+	+	+	+
Nitzschia sp.	++	+++	++++	+++	+++	++	+	+++	+	++++	++++	+
Syndra acus var. radians	+	+	+++	+	+	++	+++	++	+	+++	++++	+
S. fasciculsta	+	+	+	+	+	++	++	+	++++	++	+++	++
S. ulna (Nitz.) Ehr.	+	+	++	+	+	++	++++	+	+++	+	+	++
Synedra sp.	+	+	+++	+++	+	+	+	+	+	+	+	+
Chlorophyta												
Cladophora glomerata	+	++	+	++	+	++++	+	+++	+	++++	+	+
Scenedesmus quadti ciauda	+	+	+	+	+	++	+	+	+	++	+	+

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Summary

Two stations were selected in the Shatt al- Arab estuary, up and downstream Basrah city centre. Seven water samples were collected from each station at selected tide levels. The number of phytoplankton taxa in the Shatt al- Arab was higher in the station upstream Basrah city centre compared with downstream station. The number of - mesosaprobic taxa showed a reverse pattern of distribution. The enrichment of water samples with the major nutrients indicates that the phytoplankton of the Shatt al- Arab is likely to suffer from the deficiency of nitrogen and phosphorus in upstream station morethan the downstream one.

« الملخص »

تمت دراسة مقارنة للهائمات النباتية في محطتين في مصب شط العرب اعلى واسفل مركز مدينة البصرة. جمعت سبع عينات من الماء من كل محطة في مستويات مختارة من المد. وجد ان عدد الهائمات النباتية في المحطة العليا اكثر من عددها في المحطة انسفلى وكذلك الحال بالنسبة الى تنوع الانواع في حين اظهر عدد الهائمات من مجموعة mesosaprobic - ∝ نتيجة معاكسة في التوزيع. وظهر من اغناء عينات الماء بالمغذيات الرئيسة ان الهائمات النباتية في شط العرب قد تعاني من نقص في النتروجين والفسفور في المحطة العليا اكثر منه في المحطة السفلى.

THE OBSERVATION OF BIRD DURING THE AUTUMN MIGRATION IN THE VICINITY OFBASRAH CITY IRAQ

by

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The bird study in Iraq and the Arabian countries depends, for a long time, on those studies done by amateurs and some researches such as Shape (1886), Meinerzhagen (1914), Thornhill (1918), Ticehurst et al. (1922) and Ticehurst (1927). During the fiftees, Allouse (1953, 1957) shows mnch attention to the Iraqi birds when he pnblished his book «Birds of Iraq». In that book he put the principles for a future studies. Latter on few workers take the lead in bird study in Iraq, (Kainady 1976, Kainady and Al-Dabbagh 1976, Kainady and Al-Joborae and Atti 1977), but unfortunately, the study is still at its starting stages. The present study presents an additional information to those already at hand in Iraq.

Study area:

The observation area is located among differrnt geographicl environments; desert, marshes, swamps, riverine and date-palm roves. Each environment has its own birds species which live, migrate to or pass on.

The preliminary investigations pointed out that these environments encourage the birds to live in temporarily or permanently. the encoursgements are represented by plant roots, shcells (snails), reeds, Papyruses, other aquatic vegetations and water surfaces, which have a lot of small fish and water insects. Moreover, these water surfaces are prehibited against the hunters and fishers. The factors above make these environment safe for the birds. Therefore, it is argent to study the birds from the point riew of species, numbers, movements in this area.

Methods

Four trips a week have carried out by special car. Two of them at the morning- an hour before sunrise even two hours after and the other at the evening two hours before sunset. The total of 276 hour have carried out regularly during the period from 10.7.86 to 10.12-86.

Birds have been observed carefully by eye and field glass in order to be classified, accounted, and to know their movements. Therefore, the Auther had to hunt some samples from them for further investigations on their species. These samples have classified and studied in the Basrah Natural History Museum and showed, but some of them have rare skins. The samples have kept in the Museum. Also, the bird environment have photographed. The study area (figl) have been divided into four sections as follows:-

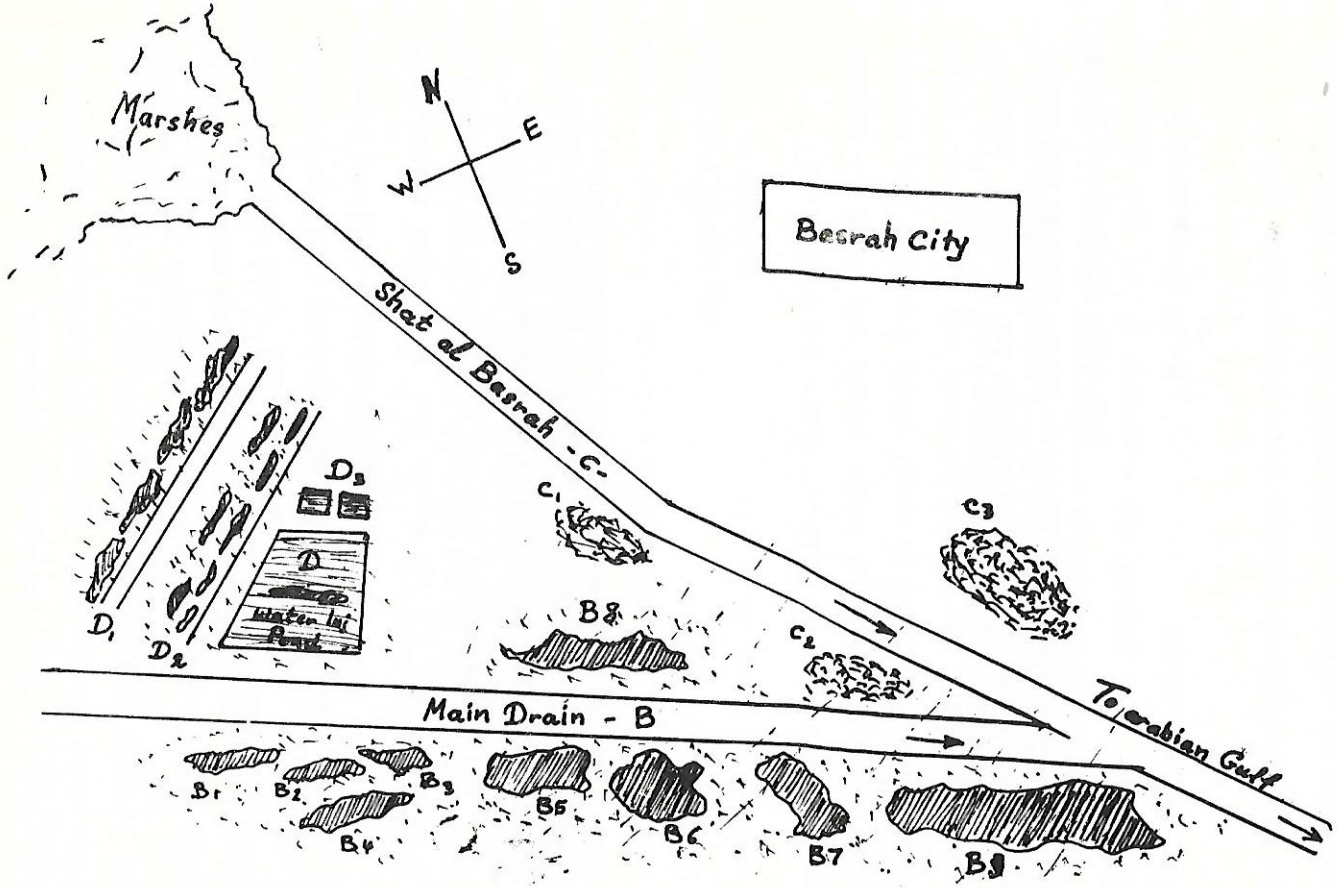
Semi-desert area(A): It has shape of 12 Km^2, Nearly dense vegetations are separated in this area particularly in the shallow depressions which filled by water after the rainfall. These depressions are formed ponds which attract some birds.

M.O.D. CANAL(B):

The main drain which is called the third river has constructed to drain the excess water from the Irrigated landsin central and southern water flows in this drain it expands the water surfaces in the areas as well as the shallow ponds and swamps, between the semi-desert and the main drain. These ponds and swamps withdrew several hundreds of the water birds. These ponds are as following:-

1- Swamp group (B_1-B_4)

Very shallow and saline swamps located adjacent to the M.O.D. canal. they are dried during summer, no vegeatations


Marshes
N
E
W
S
Basrah City
Shat al Basrah - C -
C1
C3
C2
B8
D3
D
water lay
pond
D1
D2
Main Drain - B
To Arabian Gulf
B1
B2
B3
B4
B5
B6
B7
B9

Semi desert

2- Ponds group (B_5,B_6)

These are larger and deeper than the above. The water remains for a long tine., it has mudy Button and it formed through the diging activties of the M. O. D. canal, rain and flew water from the semi-desert. This ponds serve as a overneight places for several bird spieces.

3- Swamp group (B_7,B_9)

Periodical swamps, they have large shallow surface, dried in summer and fill with rainy water soon. In winter attracts many Gulls.

