مجلة
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هيئة تحرير المجلة

الدكتور خلف حسون الربيعي	رئيس هيئة التحرير
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CONTENTS

CROWTH OF THE CYPRINID FISH, *BARBUS LUTEUS* (HECKEL) IN THARTHAR RESERVOIR, IRAQ

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Barbus luteus, locally known as "himri" represents one of the commercially important fresh water fishes in Iraq. This fish inhabits a wide range of habitats from the marshes in the South to the Tharthar Reservoir at North-West of Baghdad. Save and except the study of Bhatti and Al-Daham (1978) on the annual changes in the testicular activity of this fish, no work has so far been published in Iraq on any other biological aspect of this species. A number of studies, however, have been published on age and growth of some other species of *Barbus* in Iraq (Al-Hamid, 1966 ; Al-Hamid, 1972 ; Ahmed, 1974 ; Al-Jaryan, 1974). The present work is an attempt to describe mathematically the growth of *Barbus luteus.*

MATERIALS AND METHODS

A total of 232 fish were collected from Tharthar Reservoir beteewn June and November 1971. The reservoir (Fig. 1) is situated in a place between the two great rivers of Iraq, the Tigris and the Euphrates and about 65 Km. North West of Baghdad. It is connected to the Tigris by

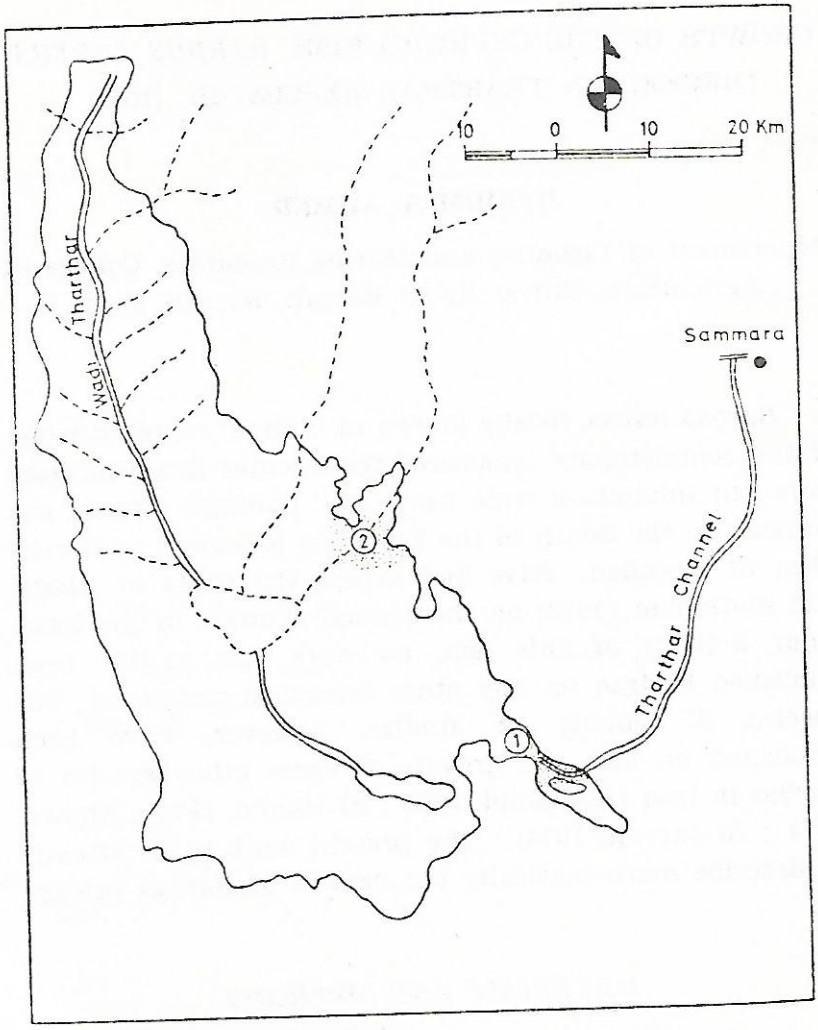

Fig. 1. Monthly distribution of primary moult in *Turdoides altirostris* : more than one feather moult in a bird is connected with dots. N : no sign of primary moult, C : primary moult completed, J : juvenile, I : adult

a 65 Km long man-made channel starting from Sammarra dam in Salah Al-Deen district in order to get rid of the devastating effects of the flood. It is roughly 100 Km in length and about 40 Km in width, the total area being 2050 square Km (Irrigation department report, 1954) and the potential storage capacity 72.8 thousand million cubic meters.

The reservoir is connected to the Euphrates so that the excess water from the former can be passed out to the latter.

Samples were collected from two stations (Fig. 1). Gillnets with a mesh size ranging between 1.5 and 5 cm sq. were used for collection. Due to the difficulty in separating the sexes morphologically and also because the sample size was not very large, sexes were combined. Five to ten scales were collected from the region between the dorsal scales from each envelope were chosen and these were in gm of all fiish were measured. The scales from each fish were kept in envelope on which the pertinent data (date of capture, total length and weight) were recorded. In the laboratory the scales were cleaned using tap water and by rubbing between the thumb and the fingers. Three scales from each envelope were chosen and these were mounted between two glass slides, then magnified 35 times using Scale Projector. A strip of paper made for the most clear one was fixed to the 'focus' of the scale. The annuli and the scale margins were marked on that paper strip for further determination of lengths for back calculation. This method have been successfully applied on the scales of other Iraqi fish by Ahmed (1974) and Al-Jaryan (1974). Annuli were not clear on some of the scales which were therefore discarded.

Growth has been described here in terms of length, and using 212 fish, weight length relationship determined by the least square method.

Although growth equations have been applied and summarized by different workers (Beverton & Holt, 1957 ; Tesch, 1968) the one most commnly applied to fish is that of Von Bertalanffy (1938, 1957). So in the present study this method has been followed.

The equation has the common form

$L_t = L\infty [1 - e - K (t-t_o)]$

Where L_t = total length at time t

$L\infty$ = the lengts as age approaches infiinty, or the maximum size toward which the length of fish is tending.

K = Constant, which is a measure of the rate at which length approaches L

t_o = a parameter indicating the hypothetical time at which the fish size would be zero if it had always grown according to the above equation.

To obtain the parameters $L\infty$ and K from a Ford-Walford plot (Ford, 1933, Walford, 1946) annual mean lengths at each age group were required. These were obtained from the back calculations.

RESULS

Fish ranged from 76 mm to 345 mm in total length averaging 222 mm. Weights ranged from 5.4 gm to 501 gm with a mean weight of 219.2 gm.

The results of the present study have been summarized in three tables and one figure.

Separate weight-length relation was not determined for males and females in the present study because of the small size. So the weight-length relationship of *Barbus lutues* with both the sexes combined has been described by the following equation obtained by fitting a straight line by least squares to the logarithms of the average lengths and weights of fish in successive 1 cm length groups.

$$\text{Log}_e W = -4.3383 + 3.010 \text{ Log } L$$

$$\text{or } W = 0.013\ L^{3.01}$$

where W = weight of fish in gm

and L = length of fish in mm

The above equation fits the data fairly. The mean lengths, mean weight and calculated weights for the different length groups have been shown in Table 1.

Calculated lengths of the different age groups obtained by back calculations together with the annual mean length of each age group are shown in Table 2. A decrease in the lengths of younger fish calculated from successively older age groups was evident in this study.

Fig. 2 shows the Ford-Walford plot for this species. When L_{t+1} was plotted against L_t, the straight line intersects a line drawn at 45° through the zero point. The ultimate length L_∞ was determined as the point where the curve intersects this 45° line.

Table 1

Observed and calculated weights for the different 1 cm length groups of *Barbus luteus* in Tharthar Reservoir.

Length group	No. of fish	Mean length	Mean weight	Calculated weight
7 - 7.9	5	7.6	5.6	5.8
8 - 8.9	9	8.4	8.4	7.9
9 - 9.9	8	9.3	10.4	10.8
10 - 10.9	11	10.3	14.0	14.6
11 - 11.9	6	11.4	19.0	19.8
12 - 12.9	10	12.3	24.9	24.9
13 - 13.9	7	13.3	29.3	31.6
14 - 14.9	3	14.1	39.7	37.6
15 - 15.9	3	15.5	44.3	50.1
16 - 16.9	2	16.3	51.5	58.3
17 - 17.9	3	17.7	78.0	74.7
18 - 18.9	5	18.4	81.4	84.0
19 - 19.9	2	19.3	111.5	97.0
20 - 20.9	3	20.2	113.6	111.2
21 - 21.9	3	21.2	131.0	128.7
22 - 22.9	15	22.4	166.2	152.0
23 - 23.9	4	23.3	159.7	171.0
24 - 24.9	9	24.5	211.8	199.0
25 - 25.9	8	25.4	224.0	221.8
26 - 26.9	6	26.5	250.7	252.1
27 - 27.9	8	27.3	276.0	275.7
28 - 28.9	11	28.3	309.4	307.3
29 - 29.9	7	29.2	322.0	337.7
30 - 30.9	15	30.5	395.0	385.1
31 - 31.9	13	31.4	400.7	420.3
32 - 32.9	14	32.4	467.0	462.0
33 - 33.9	14	33.4	489.0	506.3
34 - 34.9	8	34.3	498.0	548.5

Table 2

Mean lengths at the end of each year of life of various age groups and annual meanth length of *Barbus luteus*.

Age group	No. of fish	Year of life						
		1	2	3	4	5	6	7
I	8	7.8						
II	23	8.5	16.4					
III	35	8.9	17.3	21.6				
IV	59	8.2	15.2	20.9	25.2			
V	55	7.4	14.3	19.7	23.8	28.0		
VI	29	8.0	16.1	20.0	24.9	30.2	32.8	
VII	1	7.9	15.9	20.4	24.3	28.1	30.7	32.3
Annual mean length		8.1	15.9	20.5	24.5	28.8	31.7	32.3

The equation obtained was

$$L_t = 38.0\ [(1 - e^{-0.29\ (t\ -\ 0.20)}]$$

Table 3 gives the observed annual mean lengths taken from Table 2 and the annual mean lengths calculated by using the above equation. The two sets are very close to each other indicating the equation fits the data adequately. As the data indicate the fish showed a progressive increase in calculated length with increasing age.

DISCUSSION

Maximum length attained by this species calculated in this paper (38.0 cm) indicates that unlike many other *Barbus* species, *B. luteus* don not reach very large sizes. Although growth has not been mathematically calculated for other *Barbus* species of Iraq, data given by Ahmed (1947) and Al-Jaryan (1974) shows that other *Barbus* species like *B. xanthopterus, B. grypus* and *B. esocinus* live longer and attain a much larger sizes (Table 4).

The n-value of 3.01 obtained for *B. luteus* indicate that its growth pattern is more or less isometric and the fish maintains specific gravity during the life. In this aspect growth does also shows some differences from other *Barbus* species living in the Tharthar Reservoir. The n-value obtained by Ahmed (1974) for *B. esocinus* was 2.861 and those obtained by Al-Jaryan (1974) for *B. xanthopterus* and *B. sharpeyi* were 2.843 and 2.212 respectively. It is however very near the n-value obtained by Ahmed (1974) for *B. grypus* (2.989).

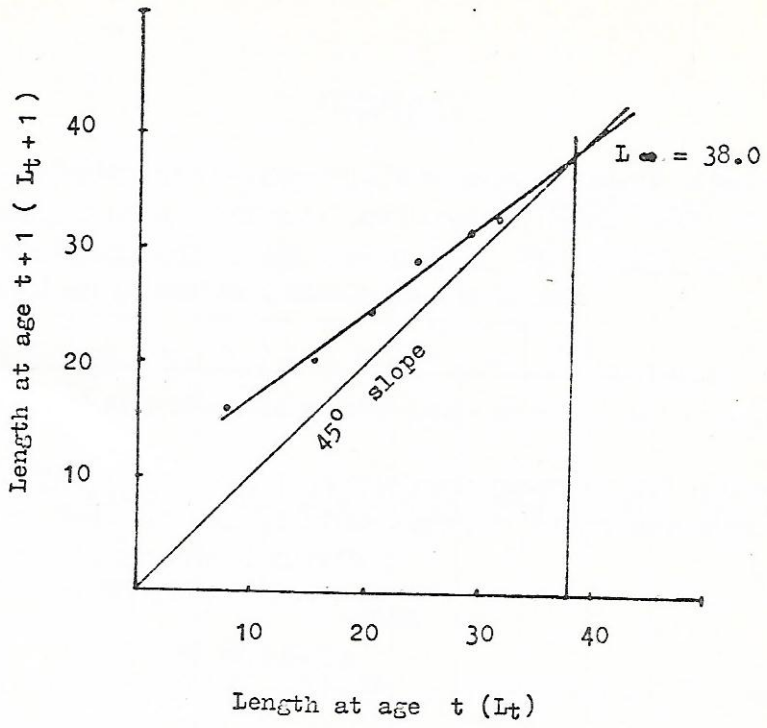

Fig. 2. Ford-Walford plot for *Barbus luteus*.

Table 3. Observed and calculated annual mean length of *Barbus luteus* in Tharthar Reservoir.

Age in years	Observed length (cm)	Length calculated by Von Bertalanffy eq.
1	8.1	7.9
2	15.9	15.4
3	20.5	21.1
4	24.5	25.4
5	28.8	28.5
6	31.7	30.9
7	32.3	32.7

Table 4

Comparison of the growth of different *Barbus* species living in Tharthar Reservoir.

Species	Length (cm.) at age										
	1	2	3	4	5	6	7	8	9	10	11
*Barbus grypus**	16.2	25.2	33.9	41.0	46.0	52.1	58.5	68.1	78.5	81.5	88.3
*Barbus esocinus**	19.6	28.2	36.3	43.5	53.0	62.3	73.3	79.0	81.9	87.5	
*Barbus xanthopterus***	12.8	22.1	28.4	34.2	39.5	44.6	49.6	54.4	59.8	64.3	
*Barbus sharpeyi***	12.8	21.4	28.2	35.3	42.5	47.1	53.3	57.8			
Barbus luteus	8.1	15.9	.5	24.5	28.8	31.7	32.3				

* calculated from data of Ahmed, 1974;

** Al-Jariyan, 1974.

SUMMARY

Growth of the Cyprinid fish, *Barbus luteus* (Heckel) locally known as "Himri" was studied. Fish was taken from the Tharthar reservoir in Iraq. The growth equation based on a total of 232 fish was as follows :

$$L_t = 38.0\ (1 - e^{-0.29\ (t-0.20)})$$

The weight-length relationship based on 212 fish was described by the following equation which indicates an isometric pattern of growth :

$$W = 0.013\ L^{3.01}$$

الخلاصة

تمت دراسة نمو أسماك الحمرى *Barbus luteus* (Heckel) المجموعة من خزان الثرثار ، العراق . كانت معادلة النمو التي استخرجت بالاعتماد على ٢٣٢ سمكة هي :

$$L_t = 38.0\ (1 - e^{-0.29\ (t-0.20)})$$

استخرجت أيضا علاقة الوزن بالطول بالاعتماد على ٢١٢ سمكة وكانت كالتالي :

$$W = 0.013\ L^{3.01}$$

مما يدل على أن نمو هذه الاسماك قياسي

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THE COMMON ROROUAL ; *BALAENOPTERA PHYSALUS* A NEW RECORD FOR THE ARAB GULF

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One whale got stranded in Khor-al-Hamra, Ras-al-Khima (UAE) on 6 April 1978 (Fig. 1). The Natural History Museum of the United Arab Emirates University was informed about the whale stranding and we visited the area and saw the whale on the next day. We were told that the whale was alive but with little movement when stranded on 6 April. By the time we reached the whale it was dead and partly putrefied by the intense sun.