SHAT-Al-BASRAH (C):

This river connects between the Hammar marsh and Khor Al-Zubair (Arabian Gulf). It attracts some water birds. It has been noted that some garbage dumping areas (C1-C3) which attract hundreds of Black kits from these areas these birds move to the surroundings areas.

2- Water injection pond (D):-

The reserve water areas of the industrial facility located northeast of the area and lies within the critical area

The Pond has surface dimensions of 110 m × 90 m having a depth of 50 to 150 cm, which has atendency toward eutrophy, it must be considersd as attractive area to water birds.

The pond is separated into two water surfaces segments by means of a dam, so that two water surfaces of appr, 700 × 900 ha and 500 m × 900 ha are created. The dam has no connection to the land. This water surface attracts thousend of Birds (Furbeth 1985).

ANNEXED PONDS

Ponds Group (D1):-

these are large deep and saline adjacent to the main road, they are surrounded by vegetations, dried in summer. In winter attracts some wade birds for long period.

Swamps Group (D2):-

they are located adjacent to the main pond. These are shallow and saline. They are sustained by seepage and leakage water from the main pond and from the rain. They are dried during summer.

Ponds Group (D3):-

Two large water surfaces, supplied with water by pumps. They are shallow, therefor, vegetations are grow such as reeds, popyruses. Thus it is suitable for wade birds.

Bird Control

1. Little Grebe Podiceps ruficollis (Pallas).

Winter visitor and is reported by Gumming (Sharpe 1886) in the Fao area as arriving in September and leaving in February. In winter it spreads out to the rivers and swamps where it is not usually found during the breeding seaon.

Through the bird control in Basrah area it was noted as following:-

21/July (25 Burid), 22/7(50), 24/7(100), 27/7(40), 31/7(6), 1/August (20), 4/8(30), 24/8(100), 25/(65), 4/September(15) ,9/9(25, 10/9(100, 14/9(120, 21/9(100),24/(150), 1/October(30), 2/10(20), 8/10(40), 13/10(50), 15/10(150), 19/10(30), 22/10(30) 23/10(15), 28/10(6), 29/10(100), 3/November(50), 9/11(100) 12/11(50), 18/11(100), 20/11(50), 30/11(30) 1/December(50), 3/12(30), 10/12(20)

2. Black-necked Grebe:- – Podiceps n. nigricollis Brehm.

Resident in small numbers, breeding in the marshes, in winter it spreads out to the rivers (Allouse, 1953)24/8(3) 31/7(5) 24/8(8) 8/10(3 15/10/(3) 12/11(7) 1/12(15) 3/12(4).

3. Great Crested Crebe Podiceps. C. cristatus (L.).

Awinter visitor. Breeding birds were reported in August, of the year it was seen on the rivers and flooded areas, from Mosul in the north to Basra and Fao in the South. (Allouse, 1953).

21/7(2) 21/8(5) 31/8(10) 10/9(2) 14/9(3) 18/9(1) 21/9(1) 24/9(1) 29/9(2) 1/10(3) 1/10(10) 13/10(3) 13/10(16) 28/10(16) 28/10(3) 3/11(6) 12/11(10) 1/12(10) 13/12(5)

4. Grey Heron Ardea C. Cinerea L.

Very common in winter and widely distributed. Herons also breed in the small islands at the head of the Arabian Gulf.

Nests and eggs were reported from that area in May (Ticehurst et al 1922)

21/7(2) 24/9(5) 24/9(15) 29/9(8) 2/10(1) 8/10(2) 12/10(8) 15/10(2) 16/10(3) 22/10(3) 9/11(4) 18/11(5) 3/12(20)

5. Little Egret Egretta. g. garzetta (L.)

Common in small numbers during the summer. It breeds in the marshes and in the Fao area.
2/10(40) 16)10(1) 26/10(1) 3/12(4) 10/12(3)

6. White Stork - Ciconia C. Ciconia (L.).

White storks are winter visitors and passage migrants in Flocks of autumn migrants from the north become abundant from mid-september till the end of October, and spring migrations extend from mid-february to early April-(Allouse, 1953). 22/7(3) 1 hanted 2 speaiemens.

7. Flamingo:- Phoenicopterus ruber roseus.

Fairly common and resident. Breeds in the marshes of southern Iraq and the head of the Arabian Gulf.
13/10(20) 15/10(4)

8. Teal:- Anas C. Crecca L.

A very commen winter visitor at the met with on rivers, marshes and irrigation canals from August and leave within the first half of April (Ticehurst et. at.,1922)
24/9(4) 29/9(1) 26/10(5) 29/10(100) 9/11(5)

9. Marbled duck:- - Anas angustirostris Menetries.

Fairly common and resident, there are but few winter records, one from Diala river and another from Musul (Ticeh, 1926)
30/8(6)

10. Wigeon:- Anas penelope (L.)

Very plentiful in winter suitable localities such as rivers, marshes and floaded areas; arriving in September and leaving in March (Ticehurst, 1922).
29/10(150) 3/11(100) 9/11(350) 12/11(400) 18/11(200) 20/11(200) 1/12(200 – 300) 3/12(350) 10/12(50)

1. Gadwall:- Anas strepera L.

Very common. It arrives in September and leaves in March of the year.
29/10(150) 12/11(300) 20/11(300) 1/12(300 – 400) 3/12(350) 10/12(100)

12. Shovler:- Spatula Clypeata (L.)

A very common winter visiter, arriving in late August or September and leaving in March of the year (Allouse, 1953).
29/9(2) 1/10(2) 28/10(150) 29/10(200) 9/10(20) 3/12(10)

13. Common Pochard: Aythya ferina (L.)

A commen winter visitor. Reported as arriving in October and leaving in March , or as late as the middle of April.
24/9(20) 29/9(4) 1/10(2) 8/10(15) 19/10(400) 22/10(50) 23/10(10) 28/10(200) 29/10(350)
3/11(1000) 9/11(600) 12/11(1200) 18/11(800) 20/11(100 – 1200) 1/12(1500 – 2000) 3/12(1500) 10/12(500)

14. Tufted Duck:- Aythya Fuligula (L.)

A common winter visitor, the species arrives and leaves nearly at the same time as other diving ducks. (Allouse 1953)
26/10(30) 28/10(100) 29/10(50) 3/11(100) 9/11(150) 12/11(250) 18/11(50) 20/11(50 – 100) 1/12(50 – 150) 3/12(50 – 100) 10/12(30 – 50)

15. Black Kite:- - Milvus l. lineatus.

A very common winter visitor, arriving in August and September and leaving in April. (Allouse 1953).
1/8(6) 6/8(5) 4/9(80) 10/9(300) 14/9(350) 17/9(100) 18/9(15) 24/9(4) 29/9(2) 8/10(50) 12/10(55) 16/10(10)
19/10(32) 19/10(40) 22/10(50) 25/10(15) 26/10(180) 29/10(20) 9/11(100) 12/11(120) 18/11(50) 3/12(45)

16. Osprey:- Pandion h. haliaetus (L.)

An uncommon winter visitor. Few nonbreeding birds may stay as late as July and may even spend the summer. 2/8(2) 29/9(1)

17. Coot:- - Fulica a. atra L.

A very common winter visitor. Breeding was reported in June, and many adults and young could be seen from July to September, (Allouse 1953)
21/7(12) 22/7(40) 24/(15) 27/7(30) 31/7(20) 12/8(14) 24/8(15) 25/8(24)
4/9(37) 7/9(20) 9/9(20) 14/9(150) 21/9(40) 24/9(4) 29/9(150) 1/10(6) 8/10(65) 13/10(100) 15/10(160) 19/10(7) 22/10(150) 23/10(50) 26/10(40) 28/10(200) 29/10(120) 9/11(100) 12/11(100) 18/11(1200 – 1500) 20/11(1000 – 1300) 3/12(2000) 10/12(1500 – 2000)

18. White tailed Plover:- **Chettusia leucura (Lichtenstein).**

Very common and resident,
24/7(12) 22/7(7) 4/8(4) 31/8(3) 3/9(40) 4/9(3) 10/9(2) 17/9(10) 17/9(10) 12/9(2) 42/9(2) 13/9(30) 2/10(2) 4/10(5) 15/10(1) 16/10(1) 29/10(4)

19. Red-watted Lapwing:- **Lobivanellus indicus aigneri.**

A common resident and widely distributed. 21/9(3)

20. Spur-winged Plover:- **Hoplopterus spinosus (L.).**

Winter ivsitor. The status of this bird in our area requires investigation.
31/8(3) 4/9(30) 29/9(2) 8/10(1)

21. Grey Plover:- **Charadrius squatarola (L.)**

Probably a passage migrant in the Fao district, as comming reported it in September and October (Sharpek 1891)
12/10(30) 15/10(2) 16/10(30) 16/10(30)

22. Ringed Plover:- **Charadrius hiaticula tundrae (Lowe).**

Probably a passage migrant,
17/9(15) 21/9(10) 29/9(7) 1/10(5) 2/10(3)

23. Little Ringed Plover:- - Charadrius dubius Curonicus Gmelin.

Very common as resident and widely distributed migrating locally where the breeding season is over. Frequently seen in winter along the edges of rivers, canals, and marshes. (Allouse 1953). 12/8 (17) 20/9 (25)

24. Kentish Plover: - Charadrius a, alexandrinus L.

Fairly common and resident throughout our area. Reported as breeding at Fao (Cumming, 1918) at Basrah (Tomlinson 1916). Breeding season is from early April to June.
25/8(50) 14/9(30) 18/9(200) 27/9(50
1/10(30) 1/10(20) 2/10(2) 16/10(10) 3/12(30)

25. Great white Heron

Awinter visitor in small numbers arriving in November and leaving in March
15/10 (7) 21/10 (3) 14/11 (9) 11/12 (5)

26. Common Snipe:- Capella g, gallinogo (L.).

A common winter visitor frequenting suitable places from northern to southern Iraq.