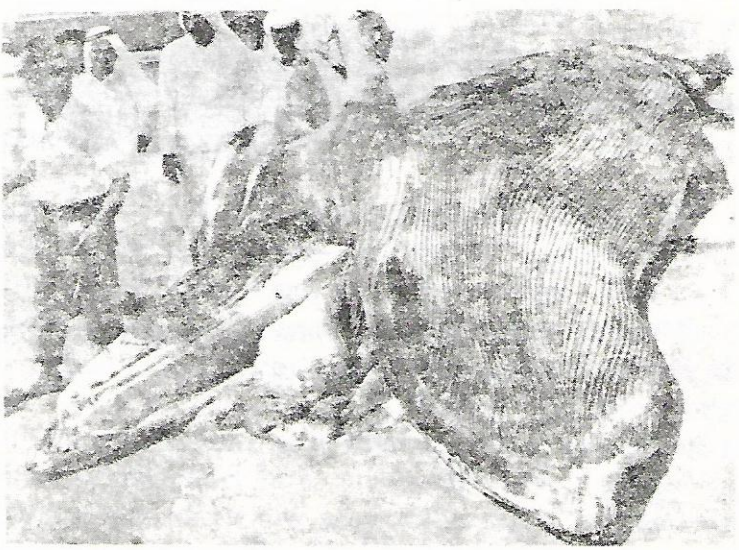

Fig. 1. *Balaenoptera physalus* stranded in Khor-al-Hamra, Ras-al-Khima on 6 April 1978. (Photo. Al-Robaae)

The overall colouration at the time of our visit was dark, the dorsal side more so than the ventral side. We photographed the specimen and took the measurements. The measurements in cm are : Total length : 1350 ; Length of flipper : 150 ; Width of flipper : 34 ; Snout to nostril : 230 ; Snout to eye : 244 ; Snout to lower jaw : 300 ; Circumference (between flipper and eyes : 500 ; Number of ventral grooves : 80 ; Length of groove (longest) : 1000 ; length of dorsal fin : 48 ; Height of dorsal fin : 40 ; and Length of penis : 120 (Fig. 2).

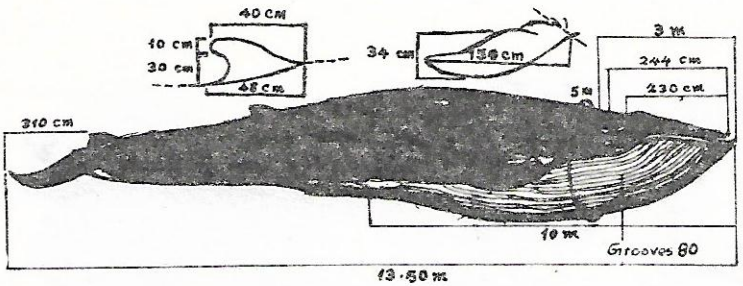

Fig. 2. Measurements of *Balaenoptera physalus* stranded in Khor-al-Hamra on 6 April 1978.

We tried to pull the whale to the dry shore but could not succeed. The cars could not reach near the whale for pulling because of the muddy loose ground. Ultimately we dug a hole bigger than the size of the whale by the side of it and rolled the whale into it and thus buried it ii the intertidal zone. After about a year the bones were dug out. The skeleton was remarkably clean of oil. We washed the bones and put in the sun on the shore for two weeks. All bones were marked to indicate their respective positions and taken to the Museum. The skeleton is iow exhibited in the Natural History Museum of the UAE University. Except for a few phalanges on both sides, the skeleton is rather complete.

Balaenoptera acutorostrata, B. edeni, and *B. borealis* have ventral grooves less than 80. Our specimen has 80 ventral grooves which comes within the range of *B. musculus* (80-100) and *B. physalus* (70-110). *B. musculus* has pale spots all over entire body and the flipper about 1/7th of the total length. The lack of spots on the body together with the relatively small flipper — 1/9th of the total length — identify our specimen as *Blaaenoptera physalus* (Linnaeus) the Common Rorqual.

Description : Total length 18.50-25 m (male on the average 60 cm longer than the female). Seen from above the front part of the head is wedge-shaped. Hind part of the back with a conspicuous dorsal ridge. Dorsal fin relatively small, but slightly larger than that of the Blue Whale. Pectoral fins *c.* 1/9 to 1/10 of the total length. 70-110 furrows underneath (agerage 85). Asymmetrically coloured ; upperside grey, underside white, right lower jaw white, left lower jaw grey ; the inside of the mouth pigmented on the right side, unpigmented on the left ;

pigmentation of the tongue also predominantly on the right. In each half of the upper jaw 320-420 baleen plates ; one-third (the front part) of the plates on the right side of the jaw are white, the others, and the baleen plates of the left jaw are dull blue-grey or striped ; the fringe is yellowish-white. The ventral surface of the pectoral fins is white (Brink 1973). The total length of our specimen 13.50 m indicates that it is an young one.

Distributon : Brink (1973) gives as : Greenland, Iceland, Spitsbergen, Bear Island to the Kara Sea and Novaya Zemlya ; Faeroes, British Isles, Ireland. Along the whole Norwegian coast. A few records in the Baltic : Sweden, Poland, Germany. North Sea ; Great Britain, Holland, Belgium, Germany, Denmark, Sweden, English Channel ; France, Spain, Portugal. Fairly regular in the Mediterraiean : France, Italy (also in the Adriatic). Azores.

The Common Rorqual inhabits all oceans, the largest population is in Antarctic ; only rarely found in coastal waters. This whale generally migrates to areas of cold water in summer for feeding and to warmer seas in the winter for breeding. The food is small crustaceans and small pelagic fishes like herring, mackerel and saury are also eaten (Ridgway, 1972).

Previous whale strandings on the coast of the UAE : I was told that about ten years back one big whale was stranded in the UAE. One nearly complete vertebral column of a whale was seen in the intertidal zone in Dayyinah island in 1978. In the same year I have also seen vertebrae of whale in Zirkuh and Arzanah islands. All these vertebrae appear to belong to species of *Balaenoptera*.

The whales recorded from the Arab Gulf todate are : *B. musculus* (Blanford, 1876 and Al-Robaae, 1971), *B. edeni* (Mahdi, 1967 and Al-Robaae, 1969) and *Megaptera novaeangliae* (Hatt, 1959). Therefore, the present finding of the Common Rorqual *Balaenoptera physalus* from the southern part of the Arab Gulf is a new record for the Arab Gulf.

SUMMARY

A new record of Stranded Balaenoptera Physalus has been made for the First time in Khor-al-Hamra, Ras al-Khaima (UAE) on April 6, 1978. Which is a new eddition to oetacean Fauna of the Arab Gulf.

ملخص البحث

حـوت الهركول Balaenoptera Physalus الذى وجـد على شواطيء خور الحمرا برأس الخيمة (دولة الامارات العربية المتحدة) يوم ٦ نيسان ١٩٧٨ هو تسجيل جديد للمرة الاولى في الخليج العربي يضـاف الى مجموعة الحيتان المسجلة في المنطقة سابقا ..

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SOIL FUNGI OF SOUTH IRAQ

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The south region of Iraq has varied ecosystems : salt marshes, cultivated lands and desert. Most of the soil types of this region of Iraq are saline alluvial (typical of deserts) with some areas having sandy soils (Guest, 1966). The climate is typically arid with hot dry summer and cool rainy winter.

Only a few preliminary investigations have been made on soil fungi of Iraq by Al-Dnoory *et al.* (1959). But these pioneering studies are on the soil mycoflora of Iraq, concentrated on area around Baghdad and central Iraq. Other studies were made by Ismail and Abdullah (1977) who isolated 37 species : 3 belonging to the Phycomycetes, 32 to the fungi Imperfecti, and 2 to the Mycelia Sterilia from soil samples collected from four localities around Basarh.

The paucity of available information on the soil fungi of the south region of Iraq calls for an extensive study of soil fungi of this region. The aim of the present investigation is to study mesophilic sugar fungal populations, their density and distribution in the south region of Iraq. This study represents the first part of a series of investigations to be undertaken by the this authors.

MATERIALS AND METHODS

Following to the method described by Johnson *et al.* (1959), ten soil samples are collected, from different localities in south region of Iraq in November 1977 and April 1978. These localities includes areas under cultivation (*Phoenix dactylifera, Cucumis sativum, Tamarix articulata* and *Lycopersicum solani*). Al-Haur, salt marshes and deserts. Soil samples (2.5 kg. each) are taken from ten spots in each locality and thoroughly mixed to form a composite sample. At each spot the samples are collected at about 5 cms from the roots of dominant plants from the surface level of a depth of about 15 cms.

The Soil samples are analyzed chemically for the estimation of total soluble salts, organic matter, and pH value. Estimation of soil fungi is carried out using the dilution plate method of Johnson *et al.* (1959), with some modifications as follows : (1) Menzeis's (1957) dipper is used instead of pipettes, (2) Modified Czapek's medium, in which glucose (10 gm per L) is replaced by sucrose to isolate sugar fungi. In all cases rose-bengal is added, as bacteriostatic agent to the medium at concentration of 1/15000 (Smith and Dawson, 1944).

Six plates are used for each soil sample. Incubation is conducted at 25°C for the isolation of mesophilic sugar fungi. The colonies of slow growing fungi which are about to be over grown as well as mycelial fragments of some colonies are transferred to fresh Czapek's + 0.05 yeast extract, soil extract or potato dextrose ager.

The cultures are kept in the culture collection of fungi at the College of Education, University of Basrah.

RESULTS

The results given in Table 1 show that south Iraqi soils are generally poor in organic matter contents. It reaches 2.8 percent in cultivated soil and drops to 0.2 percent in non-cultivated sandy soil. The total soluble salts vary greatly from a low value in desert plateau of Sannam hill 0.2 percent to a high value in the salt depression of Al-Hweir 52.9 percent. The pH value of the soil samples reveals no appreciable differences, all soil samples are alkaline and their ranges from 7.3 to 9.1.

In general, saline silty and sandy non-cultivated soils are found poor in their fungal content, while the samples collected from Al-Chebaiesh under *Phoenix dactylifera* trees possessed the highest count (Total count = 68300.0 colonies per gm dry soil). The number of propagules varies greatly from one ecosystem to another. All the soil samples do not show any regular correlation between the fungal content, or the range of fungal genera and the soil pH value.

The results represent in Table 2 show that the highest number of *Aspergilus, Penicillium* species, *Dematiaceous* and Hyaline Hyphomycetes genera are isolated from soil samples No. 7 : (6 *A.* spp. out of 12), (2 *P.* spp out of 6), (3 Dematiaceous Hyphomycetes genera out of 9) and (3 Hyaline Hyphomycetes genera out of 7) and No. 5 (5 *A.* spp. out of 12), (2 *P.* spp. out of 6), (4 Dematious Hyphomycetes genera out of 9) and (1 Hyaline Hyphomycetes genera out

of 7). These samples are silty soil which are relatively rich in organic matter and low in salinity. The least number of genera and species is recorded in soil sample No. 3 where only one species of *Penicilium* is present. Most of the soil samples show regular correlation between the count of *Aspergillus* and range of its species only.

Forty one species belonging to twenty genera are identified during the course of this investigation, Table 3. The genus *Aspergillus* is occupied the first place in count (Mean total count = 4188.1 colonies per gm dry soil) and second frequency of isolation (7 times out of 10). It is represented by 12 species and thus possessed the widest spectrum among all recovered genera. Two of these species namely ; *A. niger* and *A. sydowii* are of moderate (5 times and Mean total count = 1353.5 colonies per gm dry soil) and low occurence (2 times and Mean total count = 1721.7 colonies per gm dry soil) respectively and are by far the most dominant species. *A. candidus, A. terreus, A. versicolor,* and *A. ochraceus* are of low occurrence from 176.7 to 375.0 colonies per gm dry soil). The remaining five species are of rare occurrence. The second place in count go to *Penicillium* (Mean total count = 2548.7 colonies per gm dry soil), but it takes the first place in occurrence (isolated from all samples). Six species are identified of which *P. notatum* (recorded 8 times) and *P. vinaceum* (recorded 4 times) are most frequent. *P. roqueforti* is isolated in high count (Mean total count = 1050.0 colonies per gm dry soil), but in one sample only. The other species are less frequent. The third place in count and frequency of occurrence go to *Stachybotrys* which is represented by one species namely ; *St. atra* (Mean toal count = 993.3 colonies per gm dry soil and recorded 3 times). The fourth and fifth places in

count are recorded for *Humicola* (2 species namely ; *H. fuscoatra* (Mean total count = 883.3 colonies per gm dry soil and isolated 4 times) and *Fusarium* (Mean total count = 583.3 colonies per gm dry soil and isolated 4 times) respectively. Both *Cladosporium* (*C. herbarum*) and *Ulocladium* (2 species namely ; *U. botrytis*, and *U.* sp.) are of moderate occurrence (isoloted 4 times) and respectively constituted 307.7 and 62.5 colonies per gm dry soil. The other genera or species show very low count and occurrence. The results in Table 3 also show that there is considerable variety in the genera or species of fungi in any sample tested.

The results in Table 4 show that the cultivated soils are rich in fungal populations (Mean total count = 16525.0 colonies per gm dry soil) as compared with non-cultivated soils (Mean total count 3241.3 colonies per gm dry soil). It is also seen that the fungal populations are constituted mainly by the genera of *Aspergillus*, and *Penicillium*. *Penicillium* is more abundant in non-cultivated soil (Mean total count = 3063.5 colonies per gm dry soil and percentage = 42.2). Most of the other fungal genera are more found in cultivated soil than in non-cultivated soil.

DISCUSSION

The soil fungi of south Iraq are studied in ten soil samples collected from different localities representing ecosystems. The data reveal that most of cultivated and fertile soils have a greater populations of soil fungi as well as a wider spectrum of fungal genera or species than non-cultivated soils. Such conclusion was also reached by Al-Doory *et al.* (1959) and Ismail & Apdullah (1977).

About forty one mesophilous species belonging to eighteen genera are isolated. These fungi come under : (1) Phycomycetes (18) Ascomycetes, (15) Dematiaceous Hyphomycetes and (7) Hyaline Hyphomycetes. No selective dstribution of different soil fungi are recorded in the various ecosystems and soil types. This result is in conformity with those obtained by Ranzoni (1968), Moubasher & Moustafa (1970), Moustafa & Musallam (1975) and El-Dohlob & Abu-Ellil (1978).

The soils of south Iraq (arid region) are predominated by *Aspergillus* especially by *A. nigar* and *A. sydowii* than by any fungal genera and species identified. Moubasher & El-Dohlob (1970) showed that *Aspergillus* was more abundant in Egyptian soil in summer months. Also Moustafa & Musallam (1975), and Ismail & Abdullah (1977) observed the aboundance of *Aspergillus* in Kuwaiti and Iraqi soils respectively.

Dematiaceous Hyphomycetes is higher in count, frequency, and spectrum range of genera and species in south Iraqi soil than those of Hyaline Hyphomycetes. The prevalence of dark-coloured Deutromycetes was reported in French Sahara (Nicot, 1960), Sonoran desert, U. S. A. (Razoni, 1968) and of the arid and extreme-arid climatic belts of salt marshes, Egypt (Zahran *et al.*, 1977).

Fusarium is the most abundant genus of Hyaline Hyphomycetes in the south arid region of Iraq. Tolba (1952) and Tolba & Moubasher (1957) recorded a high prevalence of *Fusarium* among the fungi recorded from damping-off of cotton and lettuce during the summer months. Also Moubasher & El-Dohlob (1970) showed striking predominance of *Fusarium* over all the soil fungi

during June-July 1967 (the hottest months during their experimental period). *Fusarium* was frequent in Wadi El-Natrun (arid region) (El-Dohlob *et al.*, 1978).

Species of *Penicillium*, mainly represented by *P. notatum* and *P. roqueforti*, are mre abundant in non-cultivated soils.

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SUMMARY

Twenty genera and forty one species of fungi are isolated from soil samples from different ecosystems of soutn Iraq. Twelve species of *Aspergillus*, 6 of *Penicillium*, 12 of Dematiaceous, 6 of Hyaline Hyphomycetes, one genus of Phycomycetes and one genus of mycelia Sterilia namely ; *Rhizoctonia* are identified. Most of the fertile and cultivated soils show a greater population as well as a wider spectrum of genera and species than the non-cultivated soils. Most of the fungal genera and species do not show regular correlation between the count and frequency of occurrence. No selective distribution of different soil fungi are met within the various ecosystems and soil types.

Aspergillus is the most abundant genus in the soils of south Iraq and predominating in cultivated soils, but *Penicillium* is most frequently met within non-cultivated soils. Demaţiaceous are more abundant than Hyaline Hyphomycetes.

الملخص العربي

فطريات التربة في جنوب العراق

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فرع علوم الحياة ـ كلية التربية ـ جامعة البصرة

لقد تم عزل احدى وأربعين نوعا تنتمي الى عشرون جنسا من نظم بيئية مختلفة من جنوب العراق ولقد عرف أثنى عشر نوعا تنتمي الى جنس الاسبرجلس ، وستة أنواع تنتمي الى جنس البنيسيليوم ، وخمسة عشر نوعا تنتمي للفطريات السود الناقصة وسبعة أنواع تنتمي للفطريات الشفافة اللون الناقصة وجنس واحد ينتمي للفزول الفطرية العقيمة وهو رايزوكتونيا وقد أتضح من خلال هذا البحث أن الاراضي المزروعة والخصبة تحتوي على عدد أكثر ومتنوع من الاجناس والانواع من الاراضي غير المزروعة ولا توجد علاقة واضحة بين الاعداد ومدى التكرار .

ولا توجد فطريات مميزة لاي نظام بيئي ، أو نوع تربة ، ووجد أن جنس الاسبرجلس هو السائد في تربة جنوب العراق ، وأنه يسود في الاراضي المزروعة بينما البنيسيليوم يسود في الاراضي غير المزروعة . وأن الفطريات السود الناقصة تسود على الفطريات الشفافة اللون الناقصة .

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Table 1

Details of fungal collection in the soil samples tested

Soil No.	Total count	No. of genera	Locality	Ecosystem and Plant cover	Soil type	pH	Total soluble salts	Organic Compound content
1	4466.7	6	Abu Al-Khasib	*Phoenix dactylifera*	Silty	8.1	0.6	2.8
2	2816.7	7	Al-Athal	*Lacopersicum solani*	Sandy loam	8.1	1.1	1.1
3	2200.0	1	Al-Athal	*Tamarix articulata*	Sandy loam	8.8	4.0	1.2
4	93.3	6	Abu Al-Khasib	Salt marshe	Silty	8.4	20.0	1.2
5	17666.7	7	Ash-Shafi	*Cucumis sativum*	Silty	8.0	2.3	1.2
6	3200.0	3	Ad-Deir	*Phoenix dactylifera*	Silty	8.5	9.3	0.7
7	68800.0	8	Al-Chebaiesh	*Phoenix dactylifera*	Silty	7.7	0.6	2.4
8	112.0	5	Al-Hweir	Salt marshe	Silty	9.1	52.9	0.8
9	12666.7	3	Sannam hill	Non-cultivated	Sandy loam	7.3	3.9	0.7
10	93.3	8	Plateau of Sannam hill	Non-cultivated	Sandy	8.3	0.2	0.2

Soil numbers 2, 3, 9 & 10 collected in November 1977 and the rest in April, 1978.

Table 2

Details on *Aspergillus*, *Penicillium*, Dematiaceous & Hyalin Hyphomycetes in the fungal collection.

Soil No.	*Aspergillus*		*Penicillium*		Dematiaceous Hyphomycetes		Hyaline Hyphomycetes	
	Count	No. spp.	Count	No. spp.	Count	No. genera	Count	No. genera
1	533.3	2	200.0	2	1333.3	3	933.3	1
2	1166.7	5	133.3	1	1216.7	3	233.3	1
3	-	-	2100.0	1	-	-	-	-
4	-	-	76.7	1	16.7	5	-	-
5	6333.3	5	2000.0	2	5000.0	4	4333.3	1
6	600.0	1	2400.0	1	200.0	1	-	-
7	33200.0	6	6400.0	2	19600.0	3	6000.0	3
8	34.0	2	4.0	2	6.0	2	68.0	1
9	-	-	12166.7	2	333.3	1	166.7	1
10	13.3	2	6.7	2	40.0	4	6.7	2

Table 3

List of fungi identified with mean total count and occurrence

Sample No. → / Fungal organisms ↓	1	2	3	4	5	6	7	8	9	10	Mean total count	No. of Isolates	Occurrence.
Aspergillus	+	+	–	–	+	+	+	+	–	+	4188.0	7	H
A.niger Tiegh	+	–	–	–	+	+	+	+	–	–	1353.0	5	M
A.candidus Link ex Fr.	+	+	–	–	+	–	–	–	–	–	176.0	3	L
A.sydowii (Bian & Sart) Thom Church	–	+	–	–	–	–	+	–	–	–	1721.0	2	L
A.terreus Thom	–	+	–	–	+	–	+	–	–	–	375.0	3	L
A.ochraceus Wilhelm	–	–	–	–	+	–	+	–	–	–	233.0	2	L
A.versicolor (Vuill) Tirab.	–	–	–	–	+	–	+	–	–	–	193.0	2	L
A.clavatus group	–	–	–	–	–	–	+	–	–	–	40.0	1	R
A.wentii Wehmer	–	–	–	–	–	–	–	+	–	–	3.0	1	R
A.cremeous group	–	–	–	–	–	–	–	–	–	+	1.0	1	R
A.fumigatus Fres	–	+	–	–	–	–	–	–	–	–	1.7	1	R
A.carneus (Tiegh.) Blochw.	–	+	–	–	–	–	–	–	–	–	88.0	1	R
Penicillium	+	+	+	+	+	+	+	+	+	+	2548.0	10	H
P.notatum Westl.	+	–	+	–	+	+	+	+	+	+	850.0	8	H
P.vinacium Gilm & Abbott	+	+	–	–	+	–	+	–	–	–	639.0	4	M
P.roqueforti Thom	–	–	–	–	–	–	–	–	+	–	1050.0	1	R
P.oxalicum Currie & Thom	–	–	–	+	–	–	–	–	–	–	8.0	1	R

Table 3 (contd..)

List of fungi identified with mean total count and occurrence

Sample No. → / Fungal organisms ↓	1	2	3	4	5	6	7	8	9	10	Mean total count	No.of isolates	Occurrence
Stachybotrys atra Corda	–	–	–	+	+	–	+	–	–	–	993.0	3	L
Humicola	+	+	–	–	–	+	+	–	–	–	883.0	4	M
H.grisea Traaen	+	+	–	–	–	+	–	–	–	–	123.0	3	L
H.fuscoatra Traaen	–	–	–	–	–	–	+	–	–	–	760.0	1	R
Cladosporium herbarum (Pres.) Link-ex S.F.Gray	–	–	–	+	+	–	+	+	–	–	407.7	5	M
Ulocladium	+	–	–	+	–	–	–	–	+	+	62.5	4	M
U.botrytis Preuss	–	–	–	+	–	–	–	–	+	+	35.8	3	L
U.sp.	+	–	–	–	–	–	–	–	–	–	26.7	1	R
Alternaria	–	–	–	+	+	–	–	–	–	+	367.2	3	L
A.alternate (Fr.) Keiss	–	–	–	+	+	–	–	–	–	–	366.8	2	L
Scytalidium	+	–	–	+	+	–	–	–	–	+	41.2	4	M
S.lignicola Presante	+	–	–	+	+	–	–	–	–	–	40.2	3	L
Papulospora sp.	–	+	–	–	–	–	–	–	–	–	113.3	1	R
Pleospora herbarum (Pres.ex Fr.) Rabenh	–	+	–	–	–	–	–	–	–	–	5.0	1	R
Fusarium spp.	+	–	–	–	+	–	+	–	+	–	583.3	4	M
Cephalosporium roseoriseum Saksena	–	–	–	–	–	–	+	–	–	–	440.0	1	R
Verticillium punicéum Cook & Ellis	–	–	–	–	–	–	+	–	–	–	120.0	1	R
Trichosporella sp.	–	–	–	–	–	–	–	+	–	–	6.8	1	R
Mucor sp.	–	+	–	–	–	–	–	–	–	–	6.7	1	R
Rhizoctonia sp.	–	+	–	–	–	–	–	–	–	–	23.3	1	R

Table 4

Dominant general found in cultivated and non-cultivated soils

Ecosystem → / Fungal genera ↓	Cultivated		Non-cultivated	
	Mean total count	Percentage	Mean total count	Percentage
Penicillium	2205.6	13.3	3063.5	94.5
Aspergillus	6972.2	42.2	11.8	0.3
Ulocladium	44.4	0.3	89.6	2.7
Cladosporium	511.1	3.0	2.7	0.1
Alternaria	611.1	3.7	2.0	0.1
Humicola	1472.2	8.9	-	-
Stachybotrys	1655.6	10.0	0.4	0.01
Scytalidium	66.7	0.4	2.9	0.1
Trimmatostroma	-	-	0.5	0.1
Pleospora	8.3	0.05	-	-
Papulospora	188.9	1.1	-	-
Fusarium	944.4	5.7	41.7	1.3
Cephalosporium	733.3	4.4	-	-
Verticillium	200.0	1.2	-	-
Botryotrichum	-	-	0.8	0.03
Beniowskia	-	-	0.8	0.03
Trichosporiella	-	-	17.0	0.5
Rhizoctonia	38.9	0.2	-	-
Mucor	11.1	0.1	-	-
Mean total count	16525.0		3241.3	

Aspergillus versicolor group, *Pencillium frequants* series, *P. aurantiacandidum*, *Alternaria* spp 1 & 2, *Scytalidium thermophyllium*, *S.* sp, *Beniowskia* sp., *Botryotrichum piluferum*, and *Trimmatostroma betulinum* are found in less than one in mean total count.

Occurrence : H = High ; More than 5 cases out of 10, M = Moderate ; 5 — 4 cases out of 10, L = low ; 3 — 2 cases out of 10 and R = rare ; less than 2.

Table 4. Dominant genera found in cultivated and in non-cultivated soils.

TWO NEW SPECIES OF *ERGASILUS* (COPEPODA : CYCLOPOIDA) FROM THE GILLS OF TWO IRAQI FRESHWATER FISHES.

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INTRODUCTION

While surveying the parasites of some Iraqi fishes, many ergasilid specimens were collected from the gills of two cyprinid fishes : *Barbus grypus* Heckel and *Cyprinion macrostomus* Heckel. Specimens were killed and fixed in 70% alcohol, stained either with borax carmine or acetocarmine. Measurements are in microns based on 10 specimens of each and are made by the help of stage micrometer using both low power and high power objectives. Some specimens were examined in glycerine and glycerine jelly for the counting and details of thoracic spines and setae. Drawings were made with the aid of the camera lucida.

Ergasilus barbi Sp. n. (Figs. 1-8)

Description : Female measurements as in Table 1. Cephalothorax lacking pronounced inflation, longer than wde (fig. 1). Head and first thoracic segment fused by a marked distinct groove. Antennal area projecting. Free

Table (1). Measurements of *E. barbi* sp. n. adult femals (in microns). Measurements based on 10 specimens.

	Mean	Range
Total length (excluding egg sac and setae)	1180	1020-1650
Cephalothorax length	470	440-490
width	310	284-328
Genital segment length	84	80-92
width	90	72-1000
Egg sac length	621	570-701
Abdomine length	87	71.6-101
Caudal rami length	22	20-24
width	21	20-22
Anntenule length	133	110-155
Antenna length	654	590-670

Table (2). Measurements of *E. mosulensis* sp. n. adult female. Measurements base on 10 specimens (in microns).

	Mean	Range
Total length (excluding egg sac and setae)	1520	1450-1620
Cephalothorax length	485	264-320
width	371	340-393
Genital segment length	90	80-100
width	86	84-88
Egg sac length	676	672-680
Abdomine length	21	20-24
Caudal rami length	21	20-24
width	18	16-20
Antennule length	126	100-150
Antenna length	500	450-600

thoracic 4 segments decreasing regularly in size and they are easily distinguished by a relatively shallow grooves. Ratio of widths of the 4 thoracic segments (3 : 2 : 1). Fifth segment compressed and difficult to be seen. Thoracic sternites 1 to 4 contains no spinules. Genital segment rounded, wider than long (fig. 8). Caudal rami cylindrical, longer than wide. Each ramus bears a long and stout seta medially, a relatively short seta laterally and 2 short setae ventrally.

Antennules 6-segmented (fig. 2), weakly tapering distally, with numerous simple long setae, those medially located more longer and stouter. Prehensile antenna (fig. 3), 4-segmented length relation (1 : 2 : 1). Basal segment short and stout, triangular in shape. Second segment subrectangular, with largest lenth, slightly tapering toward distal end and its maximal width at its proximal third. Third segment with more clear curvature at its distal end. Fourth segment smoothed and its smallest segment, curved to form a hook-like structure with a finely pointed end. Articulation between third and fourth segments bearing a lartge cuticle thickening and a knob on medial surface.

Leg 1 rami (fig. 4). Coxa rectangular, with distolateral spine. Exopod 3-jointed First segment with small distolateral spine. Second segment with 1 small spine on distolateral margin and a short seta located at distomedial margin. Third segment with 5 medial seta, most medial three abruptly ended, and 2 distolateral spines, the inner one is longer. Endipod 3-jointed. First segment, its lateral margin without spines but with a seta projecting from the middle of medial margin. Second segment with no spines located on lateral margin but with 1 seta on

medial margin. Third segment with 2 distolateral spine, the most outer is smaller and with 4 short setae on distomedial margin. Spine seta formula :

Exopod, I-0, I-1, II-5.

Endopod, 0-1, 0-1, II-4.

Leg 2 rami (fig. 5). Coxa similar to leg 1. First segment exopod with 1 distolateral spine and without setae on medial margin. Second segment without spine on distolateral margin but with 2 medial setae. Third segment with 1 small spine on distomedial margin and 6 terminal setae, 5 of them abruptly pointed. Endopod 3-segmented. First segment with a raw of ciliation on lateral margin and 1 medial seta at midpoint. Second segment without spine but with 1 small seta located medially. Third segment with 2 spines on distolateral margin and 4 long setae subterminally located. Spine seta formula :

Exopod, I-0, 0-2, I-6.

Endopod, 0-1, 0-1, II-4.

Leg 3 rami (fig. 6). Coxa similar to leg 1. Exopod 3-segmented. First segment with 1 distolateral spine, no setae located. Second segment without spine but with 1 seta medially located. Third segment with 6 distomedial setae, the most medial 5 abruptly pointed. Endopod 3-segmented. First segment with a row of cilia on lateral margin and 1 short seta on distomedial margin. Second segment with 1 spine on distomedial margin and 6 terminal setae, 4 of them abruptly pointed. Spine seta formula :

Exopod, I-0, 0-1, 0-6.

Endopod, 0-1, 0-2, I-6.

Leg 4 rami (figt. 7). Exopod 2-segmented. First segment with 1 spine located distolaterally and with no

seta on medial margin. Second segment without spine but with 5 long terminal setae. Endopod 3-segmented. First segment without spine but with 2 setae on medial margin. Third segment with 1 spine and 4 terminal setae the most medial abruptly pointed. Spine seta formula :

Exopod, I-0, 0-5.

Endopod, 0-1, 02, I-4.

Leg 5 rami (fig. 8). It consist of 2 small setae born on a separately small papillae.

Mouth parts : Mandible basal segment subrectangular, unornamented with a terminal spine. Terminal segment plumose, more coaresly beset with bristles as the inner margin. Palp with pectinal inner margin. First maxillam rounded to oval in shape bearing two setae. Second maxilla with a large triangular basal segment. Terminal segment with coarse bristles covering distal end.

Male : Unknown

Host : *Barbus grypus* Heckel

Location : Gills

Locality : River Tigris, Mosul (North Iraq).

Types : Type and paratype are deposited at parasitology section, Department of Biology, College of Science, Mosul, Iraq. Five specimens are deposited at Crustacea Section, British Museum (N. H.), London.

Ergasilus mosulensis sp. n. (fig. 9-16)

Description : Female measurements are given in Table 2. Cephalon lacking inuation, longer than wide (fig. 9). Head and first thoracic segment fused by marked groove.

Thoracic segments decreased regularly in size. Widths of 4 free thoracic segments ratio (3.5 : 2.1 : 1.5 : 1). Fifth segment compressed, difficult to be seen. Genital segment longer than wide, no decoration present. Three abdominal segments present without spinules. Third segment divided bears a long seta medially, a short seta laterally on the distal edge, and two smaller setae ventrally, spinules absent.

First antenna 6-segmented and weakly tapering, with a tuft of long setae, especially those located distolaterally (fig. 10). Second antenna 4-segmented, length relation 1 : 2 : 1.5 : 1 (fig. 11). Basal segment rectangular. Second segment enlarged, wide diminishing in size distally. Third segment with a small swelling at its base near its joint with the second segment with clear curvature. Two senssillia existed on its inner margin. Terminal segment unornamented, finely pointed with short curvature to make with the 3rd segment a distinct hook.

Leg 1 rami (fig. 12). Coxa rectangular lacking ornamentation with a distelateral spine. Exopod 3-segmented, no any spinules on both coxa basis. First segment with 1 small spine and without seta medially. Second segment with 1 small spine on distolateral margin and with 1 long seta medially located. Third segment with two long spines on distolateral margin and 5 long setae on medial margin. Endopod 3-segmented. First segment wth 1 seta on medial margin. Second segment without spine but with 1 medial seta. Third segment with 2 long spines and 4 setae terminally located. Arrangment of spine seta formula :

Exopod, I-0, I-1, II-5.

Endopod, 0-1, 0-1, II-4.