The majority arrive in the second half August and leave by early May.
4/8(1) 18/9(1) 29/9(2) 15/10(5) 19/10(10) 19/19(10)

27. Little Stint:- Calidris minuta (Leisler).

A passage migrant, reported by Ticehurst (1922) as common in the marshes in autumn and spring migrations.
24/7(10) 27/7(1) 3/8(30) 4/8(20) 21/8(40) 24/8(10) 30/8(40)
3/9(100) 3/9(120) 7/9(5) 9/9(40) 21/9(20) 12/9(80) 24/9(10)
29/9(100) 30/9(80) 31/9(20)
1/10(10) 1/10(120) 2/10(12) 2/1(20) 3/1(100
12/10(12) 15/10(50) 15/10(70) 16/10(30) 19/10(15)
18/11(180) 30/11(40) 1/12(20)

28. Dunlin:- Calidris a. alpina (L.).

A common winter visitor, arriving in early August and leaving by the middle of May.
24/7(1) 26/7(19) 3/8(20) 21/8(10) 24/8(200) 25/8(20) 29/8(30)
3/9(70) 4/9(51) 10/9(15) 17/9(8) 21/9(25) 24/9(3) 29/9(8)
29/9(30) 1/10(5) 1/10(50) 2/10(20) 3/10(70) 12/10(5) 16/10(100)
19/10(190) 22/10(20) 9/11(15) 12/11(2) 18/11(80) 30/11(40)
1/12(50) 3/12(300)

29. Curlow Sandpiper:- Calidris tastacea (Pallas).

Reported by Memnertzhagar (1914) in winter and reported at Fao on April.
26/7(10) 4/8(20) 3/9(60) 4/9(20) 7/9(30) 17/9(30) 24/9(10)
24/9(5) 29/9(30) 4/10(20) 16/10(70)

30. Ruff:- - Philomachus pugnax.

A fairly common winter visitor and passage migrant, frequenting marshes and rivers.
3/8(30) 25/8(50) 9/9(30) 21/9(1) 24/9(15) 27/9(50) 1/10(5) 12/10(15) 16/10(15) 19/10(30) 19/10(30) 22/10(10) 29/10(3) 12/11(1)

31. Black-winged Stilt:- Himantopus h. himantopus (L.)

Common and resident in the marshes of central and southern Iraq.

In winter it spreads out to shallow water and river banks
15/7(15) 16/7(21) 24/7(44) 26/7(7) 25/8(10) 7/9(140) 9/9(20) 14/9(20) 17/9(20) 21/9(10) 1/10(60) 16/10(10) 19/10(7) 22/10(5) 15/10(1)

16/7(8) 21/7(3) 24/7(40) 4/8(25) 21/8(8) 24/8(40) 25/8(4) 3/9(80) 4/9(15) 7/9(50) 10/9(30) 21/9(40) 24/9(20) 29/9(10) 1/10(200) 4/10(22) 15/10(60) 16/10(20) 19/10(15)

32.Blacktailed Godwit:- Limosa L. limosa.

Acommon winter visitor frequenting the muddy marging of marshesand flooded places from central to southern Iraq. It is reported as arriving in August and leaving in April.
12/10(10) 15/10(50) 19/10(100) 22/10(12) 24/10(50) 15/10(80) 16/10(100) 9/11(100) 18/11(7)

33. Common Redshank: Tringa totanus (L.).

Winter visitor. It mostly arrive in mid-August and leave in mid-May.
26/7(6) 4/8(5) 21/8(15) 25/8(150) 30/8(50) 7/0(60) 14/9(40) 21/9(20) 12/9(35) 29/9(20) 30/9(150) 1/10(60) 2/1(50) 8/10(2) 13/10(8) 15/10(45) 16/10(120) 19/30(95) 22/10(4) 3/11(40) 9/11(20) 18/11(330) 20/11(300) 30/11(1) 1/12(10) 3/12(100) 10/12(30)

34. Marsh-sandpiper:-

A fairly common winter visitor 2/10(3)

35. Greenshank:- Tring nebularia (Gunnerus).

Common winter visitor, the majority arrive in August and leave by the end of April.
26/7(4) 21/8(8) 25/8(80) 30/8(150) 3/9(20) 4/9(25) 29/9(10) 15/10(120) 15/10(20) 16/10(100) 19/10(120) 22/10(30) 25/10(16) 3/11(20) 9/11(4) 12/11(4) 18/11(130) 20/11(150) 30/11(20) 1/12(5) 3/12(30) 10/12(30)

36. Avocet:- Recurvirostra avosetta L.

Fairly common and resident, In winter it spreeds out to the rivers and marshes.
21/7(50) 21/8(300) 25/8(100) 27/8(300) 30/8(20) 31/8(300) 3/9(120) 4/9(200) 4/9(320) 7/9(140) 9/9(100) 17/9(2) 21/9(90)

27/9(330) 29/9(20) 30/9(2) 1/10(3) 2/10(10) 3/10(90) 4/10(30) 12/10(30) 15/10(2) 16/15(24) 19/10(3) 22/10(7) 26/10(3) 18/11(2)

37. Pratincole:- Glareola nordmanni Fischer.

This bird is summer visitor. Reports show that this bird arrives in late March and leaves in early September and there are no records in winter (Allouse, 1953)
24/7(2) 1/10(5)

38. Black-headed Gull:- Larus r. ridibundus L.

A common winter visitor, According to Ticehurst (1922) Some may arrive by mid-July, or stay to the end of May.
15/7(25) 21/7(50) 27/7(100) 3/8(100) 21/8(110) 25/8(25) 27/9(12) 3/9(20) 19/10(2) 10/12(25)

39. Slender-billed Gull:- Larus genei Breme.

Common and resident, with wider distribution in winter.
15/7(150) 16/7(200) 21/7(190) 3/8(180) 25/8(150) 3/9(60) 7/9(300) 9/9(50) 14/0(200) 21/9(6) 27/9(100) 1/10(20) 12/10(10) 15/10(10) 19/10(3) 3/11(25) 3/12(15) 19/12(30)

40. Common Tern:- Sterna hehirundo L.

The majority of common. Terns are Summer visitors. Breeding places were reported from the vicinity of Basrah in early June. (Allouse 1953)

27/7(30) 16/7(20) 21/7(4) 4/8(10) 17/9(1) 1/10(1) 2/10(15) 10/10(20).

41. Little Tern:- Sterna a. albifrons Pallas.

Probably a summer visitor or resident, The majority arrive in late April and leave by the end of September.
22/7(50) 7/9(5)

42. Red-crested Pochard:- Netta rufina (pallas).

Winter visitor, main flocks arrive in October and leave in March, but some may leave as late as the end of April.
26/10(100) 12/11(300) 20/11(300) 1/12(300) 10/12(100)

Discussion

During the observation of birds in the area of study a number of species appeared to be very distinctive from those species, the diving ducks show a greater density in the Water injection lake. During December 1986 the numbers of this species varied between 1000-3000. such as Wigeon, Cadwall, CommonPochard, Tufted duck.

The numbers of Common Pochard increased during December, 1986 and reached 2000. The present study shows that the Tufted duck has ahigh density especially during November, 1986 where its numbers reached (250) bird. This density remains high till the end of December 1986. This result contradicts with the past observations about this bird in Iraq where it shows a low

density. The Coot reaches its highest number (2000) during December 1986.

Little Grebe on the other hand Starts to increase in number from July till october 1986. Then their number drops until reaches its lower level in December 1986. The same results is true for Great erested Grebe.

In spite of that the Marbled duck is a resident in Iraq, the present study did not shows alarge number of this species and for a short period only.

During the begining of August 1986, the Black Kite starts to appear in the area of study and their numbers reached its peak in September 1986 (350 bird).

The results shows that the numbers of White storck were so low in spite of the previous observations that showed a large numbers in this area.

Summary

The present Work includes bird control and Surveying for fourty two species of some birds, mostly aquatic, from the vicinity of Basrah city. This information consider as a first record for the area and an addition to the previous information published.

الخلاصـــة

يتناول البحث تسجيل ٤٢ نوع من الطيور اغلبها من الطيور المائية للمرة الاولى في منطقة مجاورة لمدينة البصرة وهذا التسجيل اضافة جديدة للتسجيلات السابقة .

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Bull. Basrah Nat. Vol.6: 87-93, 1986

Preliminary survey of invertebrate in the Shatt Al-Arab River, Iraq.