Leg 2 rami (fig. 13). Coxa similar to leg 1. Exopod 3-segmented. First segment with 1 small spine on distolateral margin, without seta medially. Second segment with 1 small spine on distolateral margin and 1 long seta located medially at the middle of the segment. Third segment without any spine but with 6 long setae located medially. Endopod 3-segmented. First segment without spines but with 1 long seta located on distomedial margin. Second segment without spines but with 2 long setae located at distomedial margin. Third segment with 1 spine and 4 terminal long setae. Spine seta formula :

Exopod, I-0, I-1, 0-6.

Endopod, 0-1, 0-2, I-4.

Leg 3 rami (fig. 14). Coxa and basis similar to leg 1. Exopod 3-segmented. First segment without spine and without seta. Second segment without spines but with 1 long seta located medially on the middle of the segment. Third segment without spines but with 6 long setae located medially. Endopod 3-segmented. First segment without spines but with 1 long seta located medially at the middle of the segment. Second segment without spines but with 2 long setae located on medial margin. Third segment with 1 small spine on distolateral margin. Third segment with 1 small spine on distolateral margin and 4 terminal setae on distomedial margin. Spine seta formula :

Exopod 0-0, 0-1, 0-6.

Endpood, 0-1, 0-2, I-4.

Leg 4 rami (fig. 15). Coxa and basis similar to leg 1. Exopod 2-segmented. First segment with 1 small spine but without setae. Second segment with 5 subterminal long setae. Endopod 3-segmented. First segment without

spine but with 1 long seta located on distomedial margin. Second segment without spines but with 2 long setae on medial margin. Third segment with 1 distal long spine and 4 subterminal setae. Spine seta formula :

Exopod, I-0, 0-5.

Endopod, 0-1, 0-2, I-4.

Leg 5 rami (fig. 16). Represented by 2 small setae at terminal end, each one on a separate small papillae.

Mouthparts, mandible 2-segmented, basal segment subrectally unornamented with terminal spine. Terminal segment plumose, more coarsely beset with bristles on the inner margin. Palp with pectinate inner margin. First maxillae rounded to ovoid bearing basal segment. Terminal segment with coarse bristles on the inner margin. Palp with pectinate inner margin. First maxilla rounded to ovoid bearing basal segment. Terminal segment with coarse bristles covering distal end.

Male : Unknown

Location : Gills

Locality : River Tigris, Mosul (North Iraq).

Types : Type and paratype are deposited at parasitology section, Department of Biology, College of Science, University of Mosul, Iraq. Eight specimens are deposited at Crustacea Section (British Museum, N. H.), London.

Discussion

Ergasilus barbi sp. n.

In total length the present parasite resemble to that of *Ergasilus clupeidarum* Johnson and Rogers, 1972 :

E. flaccidus Fryer, 1965 and *E. latus* Fryer, 1960. The present form has 2-segmented exopod of fourth thoracic leg which resemble that of *E. flaccidus* ; *E. kandti* Van Dauwe (Redescribed by Fryer, 1965) ; *E. rhinose* Burris and Miller, 1972.

Genital segment is wider than long, which is similar to that of *E. tenax* Roberts, 1965 ; *E. inflatipes* Cressey and Collette, 1970 and *E. wareaglei*, 1971.

In this species the cephalon is constricted to an anterior and a posterior portion. Antenna and some other feature of this parasite correspond to that of *E. latus* described by Fryer, 1960 from African freshwater fishes. A similar swelling is seen at the vicinity of the joint of second and third segments. But this swelling is not conspicous as that of *E. nodulosus* (Wilson, 1911). Nevertheless, the present form differs from *E. latus* in being larger in size, without such broad fifth leg and so much characterstic bend near proximal end of the longest furcal seta. In spine seta formula the following differences are noted.

		E. latus			E. barbi		
Leg 1	exo	0-0	I-1	II-5	I-0	I-1	II-5
	endo	0-1	0-1	II-4	0-1	0-1	II-4
Leg 2	exo	0-0	0-1	0-6	I-0	0-2	I-6
	endo	0-1	0-2	I-4	0-1	0-1	II-4
Leg 3	exo	0-0	0-1	0-6	I-0	0-1	0-6
	endo	0-1	0-2	I-4	0-1	0-2	I-6
Leg 4	exo	I-0	0-5	——	I-0	0-5	——
	endo	0-1	0-2	I-3	0-1	0-2	I-4

Note : The Latin numerals indicating the number of spines, while Arabic numerals indicating number of setae.

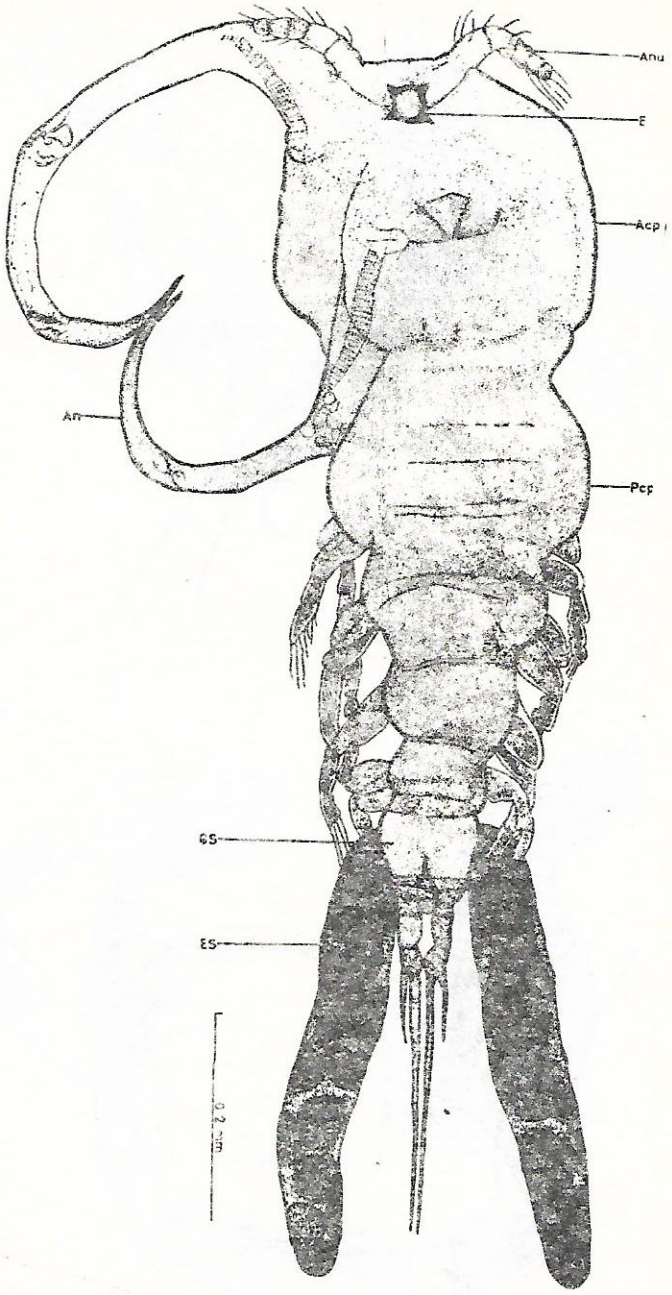
Ergasilus mosulensis sp. n.

The record of Johnson and Rogers (1972) is considered the first one on ergasils from Mugilidae in U. S. A. They synopsied *Ergasilus* of America, reporting ergasilids of 2-jointed endopodal type parasitising *Mugil* species along the gulf of Atlantic coasts. They also considered *E. iizac* Kroyer 1963 as a synonem of *E. versicolor* of Wilson, 1911 and *E. mugilus* Vogt, 1877.

The present type was reported from *Liza abu* Heckel, from Iraq while *E. seiboldi* is the first species reported from Iraq and from neighbouring countries (Herzog, 1969 : Shamsuddin, 1971 ; Beckman, 1962 and Boxshall, 1976).

Ergasilus versicolor in its pigmentation, 2-jointed endopodal segment of 4th swimming leg, absence of knobs from antenna, ratio between terminal and subterminal segment of the antenna (= straight line) less than 2 times. Accordingly many differences exist between the present parasite and that of *E. versicolor*. For instance cephalon constriction into two portions, a distinct deep groove, antennal segment shorter and wider, shorter egg sac string. The comparsion between the two species in spine setae formula as in the following :

		E. versicolor			*E. mosulensis*		
Leg 1	exo	I-0	0-1	II-4	I-0	I-1	II-5
	endo	0-1	0-2	I-3	0-1	0-1	II-4
Leg 2	exo	I-0	0-1	I-4	I-0	I-1	0-6
	endo	0-1	0-2	II-4	0-1	0-2	I-4
Leg 3	exo	I-0	0-1	I-5	0-0	0-1	0-6
	endo	0-1	0-2	I-4	0-1	0-2	I-4
Leg 4	exo	0-0	I-5	——	I-0	0-5	——
	endo	0-1	0-2	I-3	0-1	0-2	I-4



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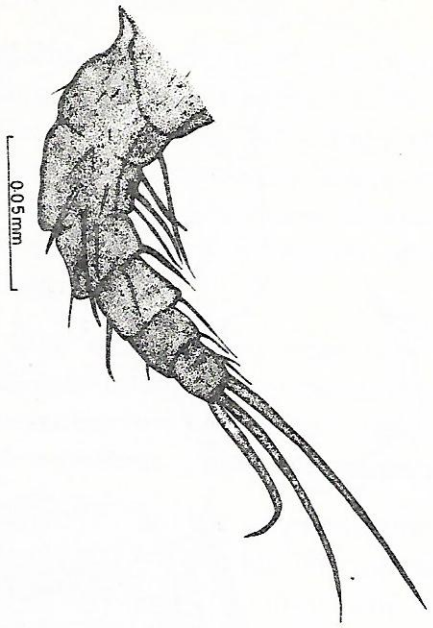

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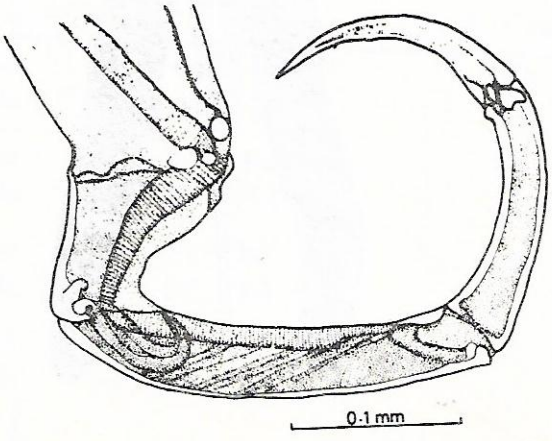

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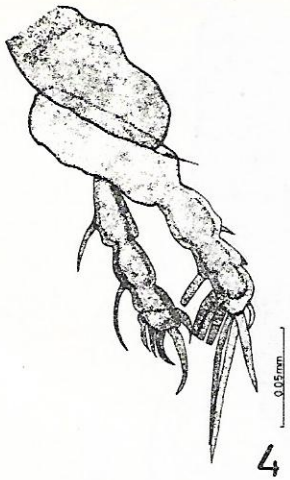

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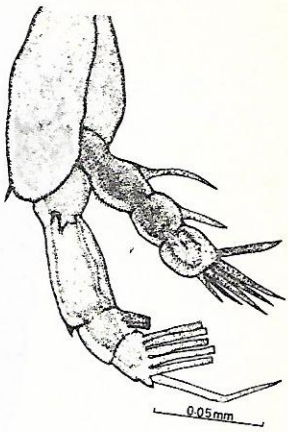

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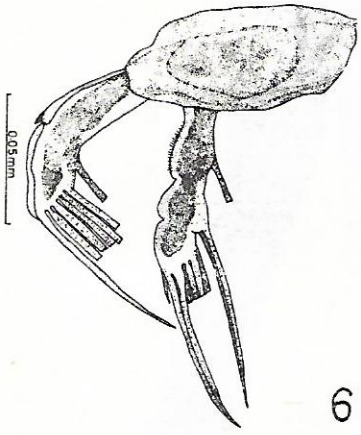

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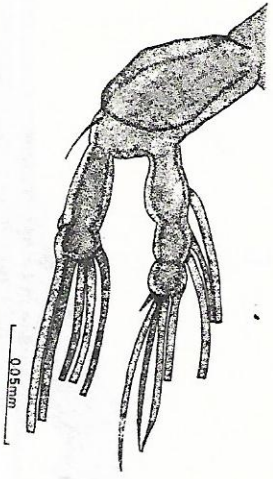

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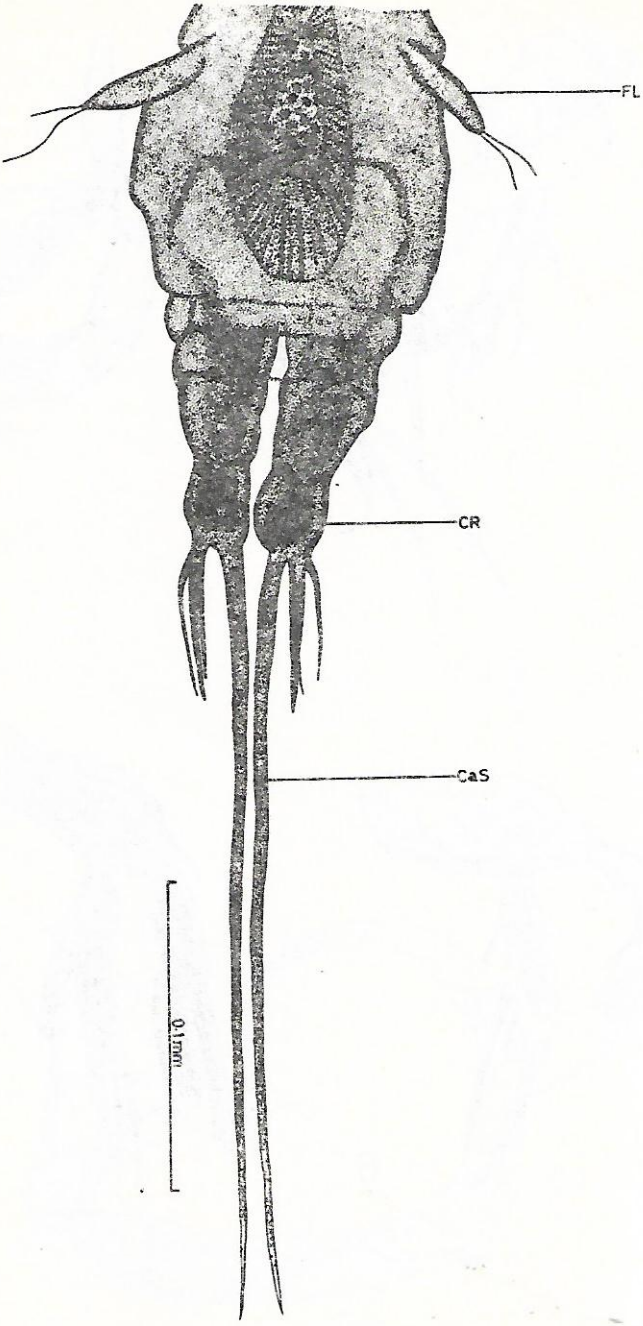

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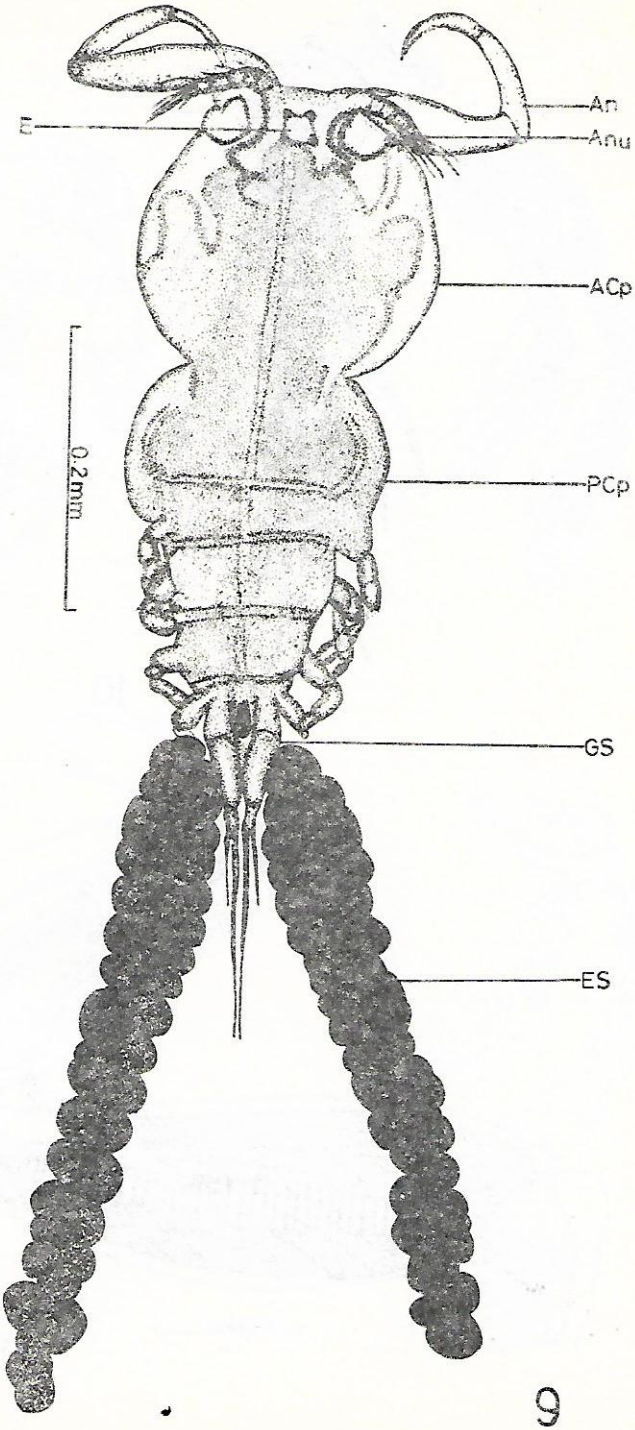