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Shatt Al-Arab River is one of the most important water bodies of soutern Iraq. Previous studies on the identification of the invertebrate are limited. Ahmed (1975) made a systematic studies on Mollusca living in Shatt Al-Arab and the Arabian Gulf. Abdul-Karim (1978) studied the water beetles (Dytiscidae) in Shatt Al-Arab.

Present work is an attempt to give an overview idea on the occurence, distribution and ecological relationship of the invertebrate species living in Shatt Al-Arab and its tributaries Which provide a basic requirements for further researchs.

Description of the area

Shatt Al-Arab River is formed from the confluence of the two major Rivers (Tigris and Euphrates) at Qurna. Shatt Al-Arab flows into the Arabian Gulf, therefore, it is an estuary and is affected by the high and low tide of the Arabian Gulf. Shatt Al-Arab water is characterized as being mixed with limited vertical stratification of tenperature (Saad and Kell, 1975), and chloranities (Hug et al, 1978), it is also Known that estuaries are less diversed and more productive.

Materials and Methods

Samples from six tribtaries namely, Al, Shafi, Al-Tanoma, Al-Bradhia, Al-Khora, Al-Sarragi and Al-Shashai and intertidal zone of Shatt Al-Arab, were collected Novenber 1985 till Febrruary 1986. Samples taken from the tributaries were collected by hand net, while thise from the intertidal zone were taken by digging the mud. All samples were sorted out in the laboratory, and the animals obtained were preserved in 70-75% alcogol for identification.

Results and Discussion

a. Identification:

The results show that samples contain the following taxa:

1. Phylum annelida:

A. Class Oligochaeta: **Tubifex** spp. ?

Nemalycastis indica (Southern).

Dendronereides heteropoda (southern).

B. Class polychaeta:

. Phylum Arthropoda:

A. Class Crustacea:

a. Order Isopoda: **Sphaeroma annandalei** stebbing.

Annina mesopotamica (Ahmed).

Asellus coxalis*

b. Order Amphipoda: **Parhyale basrensis** Salman.

c. Order Decapoda: **Sesarma boulengeri** Calman.

Elamenopsis kampi

Caridina babaulti basrensis Al- Adhub and Hamza.

Atyaephyra desmaresti mesopotamica Al-Adhub.

B. Class Insecta:

a. Order Odonata: **Perithemis** spp.*

Leucorrhinia spp.*

Orthemis spp.*

Ladona spp.*

b. Order Coleoptera: **Oreodytes** spp.*

* new record in shat Al- Arab or its tributaries.

c. Order Diptera	**Tendipes tentans**
	Tabanus atratus
d. Order Lepidoptera	**Nymphula spp.***
3. Phylum Mollusca:	
A . Class Gastropoda	**Lymnaea tenera euphretica** Mussen
	Bulinus truncatus*
	Gyraulus convexiusculus Hutton.
	Neritina crepidulare Lamarck.
	Viviparus benalensis Lamarck.
	Theodoxus jordani Sowerby.
	Melanopsis nodosa Ferussac.
	Melanoides tuberculata Muller.
B. Class Bivalvia:	**Unio tigridis** Bourguignat.
	Pseudodontopsis euphraticus Bourguignat
	Corbicula fluminalis Muller.
	Corbicula Fluminea Muller.

b. Ecology of the taxa:

1. Annelida: The two species of polycheata mentioned above are widely distributed in intertidal zone of shatt Al- Arab and its tributories and its density increased in polluted areas, while that of Oligocheata is mostly abundant in subtidal zone of shatt Al-Arab.

2. Arthropoda:

A. Crustacea:

a. Isopoda: The present studies show that both **S. annandalei** which live in burrows, and **A. mespotamica** are more abundant in the intertidal zone of shatt Al- Arab than its

tributaries, with the density of the former species was much higher than the latter.

A. **coxalis** had not been previously recorded in shatt Al-Arab or its tributaries. In the present study it was collected from the tributaries only, found in the area rich with algal materials.

b. Amphipoda: mut Copilal p. basrensis is very abundant species in both areas (tributaries and intertidal zone) of shatt Al-Arab. Mostly it was collected with plants such as **ceratophyllum demersum** or **Vallisneria spiralis.**

c. Decapode: S. **boulengeri** was the most abundant species, it lives in burrow in the supratidal zone of shatt Al- Arab, while **E. kampi** is less abundant and lives in the subtidal zone of shatt Al-Arab. Both species were also recorded in the tributaries.

C. **babaulti basrensis** and A. **desmaresti mesopotamica** were collected from both shatt Al- Arab and its tributaries. It appeared rhat the occurence of one species might effect the presence of the other. It, therefore, seems very necessary to study the ecological relationship between the two soecies.

B. Insecta:

a. Odonata: The four genera are very abundant in the tributaries with dense vegetation. However, they can be found in subtidal zone of shatt Al- Arab. All four genera are recorded for the first time in the area.

b. coleoptera: **Oreodytes** spp. was mostly abundant in both intertidal zone and tributaries of shatt Al- Arab. It is recorded for first time from shatt Al- Arab.

c. Diptera: T. **tentans** was most abundant in shallow water, rich in vegitation. It is widely spread species. T. **atratus** was collected from tributaries and intertidal zone or wherever small invertebrates present.

d. Lepidoptera: **Nymphula** is the only genus obtained belong to this order, one specimen was collected from Al-shashai branch of shatt Al- Arab River.

3. Mollusca:

A. Gastropda: **T. jordani, M. nodosa, M. tuberculata** and **G. convexiusculus** are most abundant in the intertidal zone but they are less abundant in tributaries. **v. bengalensis** and **B. truncatus** were recorded only in tributaries. The iccurrence of both **Lymnaea** and **Bulinus** may indicate a possible interaction between the two species.

B. Bivalvia: Both **U. tigridis** and **p. euphraticus** are rarely occurred in the ntertidal areas. The abundence of the related species **c. fluminalis** and **c. fluminea** were relatively high in the intertidal zone. A very few specimens of both species were collected from tributaries. Morton (1977) reported that the two species may posses intrinsically different life cycle, thus, this could explain the coexistance of both species. However, futher studies on the interaction between the two species is needed.

Summery

The occurrence and distribution of the invertebrates in shatt Al- Arab and some of its tributaries were investigated. The animals groups are: 3 species of annelida, 8 species of crustacea, 8 species of insecta and 12 species of mollusca. Eight species were recorded for the first time in the present study.

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الخلاصة

تضمن البحث دراسة تشخيص وتوزيع الحيوانات اللافقرية في شط العرب وبعض فروعه . فلقد تم تشخيص ثلاثة انواع من الديدان الحلقية ، وثمانية انواع من القشريات وثمانية انواع من الحشرات واثنا عشر نوعاً من النواعم ، وفي هذا الدراسة تم تشخيص ثمانية انواع من الحيوانات اللافقرية لاول مرة في العراق .

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BENTHONIC FORAMINIFERA FROM THE UPPER CRETACEOUS OF THE

ABU-KHEMA WELL NO. I, S. IRAQ

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The Upper Gretaceous succesion in the Abu-Khema well no I (Figure I) measures about 1000 m. thickness, is lithologically compsed of limestone, dolomite,chalky limestone, marl and shale. the succession, between depths 1050 to 1500 meters contains abundant benthonic and planktonic forminifera. The species of Globotruncana Cushman, Heterohlix Ehrenbergc Sigalia Reiss and Pseudotextularia Rzehak in general have same vertical range as those descibed from the subsurface Upper

Gretaceous biozones in south western Iraq (Darmoian 1975a, 1975b). Accordingly the above interval is dated as Santonian-Mastrichtian.

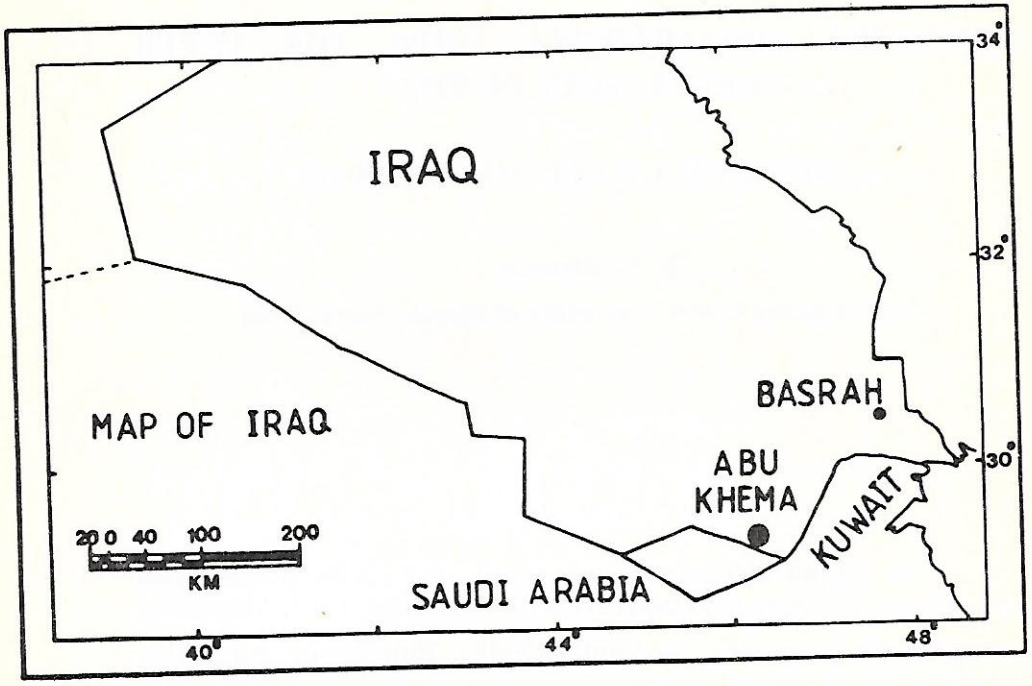


Figure 1 Location map

SYSTEMATIC PALEONTOLOGY

The classification followd here is taken form the Treatise on In-vertebrate Paleontology, Loeblich and Tappan (1964). Twelve species and subspecies belong to five genera and three families are reported. Dimension given are those of the figured specimens. The illustrated specimens are at present in the possession of the outhor.