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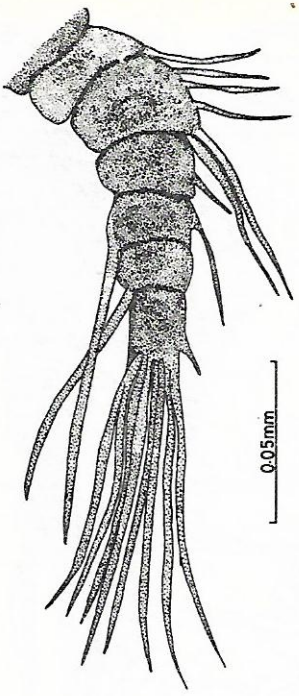

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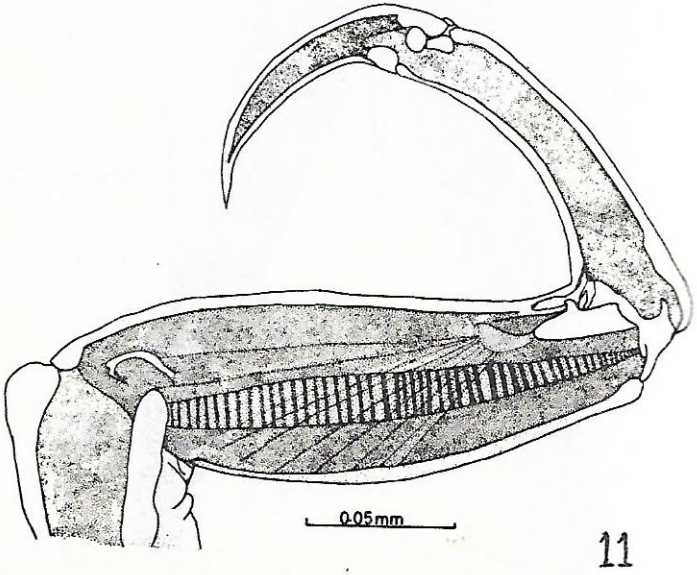

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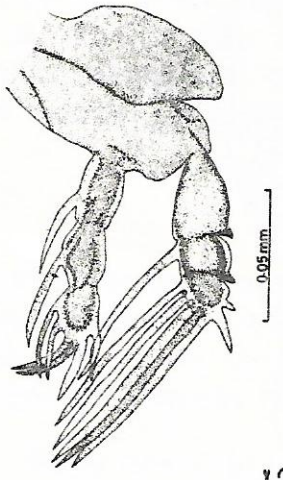

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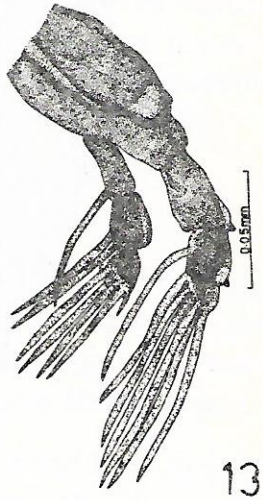

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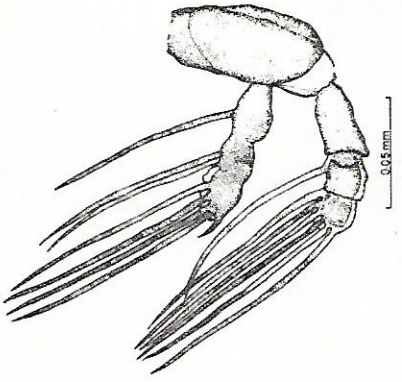

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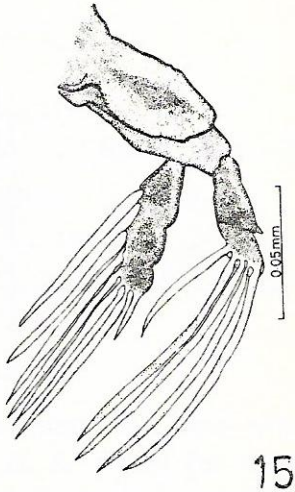

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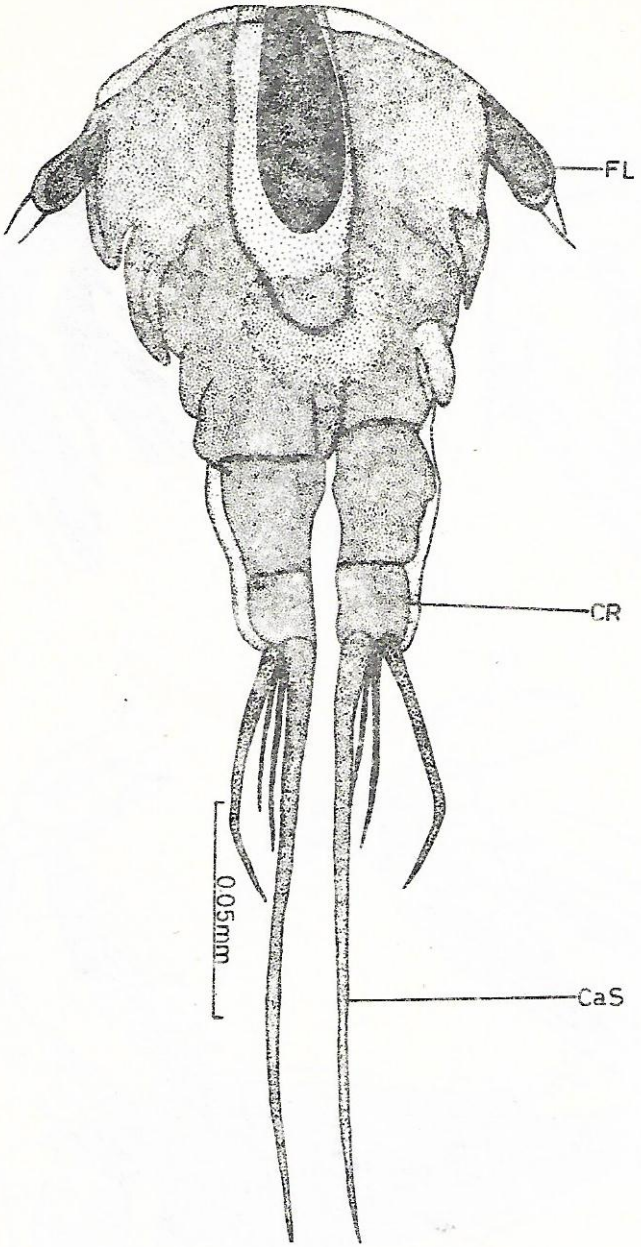

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The present parasite differs also from *E. barbi* in many characters, for instance ; the antenna of *E. barbi* is longer and slender, shape of posterior part of constricted cephalon is subrectangular and in antennal segments relation in their lengths. In cephalon constriction seem possible that they are conspecific (Boxshall, per. comm., 1975).

SUMMARY

Two new species of Copepode *Ergasilus barbi* and *E. mosulensis* have been reported from the gills of two freshwater fishes *Barbus grypus* Heckel and *Cyprinion macrostomus* Heckel from the river Tigris Mosul, Iraq.

Study reveals general description of the body and the appendages like antennae and the legs of these two species.

الخلاصة

يتضمن هذا البحث وصف لنوعين جديدين من القشريات *Ergasilus barbi* و *E. mosulensis* التي وجدت على غلاصم نوعين من الاسماك النهرية (*Cyprinion macrostomus, Barbus grypus*) المصطادة من نهر دجلة في محافظة الموصل كذلك تضمن البحث على التوالي) وصف شامل لاجزاء الجسم وبالخصوص اللواحق كاللوامس والارجل للنوعين ..

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The author would like to acknowledge the help provided by both Dr. M. H. Kasim and A. A. Warsi for their help and encouragement. The thanks are also extended to Dr. F. A. Al-Omar, Dean of College of Science for providing facilities.

The author also would to thank Dr. G. A. Boxshall (British Museum) for his valuable help by confirming the identification of the new species.

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NORTHEAST EXTENSION OF THE GEOGRAPHIC DISTRIBUTION OF FENNEC FOX *FENNECUS ZERDA* ZIMMERMANN IN THE ARABIAN PENINSULA

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On 11 July 1975, a small fox which looked like a youngoue was spotted around 17 : 30 hrs in plain desert with stunted vegetation near Jabal Sanam, 30 km northeast of Basrah, south Iraq. We chased the fox in a vehicle and on approach I identified it as Fennec fox for its large ears and pallid colouration and it was shot and collected (Fig. 1). It was a male and the identification was confirmed *as Fennecus zerda* Zimmermann. The specimen is kept in the mammal collection of the museum. The measurements in cm are : TL : 56 ; T : 20 ; HF : 8 ; FF : 11 ; and E : 8.5.

Fig. 1. *Fennecus zerda* collected near Jabal Sanam, south Iraq on 11 July 1975. (Photo. Al-Robaae)

In 1977 a live Fennec fox was brought to the Zoo at the United Arab Emirates by a desert man who cought it alive on 27 July from near Jabal Hafit at the border of United Arab Emirates with Oman. This specimen (Fig. 2) is at present alive and is kept in the Zoological Garden, Al-Ain, at UAE.

The Fennec fox is the smallest fox occurring in Arabia, the hind foot measures 92-98 mm and the greatest length of the skull 80-87 mm. The ears are relatively very large and uniformly coloured. The general colour is very pallid and the pelage even softer and finer than that of *Vulpes ruppelli. The* skull is characterized by its very large tympanic bullae, the dimensions of this structure (about 22 X 15 mm) actually exceeding those of *V. ruppelli,* which has a much larger skull. The braincase is relatively more inflated in *F. zerda* and smoother, with scarcely any trace of the sagittal crest. The dentition is weak (Harrison, 1968).

Fig. 2. *Fennecus zerda* caught on 27 July 1977 near Jabal Hafit, UAE and exhibited in the Zoological Garden, Al-Ain, UAE. (Photo. Al-Robaae)

Distribution : Harrison (1968) gives as : "the deserts of N. Africa, from Morocco, Algeria, Libya and Egypt, south to Sudan and Asben and in the Arabian peninsula."
In the Arabian peninsula the occurrence of the Fennec fox is rare. There are only two records : Flower (1932) states of Col. W. V. Nugent obtaining two specimens in N. Sinai on 18 March 1910 and Hatt (1959) mentions of Morrison-Scott's (1939 : 199) reference of a specimen found near Kuwait and which is at present in the British Museum (Natural History).

The present finding of the Fennec fox from near Jabal Sanam, south Iraq and near Jabal Hafit, United Arab Emirates form additions to the mammalian fauna of these two countries. Further the occurrence of the Fennec fox in the United Arab Emirates may indicate a northeast extension of the geographical distribution of this species within recent times (Fig. 3).

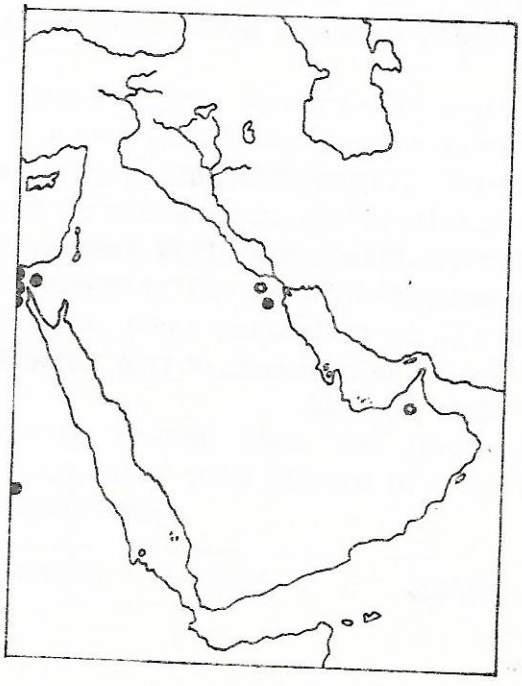

Fig. 3. Distribution of *Fennecus zerda* in the Arabian peninsula : previous records, 0 : new records.

SUMMARY

Occureuce of Fennec Fox from UAE and Iraq is a new addition to the mammalian Fauna of Arab Pennisila. It fur Thershows that the species has been secently introdused in north -- east region, since there was no earlier record of it.

ملخص البحث

في هذا البحث تأكيد لوجود ثعلب الفنك في الشمال الشرقي من شبه الجزيرة العربية وخاصة في العراق ودولة الامارات العربية المتحدة فان البحث يضيف تسجيلا جديدا لانتشار الحيوان في أراضي دولة الامارات للمرة الاولى ..

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INCIDENCE OF THE HOUSE SPARROW NESTING ON METAL POLES IN SEMI-ARID REGION OF SOUTH IRAQ

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The House Sparrow *Passer domesticus* (Linnaeus) is well known to nest in holes in dwellings and trees, or in the open in trees, close to human habitation. The records of the nesting on metal structures exposed to direct sun are limited. Summers-Smith (1967) considers lamp-posts as an unusual nest site. Allouse (1962) mentions of the House Sparrow nesting "on telegraph poles sometimes".

During the field trips conducted in south Iraq I have often come across the House Sparrow nesting on metal electric and telegraph poles since 1973. Earlier (1966-'72) I have found them nesting in similar situations in central Iraq. The present study was therefore, undertaken to examine the extent of the nesting behaviour of the House Sparrow on metal poles, particularly on the electric poles, exposed to sun.

The survey showed that the House Sparrow is commonly using metal poles exposed to direct solar radiation as breeding site.

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MATERIAL AND METHOD

The metal poles carrying power and telegraph lines on either sides of the Basrah-Baghdad highway between Basrah and Shafi (South Iraq) covering a distance of about 50 km were surveyed (Fig. 4) for the nesting of the House Sparrow. The area has over 650 electric poles and an almost equal number of telegraph poles. Two initial surveys (July and October, 1977) conducted helped me to sort out a plan for recording the data. Observations were made mostly in the forenoon by noting down the presence or absence of birds or nest on poles.

Fig. 4. Basrah-Shafi road where the incidence of the House Sparrow nesting on metal poles was studied (1977-'79).

A total of 54 surveys were made between March 1978 and July 1979, an average of five per month. No observations were made in August and January.