Drder **FORAMINIFERIDA** Eichwald, 1830.

Superfamily **NODOSARIACEA** Ehrenberg, 1838.
Family **NODOSARIIDAE** Ehrenberg, 1838.
Genus **NEOFLABELLINA** Bartenstein, 1948.
Neoflabelliona rugosa (d Ordingny).

Plate l, fig. 1-2

Flabellina rugosa D, ORBIGNY, 1840, p. 23, pl. 2, fig. 4-5. 7.

Neoflabellina rugosa (d,Orbigny), SLITER, 1968, p.71, pl.8, fig.21.

Remarks: The rare and poorly preserved specimens of this species have strongly compressed rhomboid test shapes with flat and parallel sides. Sutures are raised and sharp, periphery truncated and chambers early planispiral later chevron-shaped. Surface in most specimens is cemented by claclcareous materials obscuring the ornamentations.

Dimensions: Length (figure I),O.85mm., breadth, 0.55,thickeness, 0.15mm.; Length (figure 2), O.70mm., breadth, 0.65mm., thickness, 0.18mm.

Superfamily **BULIMINACEA** Jones, 1875

Family **TURRILINIDAE** Cushman, 1927
Genus **PRAEBULIMINA** Hofker, 1953
Praebulimina aspera (Cushman and Parker)

Plate l, figure 3

Bulimina aspera CUSHMAN and Parker, 1940, p.44, pl.8,figs. 18-19.

Praeblimine aspera (Cushman and Parker), SLITER, 1968, p.83,pl.ll, figs. ll-13

Remarks: Praebulimina aspera (Cushman and Parker) is distinguished by its elongate, two or more times as long as broad and slightly tappering test, slightly to moderately inflated chambers which are vertically arranged, depressed sutures and initially roughened surface. The species closely resembles **Praebulimina kickapooensis** (Cole) reported foem the Upper Cretaceous of Texas.

Dimensions: Length, 0.42mm, diameter, 0.16mm.

Praebulimina carseyae (Plummer)

Plate l, figure 4

Buliminella carseyae PLUMMER, 1931, p. 179, pl. 8, fig. 7.
Buliminella carseyae PLUMMER, CUSHMAN, 1946, p. 119, p.50, figs. 17-20
praebulimina carseyae (plummer), HOFKER, 1957, p. 192; figs. 235-–36,237.
Remarks: This elongate and tappering small species is rare in our materials. It is distinguished by having four inflated chambers per whorl and large adult part.

Dimensions: Length., 0.22mm., diameter, 0.13mm.

Praebulimina cushmani (sandidge)

Plate l, figure 5

Buliminlla cushmani SANDLDGE, 1932, p. 280, pl. 42, figs. 18-19.
Buliminella cushmani SANDIDGE, CUSHMAN, 1946, p. 119, pl. 50, fig. 15.

Praebulimina cushmani (Sandidge), GRAHAM and CHURCH, 1963, p. 54, pl. 6, figs. 2-3.

Praebulimina cushmani (Sandidge), SLITER, 1968, p. 83, pl. 11, fig. 15.

Remarks: The species is closely related to **praebulimina carseyae,** differs in the slighter inflation of the adult chambers and in the smaller size of the test.

Dimensions: Length, 0. 20mm., diameter, 0. 14mm.

Praebulimina kickapooensis (Cole)

Plate l, figure 6

Bulimina kickapooensis COLE, 1938, p. 45, -p. 3, fig. 5.

Bulimina kickapooensis COLE, CUSHMAN, 1946, p.123, pl. 51, figs. 11-12, 14.

Praebulimina kickapooensis (Cole), SLTIER, 1968, p. 84, pl. 11, figs. 17-19.

Remarks: The species is closely resembles **Praebulimina aspera** (Cushman and Parker) but differs in having larger test size and longer and lesser inflated chambers.

Dimensions: Length, 0. 30 mm., diameter, 0. 18 mm.

Praebulimina lajollaensis Sliter

Plate l, figures 7-8

Praebulimina lajollaensis SLITER, 1968, p. 84, pl. 12, figs. 9- 10.

Remarks: Only six specimens were recovered, they are nearly identical with the illustrated specimens of Sliter (1968). The species is easily distinguished by its globular to subglobular test shape and 3 or 4 inflated chambers.

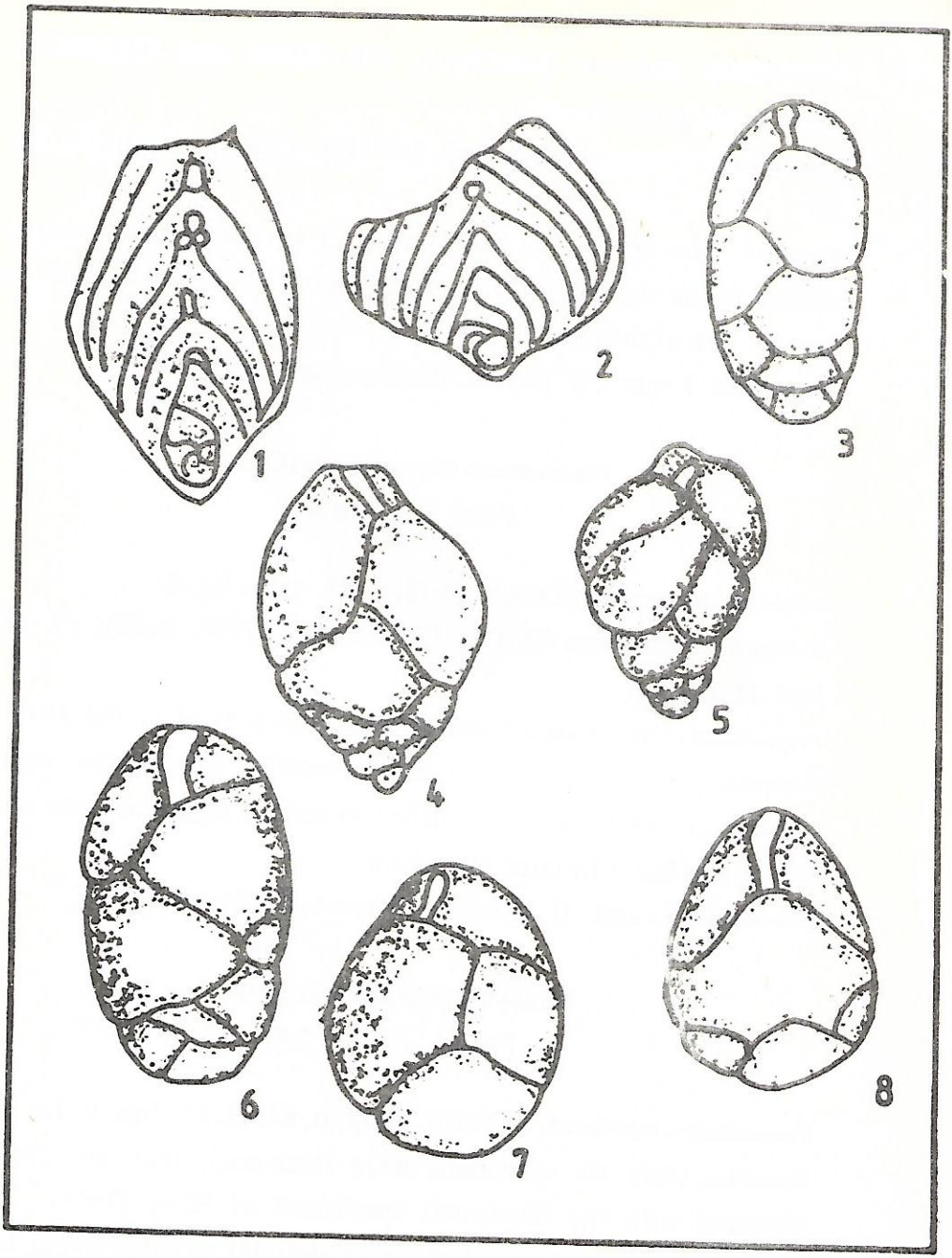


Plate 1. (1 – 2): Neoflabellina rugosa. (3): Praebulimina aspera.
(4): p. caseyae. (5): p. cushmani. (6): p. kickapooensis.
(7-8): p. lajollaensis.