RESULTS

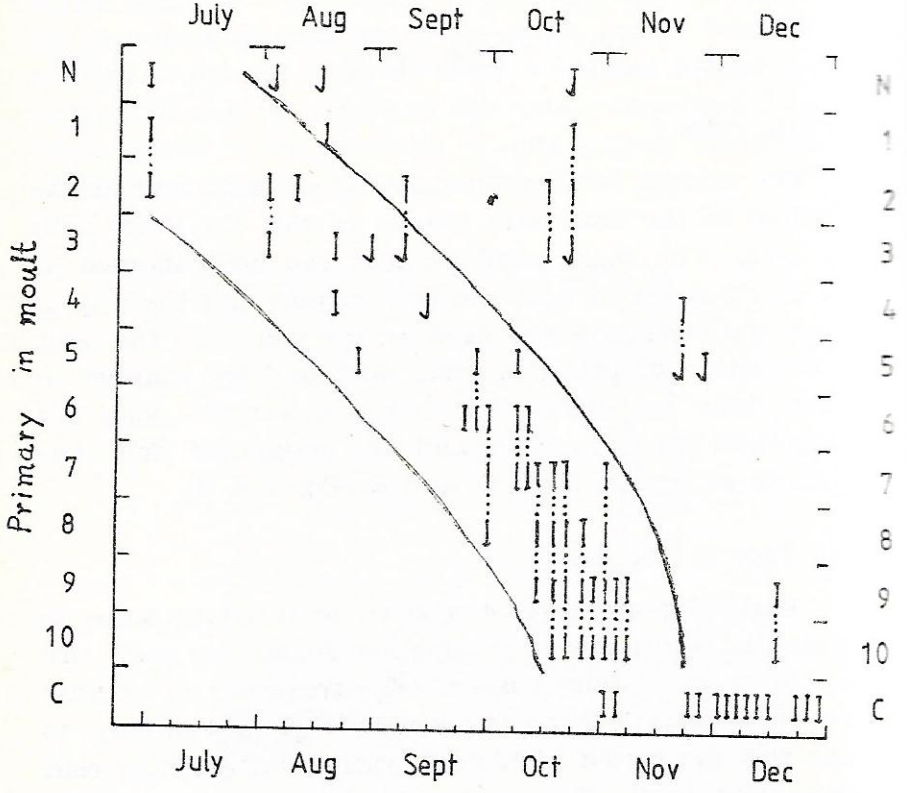
Electric Poles :

The nesting location in majority of cases was at the junction of the cross arm (which carried the lines) with the pole. The space available and the hold afforded at the junction varied with the type of pole and the way in which the cross arm was fixed on the pole. On the basis of the shape of pole and cross arm, and the manner in which both are joined together, the electric poles are categorized into five types and are designated for convenience as type A, B, C, D, and E (Fig. 5 & 6).

Pole Type A (Fig. 5A)

Particular attention was given to this type so as to obtain the frequency of occupation round the year. All the 197 poles contained nests. The frequency of occupation on a monthly basis is given in Fig. 1. February to June was the period of highest occupation reaching cent per cent in April. This was reduced to an average of 43 per cent (range 31-54) during the nonbreeding season (October to December).

One nest was the usual number in a pole. However, two or three poles were found to have been occupied by four birds each ; one pair on the left and another on the right side of the cross arm. These poles probably contained two nests.


July
Aug
Sept
Oct
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N
1
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4
5
6
7
8
9
10
C
Primary in moult

Pole Type B (Fig. 5B)

This pole was similar to A type ?ut for the different fixture of the cross arm. The pole-cross arm junction due to its fixture did not give any hold for the nest material and therefore none of the 153 poles of this type possessed nest or found to have been occupied by birds.

Pole Type C (Fig. 6C)

The hold provided by the pole-cross arm junction was slight compared to type A poles. The prevailing wind at the beginning of the breeding season together with the slight hold at the nesting site made the nest making real difficult and hence only those birds with dogged persistence succeeded in breeding in this type of pole. Occupation of these poles during 1978 is shown in Fig. 2. In the third week of March although birds were occupying nest sites no nests were present. Out of the 201 poles eighteen contained nest in June, the highest number for the year. This was reduced to six by the third week of November. Eventhough a few nests were present in early 1979, all were found lost by end of February. New nests were under making in the second week of March.

Partically all nests in these poles were lost (dislodged by wind) in winter or early spring and new nests had to be built for subsequent breeding.

Only one nest was found per pole except in one instance, where two were present one each on either side of the pole.

Pole Type D (Fig. 6D)

In this type the pole-cross arm junction did not furnish any hold for nest mnaterial. However, in 1178 one

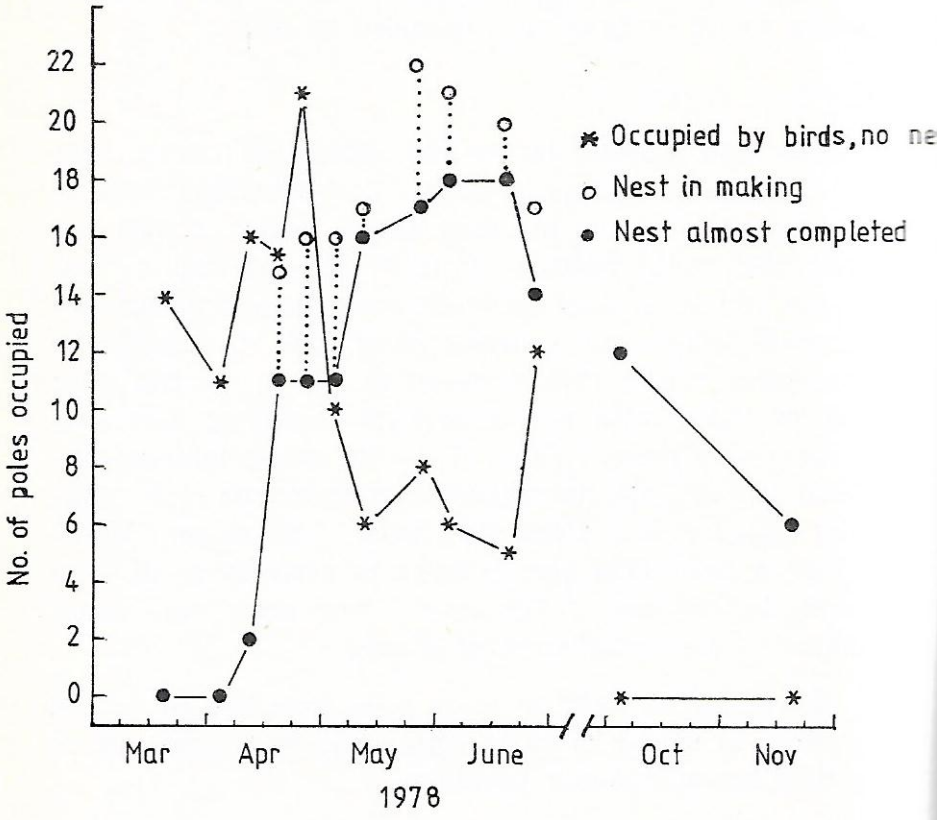

Fig. 2. Weekly frequency of occupation of pole type C.

pair managed with great difficulty to make a nest half way through (Fig. 7A), but was soon dislodged by wind. Except this no nest was found in the 72 poles.

Pole Type E (Fig. 6E)

This pole was made out of four angular beams welded together. The space available in between the beams along the pole was used for nesting from two metres upwards. All the 26 poles contained nests varying in number from one to six. These poles were found usually between poles of A and B type, after every ten or so of the A and B type.

In addition transformers (Fig. 8A), side lines (Fig. 8B), lamp shades, and any other structures which furnished a hold for nest material on electric poles were found to be utilized for nesting (Fig. 9).

Telegraph Poles :

No regular survey was done on telegraph poles. The most commonly used poles for nesting were those with open top, which lacked a cap (Fig. 10A). A good number of poles lacked the top cover. The sparrows used the tube for nesting. In such cases the nest appeared to be placed close to the top for in many cases the sitting bird's tail was projecting out from the top and the feeding was found to be made by the parent sitting on the rim of the tube. Upto 61 poles were found occupied by birds on 18 March 1979.

The other place appropriated for nesting was among the lines close to the pole (Fig. 10B) or on the cross arm (Fig. 10C). Such nests were not many, the highest number noted was fifteen (5 June 1979) and these nests were found lost in winter as in the case of electric pole type C

and the birds had to make new nests for the next breeding which they did.

Egg-laying Period :

The egg-laying period of the House Sparrow in Iraq is not well defined. Ticehurst *et al.* (1921 & 1926) record of young being fed on 19 April, and six and four eggs on 12 and 22 June respectively. Allouse (1962) mentions of a nest with four eggs on 4 July and two or more broods in a season.

My records are : Earliest date for laying : 24 & 26 March (Baghdad) and mid March (Basrah). Latest date for laying : 17, 18, 20, & 21 July (Baghdad) and mid June (Basrah). In both localities majority of the laying occurred between April and June. Number of broods reared : two common, three not unusual, four (once) ; none of the birds were marked for reasons of saftey of the bird, broods were reared one after another in the same nest.

Thus the egg-laying season of the House Sparrow in central and south Iraq lasts from mid March to third of July for a period of $4\frac{1}{4}$ months. The broods reared are usually two, three not uncommon, and four is also on record.

DISCUSSION

The Basrah-Shafi road, the area where the survey of the utilization of metal poles by the House Sparrow for nesting was made, passes between the marshes on the west and the Tigris river on the east. Both the marshes and the river lie at a distance varying from one half to two kilometres from the road.

The electric lines were drawn in the area around 1958 when the marshes reached close to the road at the highest water level in summer. Presumably at that time, if the nesting had started then, the area had a better and congenial climate for breeding activities. As flood protection the embankments were constructed around 1960 on the marsh side at a distance varying from one to two kilometres from the road. At present the road side is dry and normally from May to end of September the area experiences a hot to very hot climate (Fig. 3).

The proximity of human habitation varied from close to the road upto a distance of one to two kilometres. Except for a few instances the settlements are mostly confined to the river side of the road. The wind blowing from the marsh should play an ameliorative role in reducing the prevailing high temperature in summer. However, the windless hot days are not uncommon which could play havoc on breeding activities of the Sparrows. I did not make any study in this respect. It should be worthwhile to investigate the breeding biology of the House Sparrows on these poles so as to examine how the birds manage to breed in such a hot and hostile environment. I have heard the nestlings call from the pole nests even in June.

Irrespective of the harsh hot evironment, the House Sparrows appear to do well in their breeding activities as evidenced by the occupation of these nests even in June (90%) and July (52%) in the case of type A pole (Fig. 1). The eggs can probably tolerate a high temperature was indicated by Kainady (1977), who found eggs successfully hatching out in an ambient temperature ranging between 24.4 and 43.9° C presumably in the absence of female parent during the second half of incubation period. In

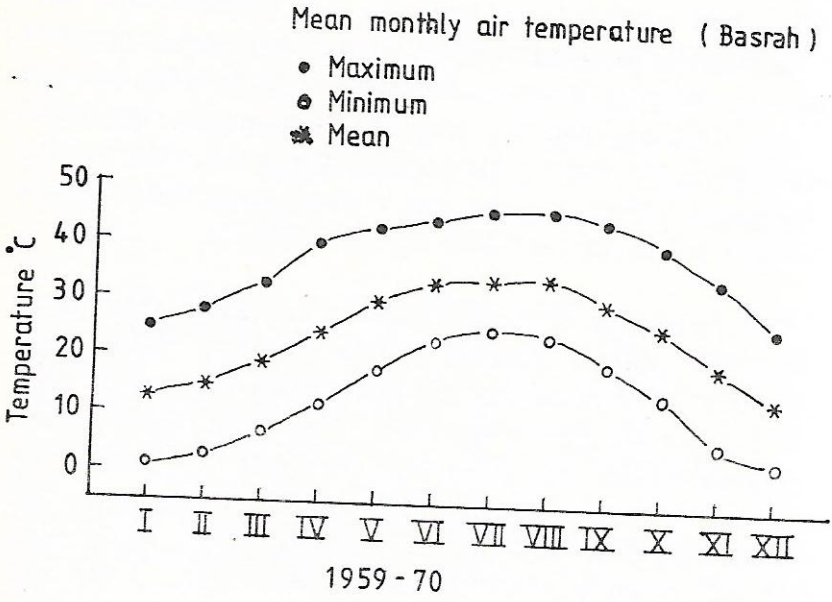

Fig. 3. Mean monthly maximum, minimum, and mean air temperatures as recorded in Basrah, based on 20 years record ending in 1970 (Lyubojevic and Al-Doori, 1972).

September the activity around the nest is reduced. An average of 43 per cent occupation of the poles during October to December period may mean possible use of nests as sleeping dormitories in winter as I have observed in one case in a nest box at my residence under observation from 1977 onwards.

As to the orientation of the nest, in pole type A there was no choice for the birds as almost all nesting sites were facing rather north. When this site was found reversed because of the pole position, as it occurred in a few cases, the birds nested facing south. In pole type C where sites were handy on both sides of the pole, except in one case (in which both sides possessed nest), all were facing rather south. Whether this was because of the greater site area obtainable on the south side or to escape from the afternoon sun and north wind is not clear.

No other birds were found to compete with the Sparrows for nesting in these sites. Although I have not witnessed any enemies to nests or their contents, the possible avian ones in the area are the two residents, the Hooded Crow and the Indian Roller, and a number of passage migrants like different shrikes and birds of prey.

The secure hold afforded by the electric poles of the type A and E helped most of the nests in these poles to be rather intact even in winter. While those in less secure situations as in pole type C and among the lines were lost in winter. After the breeding season the Sparrows apparently deserted those sites which lost nests, while frequented many of those sites with nests even in winter.

The possible harmful side effects of the House Sparrow nesting on electric poles are : 1. In the rainy season

(November to April) the wet nest material hanging down can cause short circuit in the wind, and 2. The wet nesting material holding water can in the long run corrode the pole making it a potential danger. The House Sparrow nesting can best be discouraged by selecting poles of type B and C for electric lines.

On contacting D. Summers-Smith regarding the utilization of exposed metal poles for nesting by the House Sparrow he replied me that he has not seen it in all the countries in which he had watched House Sparrows, these include most European and north African countries, Iran, Afghanistan, Pakistan and Sri Lanka in Asia, and the USA and Canada. He has however seen House Sparrows using street lights in the UK, Iran and Sri Lanka, but these were where there was suitable access because of holes or broken glass, so that the nest site differed little from the normal type of hole site used. He informs me further that the nearest thing that might be of interest is the use of pre-cast concrete power cable poles by Spanish Sparrows in Malta. This is quite common there, but of course the poles are honeycombed with suitable nesting sites.

SUMMARY

Results of the survey on the incidence of the House Sparrow nesting on metal poles (electric and telegraph) in semi-arid area of south Iraq for a distance of 50 km. together with the monthly occupation round the year of the most commonly used nesting pole are presented and discussed.

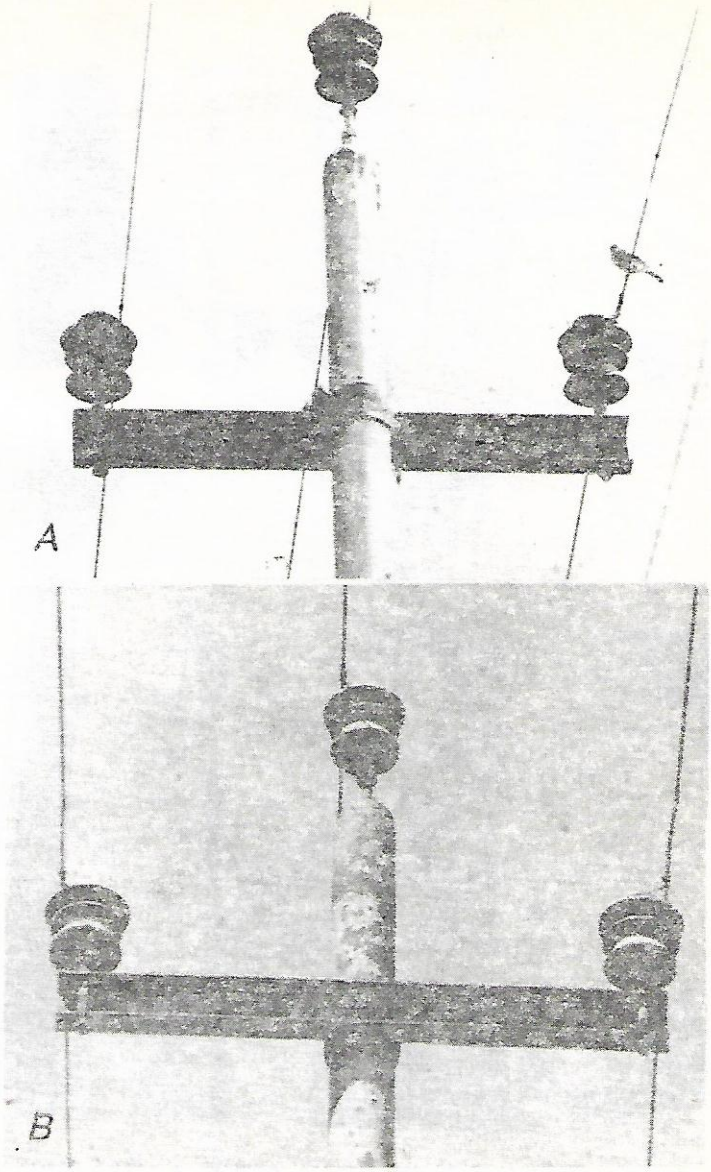

Fig. 5. Electric pole type A and B. Both types were similar but for the fixture of the cross arm. Type A was extensively used for nesting while none of the type B contained nest for lack of hold for nest material.