Remarks: The main characters of **Bolivina decurrens** (Ehrenberg) are the elongate and strongly compressed small test, slowly tappering spinose margins, angled chambers and the character of early chambers which are overlapping the proloculus. Some specimens have combined **Coryphostoma plaita** (Carsey) and **Bolivina decurrens** characters making an advance towards becoming uniserial last stage with elliptical to rounded terminal aperture. Several froms were found have distinctly twisted early stage.

Dimensions: Length (figure 1), 0.25 mm., breadth, 0.11mm., thickness, 0.06mm.; length (figure 2), 0.19 mm., breadth, 0.09 mm., thickness, 0.04 mm.

Bolivina gemma Cushman

Plate 2, figure 5

Bolivina gemma Cushman, 1927, p. 87, pl. 12, fig. 3.

Loxostoma gemmum (Cushman), CUSHMAN, 1946, p. 129, pl. 54figs. 1-3.

Loxostoma gemma (Cushman), MELLO, 1969, p. 81, pl. 9, fig. 7.

Remarks: The species is represented by nine specimens, has a large test size, sutural prominences alonge a zigzag shaped median axis and twisted early portion of the test.

Dimensions: Length (figure 7), 0. 30 mm., diameter, 0. 26 mm.; length (figure 8), 0. 28 mm., diameter, 0. 23 mm.

Family BOLIVINITIDAE Cushman, 1927

Genus BOLIVINA d'Orbigny, 1839

Bolivina decurrens (Ehrenberg)

Plate 2, figures 1-2

Grammostomum? decurrens EHRENBERG, 1854, pl. 30, fig. 17.

Bolivina decurrens (Ehrenberg), CUSHMAN, 1946, p. 127, pl. 53,figs. 12-13.

Bolivina incrassata incrassata Reuss

Plate 2, figure 4

Bolivina incrassata REUSS, 1851, p. 29, pl. 5, fig. 13.

Bolivina Incrassata REUSS, GRAHAM and CHURCH, 1963, p. 52, pl. 5, fig. 26.

Bolivina incrassata REUSS, SLITER, 1968, p. 88, pl. 12, fig. 14.

Remarks: The separation of this species from **Bolivina incrassata gigantea** Wicher was based on size differences, the latter has larger size development.

Dimensions: Length, O.26 mm., breadth, O.15 mm., thickness, O.06 mm.

Bolivina incrassata gigantea Wicher

Plate 2, figure 3

Bolivina incrassata Reuss forma **gigantea** WICHER, 1949, p. 85 (English), pl. 5, figs. 2-3.

Bolivina incrassata gigantea WICHER, BETTENSTAEDT and WICHER, 1955, p. 502, pl. 2, fig. 19.

Dimensions: Length, O.4. mm., breadth, O.16 mm., thickness, O.06 mm.

Genus BOLIVINOIDES Cushman, 1927

Bolivinoides draco (Marsson)

Plate 2, figures 6-7

Bolivina draco MARSSON, 1878, p. 157, pl. 3, fig. 25.

Bolivinoides draco draco (Marsson), HILTERMANN and KOCH, 1950, p. 598, 1, 72- 73; 2- 4, 52- 54, 58- 60; 5, 53, 69- 70.

Bolivinoides draco draco (Marsson), VAN HINTE, 1963, p. 106, pl. 14, fig. 3.

Bolivinoides draco draco (Marsson), SLTTER, 1968, p. 88, pl. 12, fig. 17 (see synonymy).

Bolivinoides draco (Marsson), HANZLIKOVA, 1970, p. 81, pl. 19, figs. 10- 11.

Remarks: The species has a triangular compressed test and distinct median sulcus which is branched to continuous riblike ornamentation.

Dimensions: Length (figure 6), 0. 35 mm., breadth, 0. 24 mm., thickness, o. 14. mm; length (figure 7), 0.25mm., breadth, 0. 2. mm., thickness o. 14mm.

Superfamily CASSIDULINACEA d'orbigny, 1839.

Family CAUCASINIDAE Bykova, 1959

Genus CORYPHOSTOMA Loeblich and Tappan, 1962

Coryphostoma plaita (Carsey)

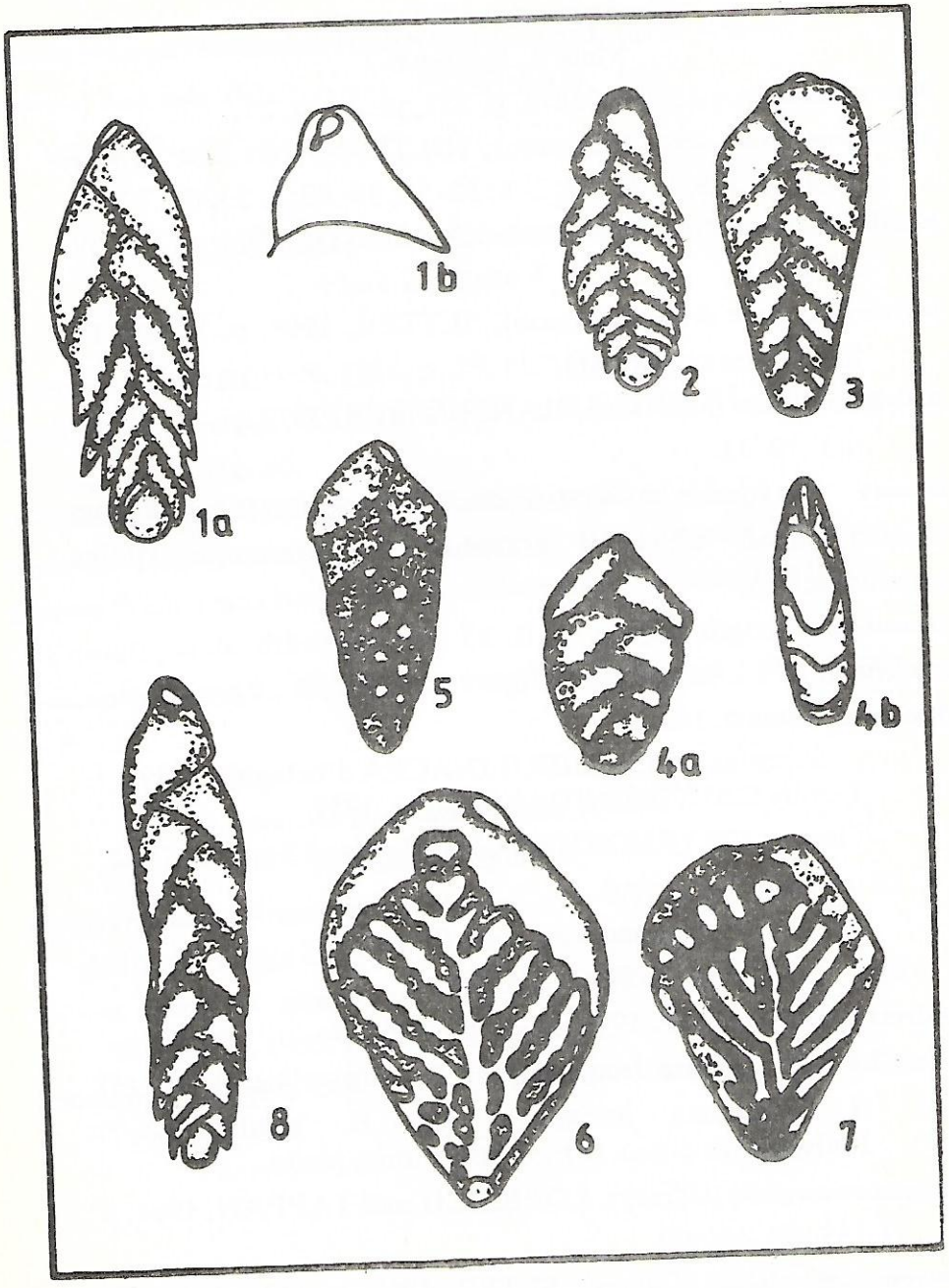
Plate 2, figure 8

Bolivina plaita CARSEY, 1926, p. 26, pl. 4, fig. 2.

Plate 2. (1-2): Bolivina decurrens. (3): B. incrassata gigantea. (4): B. incrassata incrassata. (5): B. gemma. (6-7): Bolivinoides draco. (8): coryphostoma plaita.

Coryphostoma plaita (Carsey), LOEBLICH and TAPPAN, 1964, p. C733, fig. 600 (8).

Coryphostoma plaitum (Carsey), SLTER, 1968, p. 112, pl. 19, fig. 13.


1a
1b
2
3
4a
4b
5
6
7
8

Coryphostoma plaita (Carsey), HANZLIKOVA, 1970, p. 120, pl. 35, fig. 5.

Remarks: The specimens of this species have elongate and slightly compressed shape, rounded periphery and early angular projections of Chambers. chambers biserially arranged with tendency to become uniserial. Several froms were fond have twisted early portion.