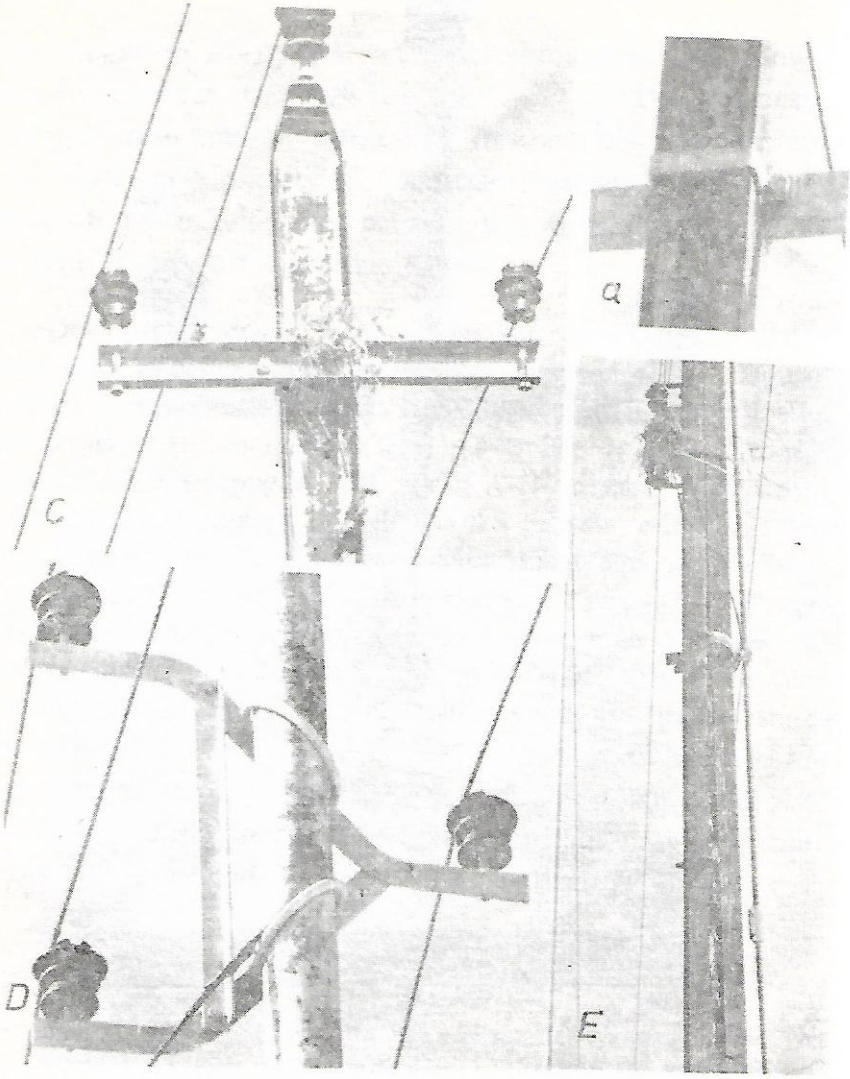

Fig. 6. Electric pole type C, D, and E. a : the other side of type C. Type C had the nests always in the south side. Type D did not furnish any hold hence no nest was present except in one case. Invariably all the E type poles contained nests varying in number one to six.

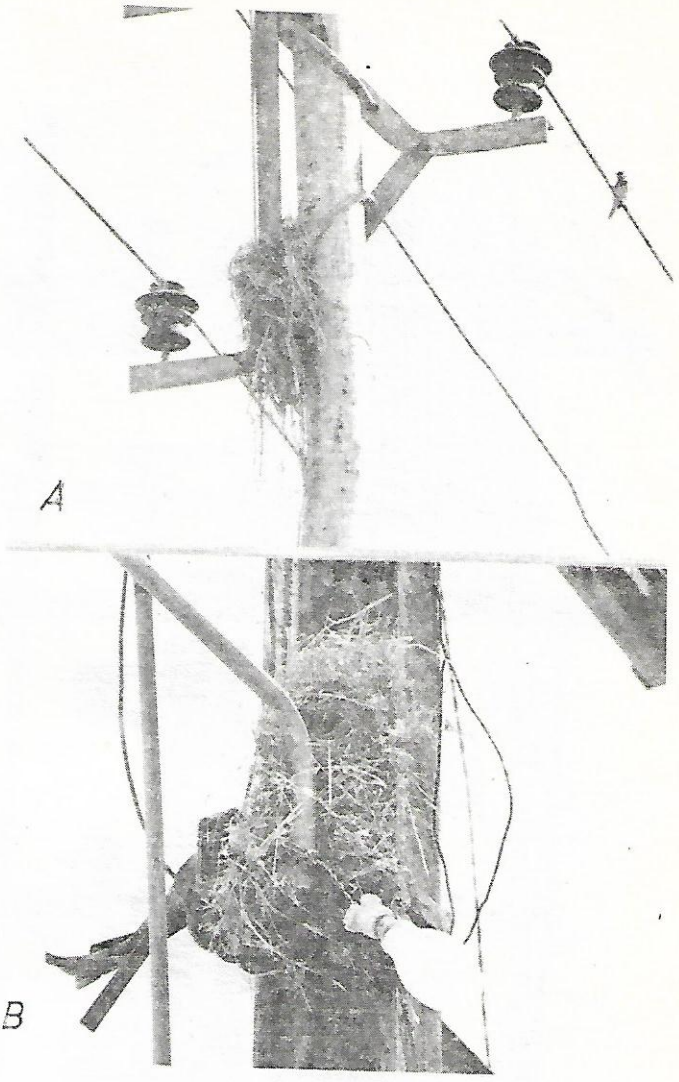

Fig. 7. A. The only nest attempted in C type ; this nest was soon dislodged by wind. B. Nest in between pole and lamp support.

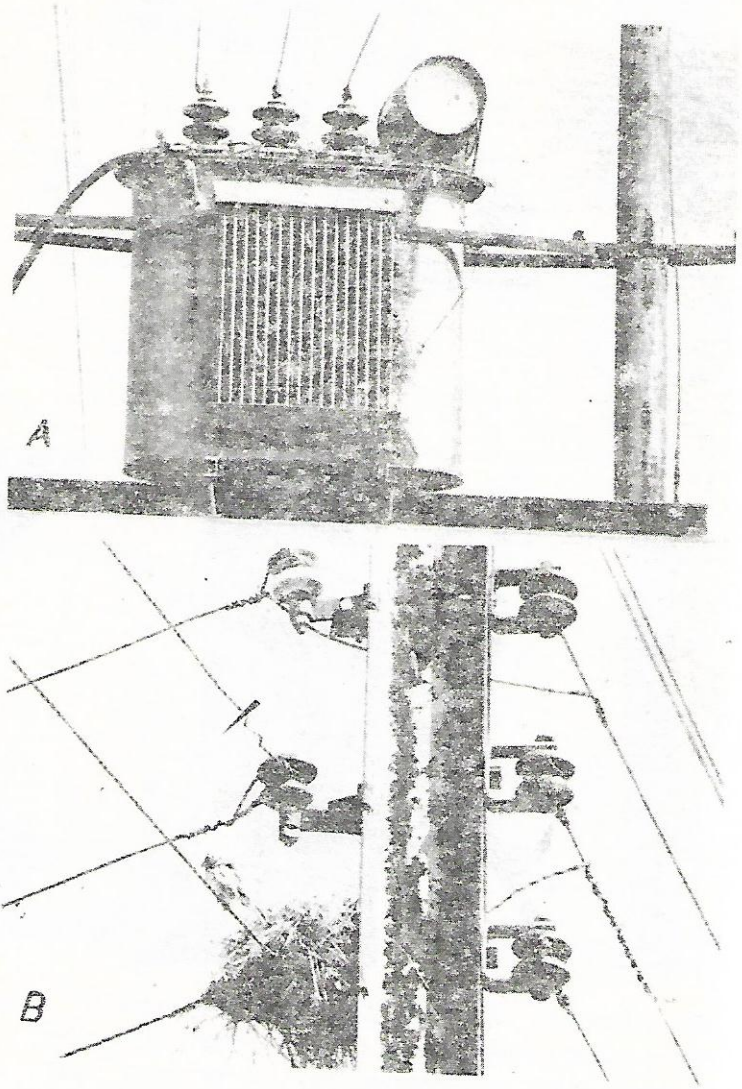

Fig. 8. Nest in the transformer (A) and on the side line (B).

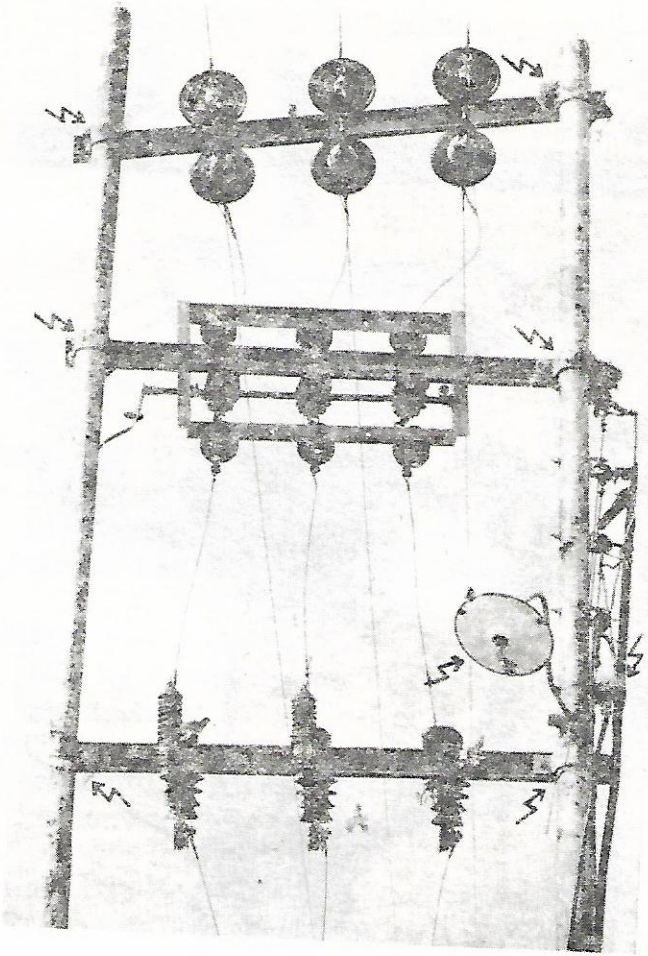

Fig. 9. Any hold on the electric poles were utilized for nesting ; arrows indicate the position of nests. Also note nest in the lamp shade.

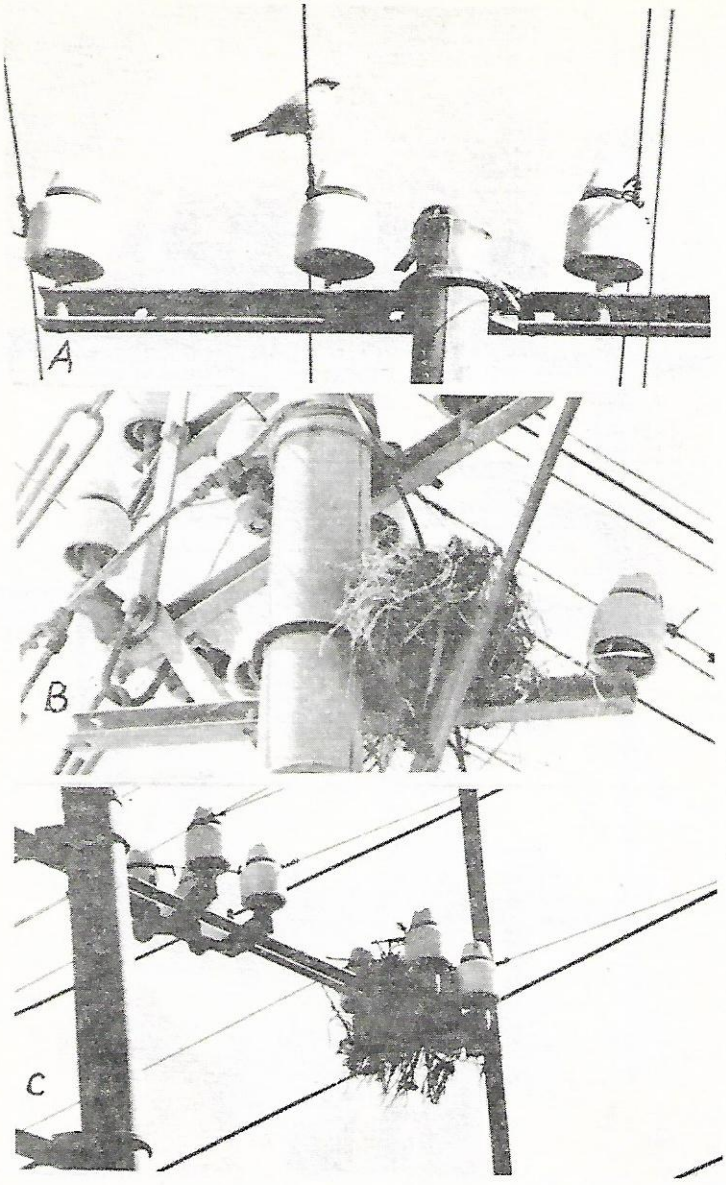

Fig. 10. Nests on telegraph poles : The most commonly used site was the tube of the pole which lacked a cap (A), the next place was among the lines either close to pole (B) or on the cross arm (C).

الخلاصـــة

دراسة عامة عن مدى تعشيش العصفور الدوري على الاعمدة المعدنية (الاعمدة الكهربائية والتلغرافية) في منطقة شبه جافة في جنوب العراق وذلك لمسافة ٥٠ كم ، والدراسة كانت شهرية ولمدة عام واحد وبينت أيضا تفضيل الطائر لانواع معينة من الاعمدة المعدنية دون سواها ..

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MOULT IN TURDOIDES ALTIROSTRIS, THE IRAQI BABBLER

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Of the four species of *Turdoides* found in the Palearctic region *Turdoides altirostris* (Hartert) the Iraqi Babbler is the smallest in size having a restricted distribution in lower Iraq and the neighbouring parts of southwest Iran. They inhabit mostly in the *Phragmites australis* (Cav.) Trin. ex Steud. reeds growing in wet areas. The breeding biology of the species has been worked out by Al-Dabbagh (1970).

A study of the moult of the Iraqi Babbler was undertaken with a view to examine whether there is any adaptive change in the moult connected with the life in a temperate region of this mostly tropical group of birds.

The moult of the Iraqi Babbler is seasonal and the moult season is concentrated ; occurring towards the close of breeding season. The moult span period is half compared to its congener *Turdoides striatus* (Dumont) the Jungle Babbler in the tropical region (Naik & Andrews 1966).

MATERIAL AND METHOD

A total of one hundred and one observations based on fifty-seven specimens (51 ringed and 6 collected birds) covering every month of the year except May, were made on moulting of the Iraqi Babbler at Shafi Field Station, Basrah, Iraq, between 1976 and 1979.

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Birds were mist-netted and notes were taken with emphasis on primary moult. All of them were ringed and soon released except those kept for the collection of the museum. Birds were identified into two categories as adult and juvenile. Juveniles were identified on a combination of characters namely, yellowish gape, naked breast and belly (devoid of down), and a wing-length of 72 mm or lesss. The breast and belly area of the Iraqi Babbler juveniles were usually naked like the juveniles of *Passer domesticus*, however, a few down feathers were occasionally found to be present. Feather scoring and numbering were done as per the British Turst for Ornithology moult record card. In the Iraqi Babbler sexes are alike in plumage colouration ; juvenile plumage appears similar to the adult plumage. The lustre of the renewed feathers was found fading soon and henoe it was difficult at times to differentiate the old feather from the new.

OBSERVATIONS AND RESULTS

The primary moult in the population began between mid July and mid August (12 July to 22 August) ; one early bird in mould (P 1 & 2) collected on 1 July probably began moulting in late June.

All birds (adults and juveniles) examined in August, September, and October were in moult except two in August and one in October, all these three were juveniles not yet started moulting (Table 1).

The October birds were in advanced stage of primary moult, having been completed P5, moulting P6 to 10. Three had almost completed the moult but for the sheath at bases of the distal primaries, of these two were collected

Table 1. Monthly distribution of the Iraqi Babbler examined for primary moult and those completed moult, at Shafi, Basrah, Iraq.