Dimensions: Length, 0. 35 mm, breadth, 0. 09 mm.

Summery

During the micropaleontological investigation of the Upper Gertaceous foriniferal content in Abu-Khema well no. I, by the author, the folowing association of benthonic species and sub-species was identified: Bolivina decurens, B. incrassata incrassata, B. incrassata gigantea, B. gemma, Bolivinoides draco, Coryphostoma plaita, Neoflabellina rugosa, Praebulimina aspera, P. carseyae, P. cushmani, P. kickapooensis and P. lajollaensis.

This paper is to report the first kown occurrence of these species form Iraq.

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الخلاصة

أثناء أجراء الفحص الأعتيادي للنماذج الصخرية في بئر أبو خيمة رقم ١ الواقع قرب منطقة الحياك في جنوب شرقي العراق، عثر على ١٢ أحفره مجهرية مهمة وتم تصنيفها حيث ظهرت انها تعود الى رتبة الفورامنيفر القاعية التي عاشت في بحار العصر الطباشيري العلوي (سانتونيان ــ ماستريختيان). ويعتبر هذا أول تسجيل لمثل هذه الأحافير في العراق.

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RECORDS OF SOME FISH PARASITES FRCM SHATT-AL-ARAB RIVER AND THE NORTH WEST OF THE ARAB GULF

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During the last fifteen years or so, rapid industrial activities around Shatt- Al- Arab river have been achieved. These resulted in a heavy impact on the aquatic environment (Hassan & Awad, 1980; Al- Daham et al., 1981). The area of Shatt- Al- Arab river represents a transitional zone for the anadromous as well as the euryhaline fishes. Therefore it is important from the parasitic fauna point of view, and to some of the migratory birds. Above all, fish culture industry in this area, and the release of carps in the southern marshes of Iraq has developed moderately during the last years.

Few works has been done on the parasitic fauna of the fishes of Shatt- Al- Arab river and the Arab Gulf, as reviewed by Mhaisen (1980). These include descriptions of two ectoparasitic isopods from the Arab Gulf (Ahmed, 1970a,b) and different aspects of fish parasites from Shatt- Al- Arab river and its branches (Al- Hadithi & Jawad, 1975; Al- Hadithi & Habash, 1977; Habish, 1977; Sharma, 1977; Bhatti, 1979; Habash &

Daoud, 1979; Al- Hadithi et al., 1980; Mhaisen, 1982; Khamees, 1983; Al- Hasani, 1985 and Al- Salim, 1985).

It is so important to know the parasitic fauna of a community, as this knowledge is necessary for management and control applications(Shulman, 1961). The scarcity of available informations, and the importance of the region, explained above, had led to undertake the present investigation.

MATERIALS AND METHODS

During the period from February 1978 till January 1984, irregular samples of fishes, mainly for teaching purposes, were taken from the following regions and places:-

- Shatt- Al- Arab river at Basrah city and two of its side branches. vis. Ashar Canal and Tannuma Canal.
- North west of the Arab Gulf within the territorial waters of the Repuplic of Iraq.
- Three fish markets at Basrah Governorate, namely Ashar Fish Market, Basrah Fish Market and Fao Fish Market.
- Basrah University Fish Farm at the College of Agriculture, Tannuma.

Some of the fishes were dissected for ecto- and endoparasites in the markets where they were bought, and on ship in the case of the fishes taken from the Arab Gulf. Other fishes were brought to the laboratory for parasitological examination. Parasite fixation, preservation and staining followed the methods explained by Khamees (1983).

RESULTS

Forty- one species of both freshwater and marine fishes belonging to 28 families (Table 1) were examined. Listing of fish species and families followed that of Al- Daham (1982). Fifteen fish species were infected. The following parasites, arranged according to their phylogenetic order, were recorded:-

Ichthyophthirius multifiliis Fouquet, 1876

Trichodina domerguei (Wallengren, 1897)

Clinostomum complanatum (Rud., 1819)

Bothriocephalus gowkongensis Yeh, 1955

Contracaecum sp.

Neoechinorhynchus agilis (Rud., 1819)

Argulus foliaceus L., 1761

Ergasilus mosulensis Rahemo, 1982

Ichthyoxenus asymmetrica Ahmed, 1970

Lernaea cyprinacea L., 1761

Nerocila heterozota Ahmed, 1970

The localities of the hosts and the parasite- host list are shown in Table (2).

DISCUSSION

1- The ciliated protozoan **Ichthyophthirius multifiliis** has been recorded previously in Iraq from two mugilid and two cyprinid fish from Baghdad, Mosul and Basrah (Herzog, 1969; Fattohy, 1975 and Khamees, 1983 respectively). The present investigation revealed its occurrence from the cyprinid fish **Carasobarbus luteus**

together with two new hosts of the same family, namely **Aspius vorax** and **Garra rufa rufa.**

2- The other ciliated protozoan, **Trichodina domerguei,** was found earlier on the skin of eight fish species taken from fish markets in Baghdad (Shamsuddin **et al.**, 1971). Its record here is from the carp, **Cyprinus carpio,** from Basrah University Fish Farm. The unfavoured ecological conditions of this farm contribute to this infection.

3- The metacercariae of **Clinostomum complanatum** were recorded for the first time in Iraq by Khamees (1983) from **Carasobarbus luteus** at Basrah. The present study shows their presence from the above named fish together with other four fish species (Table 2) representing new hosts for this parasite in Iraq.

4- The cestode **Bothriocephalus gowkongensis** was recorded for the first time in Iraq from **Carasobarbus luteus** at Basrah (Khamees, 1983), and here is another record from the same fish.

5- The nematode larvae of the genus **Contracaecum** were recorded from 14 fish species as reviewed by Mhaisen (1980). These include the fish hosts that found to harbour such parasite in the present work, so none of these fishes represents new host neither from Basrah nor from Iraq.

6- Previous records of the acanthocephalan **Neoechinorhynchus agilis** were from **Carasobarbus luteus** and **Liza abu** from Basrah only (Habash & Daoud, 1979; Al- Hadithi **et al.**, 1980 and Khamees, 1983). The present study gives another record for this parasite in **L. abu.**

7- Earlier records of the crustacean **Argulus foliaceus** were from two cyprinid fish from Baghdad (Herzog, 1969) and from **L. abu**

from Basrah (Khamees, 1983). The occurrence here gives the second record from **L. abu** and the first record from **L. dussumieri.**

8- The crustacean **Ergasilus mosulensis** was recorded for the first time in Mosul from the gills of **L. abu** by Rahemo (1982) and then from Basrah on the gills of both **L. abu** and **Carasobarbus luteus** by Khamees (1983). In the present study, another record for this parasite was documented from both above mentioned fish species.

9- The isopod **Ichthyoxenus asymmetrica** was described for the first time on the gills of **Cyonglossus lingua** from the Arab Gulf within the Iraqi territorial waters (Ahmed, 1970a). Here it was found on the gills of **Chirocentrus dorab** from the Arab Gulf also, which represents a new host record.

10- The anchor worm **Lernaea cyprinacea** was recorded from 10 fish species from Baghdad (Al- Hamed & Hermiz, 1973 and Khalifa **et al.**, 1978) and from two cyprinid fishes (**Cyprinus carpio** and **Carassius auratus**) from Basrah University Fish Farm (Mhaisen, 1982). Another two fish species (**Aphanius dispar** and **Gambusia affinis**) from the same farm were also infected during the period of this study, adding two new host records.

11- The isopod **Nerocila heterozota** was described for the first time on the gills of **Cynoglossus lingua** from the Arab Gulf (Ahmed, 1970b). Two new hosts were recorded for this parasite in the present investigation, namely **Ilisha megaloptera** and **Sphyraena jello** both from the Arab Gulf.

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SUMMARY

Between February 1978 and January 1984, investigation of the ecto and endoparasites was carried out on fish samples taken from the north western region of the Arab Gulf, Shatt- Al-Arab river, two branches of Shatt- Al- Arab river, three fish markets in Basrah Province and from Basrah University Fish Farm. Forty- one fish species belonging to 28 families were examined. Fifteen of these species were infected with different parasites. The eleven parasites recorded were:- **Ichthyophthirius multifiliis, Trichodina domerguei, Clinostomum complanatum, Bothriocephalus gowkongensis, Contracaecum sp., Neoechinorhynchus agilis, Argulus foliaceus, Ergasilus mosulensis, Ichthyoxenus asymmetrica, Lernaea cyprinacea** and **Nerocila heterozota.** Some of these parasites represent new host records in Basrah, while others represent new host records in Iraq.

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TABLE 1: List of fish examined during the period of the present investigation. Asterisks refer to the infected fishes.

Family Orectolobidae

Chiloscyllium griseum Muller & Henle, 1841

Family Clupeidae

Hilsa ilisha (Hamilton- Buchanan, 1822).

***Ilisha megaloptera** (Swainson, 1839).

Nematalosa nasus (Bloch, 1795).

Family Chirocentridae.

***Chirocentrus dorab** (Forskal, 1775).

Family Synodontidae.

Saurida tumbil (Bloch, 1795).

Family Cyprinidae.

Alburnus capito Heckel, 1843.

***Aspius vorax** Heckel, 1843.

*Carasobarbus luteus (Heckel, 1843).

*Carassius auratus (L., 1758).

*Cyprinus carpio L., 1758.

*Garra rufa rufa (Heckel, 1843).

*Mesopotamichthys sharpeyi sharpeyi (Gunther, 1874).

Tor grypus (Heckel, 1843).

Family Bagridae.

Mystus halepensis (Valenciennes, 1839).

Family Heteropneustidae.

*Heteropneustes fossilis (Bloch, 1797).

Family Ariidae

Arius thalassinus (Rueppell, 1835).

Family Belonidae

Strongylura strongylura (Van Hasselt, 1823).

Family Cyprinodontidae

*Aphanius dispar (Rueppell, 1828).

Family Poeciliidae

*Gambusia affinis (Baird & Girard, 1853).

Family Platycephalidae

Platycephalus indicus (L., 1758).

Family Theraponidae

Eutherapon theraps (Cuvier, 1829).

Family Sillaginidae

Sillago sihama (Forskal, 1775).

Family Carangidae

Caranx sexfasciatus (Quoy & Gaimard, 1824)

Megalaspis cordyla (L., 1758).

Scomberoides tol (Cuvier, 1831).

Family Formionidae

Formio niger (Bloch, 1792).

Family Lethrinidae

Lethrinus nebulosus (Forskal, 1775).

Family Sparidae

Acanthopagrus berda (Forskal, 1775).

Family Sciaenidae

Johnius carutta Bloch, 1793.

Otolithes ruber (Bloch & Schneider, 1801).

Family Scatophagidae

Scatophagus argus (L., 1766).

Family Mugilidae

***Liza abu** (Heckel, 1843).

***Liza dussumieri** (Valenciennes, 1836).

Family Sphyraenidae

***Sphyraena jello** Cuvier, 1829

Family Polynemidae

Polydactylus sextarius (Bloch & Schneider, 1801).

Family Gobiidae

Pseudapocryptes dentatus (Valenciennes, 1837).

Family Stromateidae

Pampus argenteus (Euphrasen, 1788)

Family Mastacembelidae

Mastacembelus zimach (Walbaum, 1792).

Family Soleidae

Solea elongata Day, 1877

Family Cynoglossidae

***Cynoglossus lingua** Hamilton- Buchanan, 1822

TABLE 2: Parasite- hose list of fishes taken from Ashar Fish Market (A. F. M.), Basrah Fish Market (B. F. M.), Fao Fish Market (F. F. M.), Shatt- Al- Arab River (S. A. R.), Arab Gulf (A. G.) and Basrah University Fish Farm (B. U. F. F.).

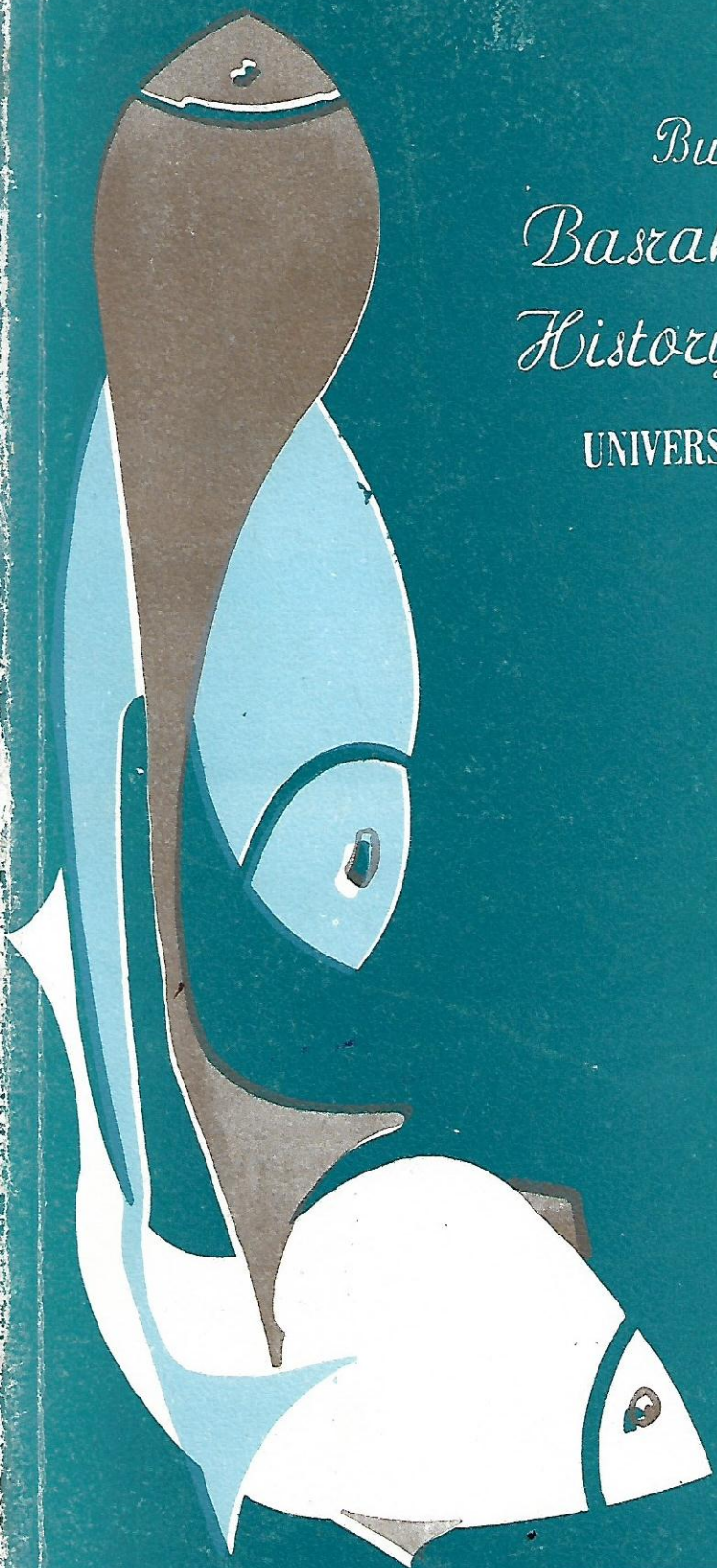
Ichthyophthirius multifiliis	
***Aspius vorax**	B. F. M.
Carasobarbus luteus	A. F. M.
***Garra rufa rufa**	S. A. R.
Trichodina domerguei	
Cyprinus carpio	B. U.F.F.
Clinostomum complanatum	
***Aphanius dispar**	S. A. R.
***Aspius vorax**	B. F. M.
Carasobarbus luteus	A. F. M.
***Gambusia affinis**	S. A. R.
***Heteropneustes fossilis**	S. A. R.
Bothriocephalus gowkongensis	
Carasobarbus luteus	B. F. M.
Contracaecum sp.	
Aspius vorax	B. F. M.
Carasobarbus luteus	B. F. M.
Heteropneustes fossilis	S. A. R.
Liza abu	A. F. M.
Mesopotamichthys sharpeyi sharpeyi	A. F. M.
Neoechinorhynchus agilis	
Liza abu	A. F. M. & B. F. M.
Argulus foliaceus	

Liza abu	A. F. M.
*Liza dussumieri	S. A. R.
Ergasilus mosulensis	
Carasobarbus luteus	B. F. M
Liza abu	A. F. M.
Ichthyoxenus asymmetrica	
*Chirocentrus dorab	F. F. M. & A. G.
Lernaea cyprinacea	
*Aphanius dispar	B. U. F. F.
Carassius auratus	B. U. F. F.
Cyprinus carpio	B. U. F. F.
*Gambusia affinis	B. U. F. F.
Nerocila heterozota	
Cynoglossus lingua	F. F. M.
*Ilisha megaloptera	F. F. M.
*Sphyraena jello	F. F. M. & A. G.

*New host record in Iraq.

الخلاصة

خلال لفترة المحصورة ما بين شباط ١٩٧٨ وكانون الثاني ١٩٨٤ اجريت دراسة حول الطفيليات الخارجية والداخلية لعينات من الاسماك المأخوذة من منطقة شمال غرب الخليج العربي، ونهر شط العرب، وفرعين من افرع شط العرب، وثلاثة من اسواق الاسماك في محافظة البصرة، ومن مزرعة اسماك جامعة البصرة. لقد تم فحص ٤١ نوعاً من الاسماك العائدة الى ٢٨ عائلة، وكان ١٥ نوعاً من هذه الاسماك مصاباً بطفيليات مختلفة. اما الطفيليات الاحد عشر المسجلة فهي:— **Ichthyophthirius multifiliis, Trichodina domerguei, Clinostomum complanatum, Bothriocephalus gowkongensis, Contracaecum sp., Neoechinorhynchus agilis, Argulus foliaceus, Ergasilus mouleensis, Ichthyoxenus asymmetrica, Lernaea cyprinacea, Nerocila heterozota.** تمثل بعض هذه الطفيليات تسجيلات لمضيفات جديدة في البصرة، في حين يمثل البعض الاخر منها تسجيلات مضيفات جديدة في العراق.



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