	Jan.	Feb.	Mar.	Apr.	May	June
Birds examined	4	18	17	13	0	4
Birds with primary moult	0	0	0	2*	0	0

	July	Aug.	Sept.	Oct.	Nov.	Dec.
Birds examined	2	9	5	11	9	10
Birds with primary moult	1	7	5	10	5	1
Birds completed moult	0	0	0	0	4	9

* In a repeat bird P10 and S8 on both wings, right central and left outermost rectrices were in moult on 30 April 1979. The fact that the same bird on a previous repeat on 15 Oct. 1978 was nearing completion of moult (P7 to 10) indicates that the April moult was the result of accidental loss and replacement. The second bird, a juvenile (with yellowish gape, naked breast and belly, having wing of 72 mm) on 17 April 1978 was moulting P1 & 2 on both wings and the third left rectrice. For other details see text.

on 15th and one on 29th. Two birds, one juvenile and one adult, were still in early stage of moult, moulting P1 to 3 and P2 & 3 respectively. In November four out of nine birds had completed their primary moult and the rest were nearing completion except two juveniles which were only half way through (P4 & 5, and 5).

All December birds were with fresh primaries save one adult which was renewing P9 & 10 on 23 December.

The primary moult season in the population had lasted from mid July to mid December (once as early as mid June and once as late as end December) for a period of five months. Majority of the birds completed the moult by mid November (Fig. 1).

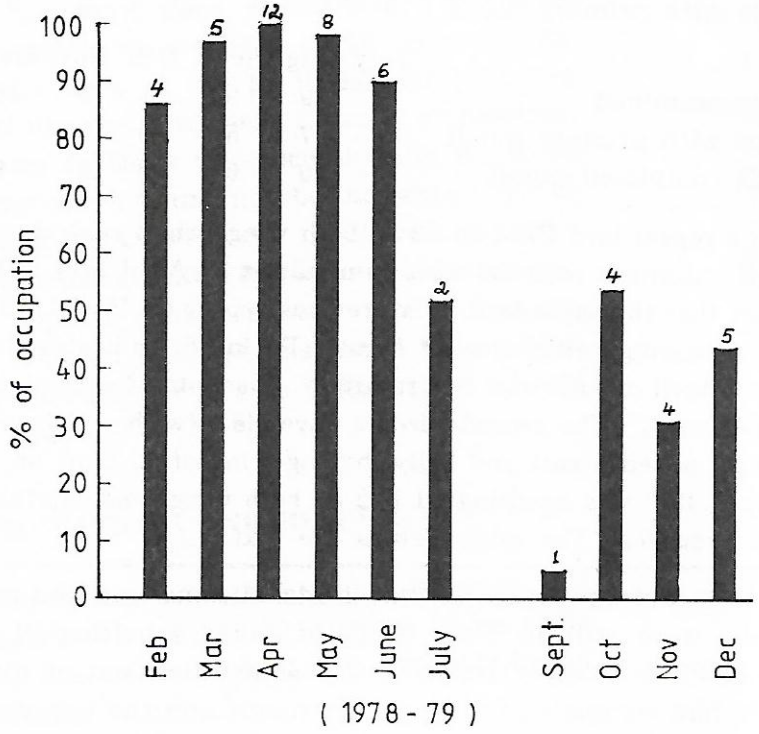

Fig. 1. Monthly frequency of occupation of pole type A by *Passer domesticus*. All the 197 poles contained nests. Numbers on top indicate the number of surveys.

Juvenile Moult :

At the start of the juvenile moult the outermost primaries were full grown as indicated by the absence of sheath at their bases. Thesmallest wing-length of the moulting juvenile was 68 mm.

One juvenile moulting the first primary on 16 August 1976 was repeated subsequently three times (29 Aug., 7 & 13 Sept.) the same year. Although the primary moult was in progress during these times, there was no moult of secondary, tail or body feathers.

Another juvenile moulting P1, 2, & 3 on 21 October 1978 was repeated twice (19 & 26 Nov.) the same year. On these two occasions although the primary moult was continuing, no secondary or tail feathers were in moult. However, when repeated on 18 February 1979, the primary moult was over, but S1 & 2 and the central pair of tail feathers were in moult. Crural tract feathers in brush stage found on 21 October and the pin feathers noted on the sides of breast on 26 November could have been the late-developing feathers as observed in *T. striatus* by Andrews and Naik (1966). Otherwise no body moult was observed.

Thus the primary moult in juveniles took place during the moult season in the same year they were born. The moult of secondary and tail feathers appear to take place a little later and the timing of their moult are not clear with the available specimens and needs further study.

The greater secondary coverts were renewed prior to the moult of P4 in the above two juveniles as in the adult (see later). Body feathers did not seem to moult during the first juvenile moult.

Adult Moult

The primary moult began with the innermost (P1) and proceeded in a regular fashion to the outermost in a descening order. The greater primary coverts moulted with their respective primaries.

Based on the moult sequence shown the nine secondaries, numbered from outer to inner, is divided arbitrarily into two sets namely, the distal one forming S1 to 5 and the proximal one forming S6 to 9.

The moult of the secondary invariably started with S1 and the distal set proceeded in a regular order from S1 to 5. The moult of the S1 began with the moult of P3 but was found lingering on till the moult of P6 (Table 2).

The proximal set moult was initiated with S7 soon after the start of S1. Although the further sequence could not be traced with the limited samples, this set was found completing the moult much earlier than the distal set.

The greater secondary coverts were found renewed with the moulting of P3. The last to complete the moult among the remiges was either P10 or S5. The rectrice moult started with the central pair any time between the moult of P3 and 7 (Table 2), and proceeded outwards, centrifugally. Usually the rectrice moult was completed with the completion of the primary moult, however, it was also observed continuing even after. The upper and lower tail coverts moult preceeded the moult of rectrices. In two adults the rectrices moult, observed on six repeats — three each, occurred in a regular fashion from inner to outer.

Body moult took place all along the moult period, taking place prior to start of primary moult and some times continuing even after the completion of the primary moult.

Table 2. Primary moult stages of the Iraqi Babbler to show the timing of the secondary and rectrice moult start.

Primary feather whose moult coincide with the start of rectrice moult	Rectrice						Secondary									Primary										Primary feather whose moult coincide with the S1 moult
							Proximal					Distal															
	3	2	1	1	2	3	9	8	7	6	5	4	3	2	1	1	2	3	4	5	6	7	8	9	10	
	o	o	o	o	o	o	o	o	o	o	o	o	o	o	¾	N	N	¾	o	o	o	o	o	o	o	Third
	o	o	o	o	o	o	o	o	o	o	o	o	o	o	¾	N	+¾	¾	o	o	o	o	o	o	o	Third
	o	o	o	o	o	o	o	o	o	o	o	o	o	o	¾	N	N	N	N	P	o	o	o	o	o	Fourth
	o	o	o	o	o	o	o	o	o	o	o	o	o	o	¾	N	N	N	½	o	o	o	o	o	o	Third
Third	o	o	N	+¾	o	o	o	o	o	o	o	o	o	o	N	N	N	N	N	+¾	P	o	o	o	o	Fourth
Fifth	o	o	¾	¾	o	o	o	o	+¾	P	o	o	o	P	N	N	N	N	N	N	+¾	½	P	o	o	Fifth
Seventh	o	¼	½	½	¼	o	o	o	N	o	o	o	o	½	N	N	N	N	N	N	N	P	o	o	o	Sixth
Sixth	o	o	+½	+½	o	o	o	o	P	o	o	o	o	P	+¾	N	N	N	N	N	N	P	o	o	o	

Note: o, P, & N mean old, pin, and new feather respectively; ¼, ½, & ¾ indicate the length attained by the moulting feather

Number of feathers moulting at a time (one side)

Once the moult began one or more feathers were in moult during the moult span of a bird except in one case (see later). One to four primaries, two and three common, were in moult at one time. On all the three occasions when four primaries were noted moulting it was inveriably towards the close of the primary moult (P7 to 10, this took place twice in 15 Oct. and once on 3 Nov.). One to three feather moult occurred at any stage of the moult ; at the start, middle, or towards the end.

In the proximal set of secondaries (S6 to 9) two feather simultaneous moult was common. However, only one feather was in moult in the distal set (S1 to 5). More than one feather moult was usual for the rectrices and this ranged from one to six feathers.

Time required for the moult

The moult time of one score (5 scores per feather) was estimated from the difference in scores and the tie elapsed between repeats. The primary moult time was then calculated by multiplying this estimate by fifty. The primary moult duration comes to 79.5 days for two adults moulting distal primaries (P5 to 10). When calculated for an adult repeated between the moult of P2 & 3 and P9 & 10, this period comes to 88.5 days. It is known that the moult rate is faster towards the close of moult than at the beginning. Therefore, the duration shown by the second sample 88.5 days is a good approximation for the renewal of primary feathers in adult.

One bird (female) with a well developed wrinkled brood patch caught on 2 August 1976 was moulting as follows : P1 news, P2 almost full grown, P3 $\frac{3}{4}$ grown, rest old (score 13) ; S1 $\frac{3}{4}$ grown, rest old ; there was no tail or body

moult. On 15 August this bird did not show any moult. However, when repeated on 3 November 1976 it was moult-in P7 to 10 (score 44), all rectrices and many body feathers. The primary moult duration estimated on this bird comes to 150 days, about 66 per cent more than what is normally required. The well formed brood patch present on the day of ringing and the absence of any moult on the subsequent repeat on 15 August points to the probable occurrence of an arrested moult resulting from breeding activities in between the original capture and subsequent repeats.

Since only one feather was in moult at any time, the distal secondary set moult rate oculd be calculated more precisely. Each feather (2 to 4), based on seven repeats of two adults took an average of twenty-one days. In the proximal set, each feather took about half the time or less. Two adults took less than 56 and 63 days for the complete renewal of rectrices. Assuming that the fifth secondary is the last to complete the moult and allowing one week for the same, a thirteen-week period is a good estimate for the moult span of an adult Iraqi Babbler.

Wing and tail measurements

The sixth primary feather forms the wing tip and from this to the tenth the primary feathers gradually decrease in length. In a bird with a wing of 79 mm these primary feathers measured (from the point of insertion in the skin to the tip) in mm as : P6 : 60, P7 : 59, P8 : 57, P9 : 48, and P10 : 33.

The flattened, straightened wing in juvenile averaged 70.6 mm (n : 17, range : 68-72) and that of the adult averaged 76.5 mm (n : 81, range : 73-82). The tail of the adult averaged 103.6 mm (n : 8, range : 98-112).

DISCUSSION

The annual moult in the Iraqi Babbler started with the innermost primary and proceeded outwards in a regular manner. With the renewal of the distal primary (P10) moulting of the rest of feathers (secondaries, rectrices, and body feathers) were normally completed. However, the last one to complete the moult appeared to be the fifth secondary. Thus the primary moult period properly marks the moult span of the bird.

The moult sequence of *Turdoides altirostris,* the Iraqi Babbler is similar to the one described for *T. striatus* the Jungle Babbler (Andrews and Naik 1966), and is in conformity with most of the passerines. In the Jungle Babbler, which lives in a tropical climate, the moulting season lasts for seven months while the same in the Iraqi Babbler is five months, much concentrated.

The primary moult span of individual Iraqi Babbler is about three months which is half the time needed by the Jungle Babbler. Whether the shorter primary moult span is resulted from an increased moult rate is not clear. However, the number of primaries growing at one time in the Iraqi Babbler was higher (1 to 4, 2 and 3 common, Fig. 1) compared to the Jungle Babbler, where more than two feather growth was rare, only twice observed. The duration of the moult may vary considerably even in related species has been shown by Pitelka (1945). He records it as varying from three to almost six months in various species of *Aphelocoma.*

The breeding (egg-laying) season of the Iraqi Babbler extends from mid March to August (Al-Dabbagh 1970,

Marchant 1963). The annual moult of this species started towards the close of the breeding season. No overlap between breeding and moulting has been reported. However, a suspected case of arrested moult due to intervention of breeding activities is presented. Although the coincidence between moulting and breeding is common in *T. striatus,* no arrested moult during breeding season has been reported.

Since the moult season starts only towards the close of the breeding season (possibly after the breeding), the concentrated moult season with the accelerated moult span enable the Iraqi Babbler to clothe well with a fresh insulative cover prior to the onset of winter, thereby fit itself to tide over the winter in a temperate region.

SUMMARY

The moult of adult *Turdoides altirostris* the Iraqi Babbler is annual and complete, occuring towards the close of the breeding season, and is completed prior to the onset of winter. In juveniles it appears to be partial covering only remiges and rectrices.

The moult sequence in the main is similar to the one described for *T. striatus,* but differs in having the moult season concentrated. The moult span of individual bird takes nearly thirteen weeks, about one-half the time required for *T. striatus.* The moult time of the primary, secondary, and rectrices are given.

An instance of arrested moult on circumstantial evidence is presented. The concentrated moult season and the shorter moult span are considered as adaptive features for the temperate conditions.

الخلاصـــة

دراسة عن تبديل حلة الريش لطائر الشرثاره العراقية . حيث يبين أن تبديل حلة هذا الطائر هو سنوي وبصورة متكاملة على جسم الطائر . ويبتدأ في وقت قريب من موسم التناسل ويكتمل في الفترة التي تقـــع مباشرة قبل موسم الشتاء . بينت الدراسة أيضا أن اليافع يختلف عن البالغ في تبديل حلل ريشه . وأوضحت الدراسه أوجه التشابه والاختلاف فـي تبديل حلل الريش في طائر الشرثاره العراقية عن غيرها من الطيـــــور المشابهة .

كما ان تبديل الحله يتأثر بالظروف المحيطية الفجائية . وأن فتـرة تبديل الحله الموسمي وقصر فترتها تتبين كصفات تأقلمية تتعلق بالظروف المعتدلة ..

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REPORT OF THE BIRD MIGRATION STUDY PROJECT OF BASRAH UNIVERSITY — 1977-79

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In 1977 owing to the shortage of rings bird ringing could be done only from January to May. The supply of rings arrived in March 1978 and the ringing continued till December excepting July and August. In 1979 the bird ringing was done from January to July. The totals for the years are : 1977 : 382 birds of 25 species ; 1978 : 930 birds of 34 species and 1979 : 1080 birds of 46 species (Table 1).

Table 1. Birds ringed at Shafi Field Station, South Iraq.

Species	1974-76	1977	1978	1979	Total
Ixobrychus minutus	1	0	1	2	4
Gallinago gallinago	0	1	0	0	1
Streptopelia turtur	1	0	0	0	1
Streptopelia decaocto	0	1	0	0	1
Alcedo atthis	6	1	10	12	29
Halcyon smyrnensis	9	0	2	5	16
Merops superci liosus	6	0	0	1	7
Upupa epops	12	0	2	7	21
Jynx torquilla	3	2	1	7	13

Species	1974-76	1977	1978	1979	Total
Hirundo rustica	20	5	1	14	40
Riparia riparia	10	0	0	7	17
Anthus trivialis	1	0	0	1	2
Motacilla alba	16	0	3	1	20
Motacilla flava	25	0	0	0	25
Pycnonotus leucotis	209	74	167	49	499
Lanius nubicus	3	0	0	1	4
Lanius collurio & isabellinus	30	5	10	64	109
Saxicola torquata	7	1	1	4	13
Turdus philomelos	0	0	0	5	5
Phoenicurus phoenicurus	52	26	46	74	198
Erythropygia galactotes	3	0	0	2	5
Luscinia megarhynchos	10	1	1	1	13
Luscinia luscinia	0	2	0	5	7
Luscinia svecica	32	5	6	12	55
Erithacus rubecula	45	7	58	1	111
Irania gutturalis	2	0	4	5	11
Turdoides altirostris	18	0	14	12	44
Locustella luscinioides	2	0	0	0	2
Acrocephalus arundinaceus	46	8	32	22	108
Acrocephalus griseldis	29	0	7	13	49
Acrocephalus stentoreus	1	1	0	5	7
Acrocephalus scirpaceus	93	3	32	19	147
Acracephalus palustris	0	0	0	2	2
Acrocepnalus schoenobaenus	3	0	0	0	3
Hippolais icterina	1	0	0	0	1

Species	1974-76	1977	1978	1979	Total
Hippolais pallida	20	4	9	34	67
Hippolais languida	2	0	0	1	3
Sylvia atricapilla	110	24	52	91	277
Sylvia nisoria	3	0	0	18	21
Sylvia hortensis	2	0	2	2	6
Sylvia borin	26	4	34	27	91
Sylvia communis	12	1	3	9	25
Sylvia curruca	48	19	27	95	189
Sylvia melanocephala	3	0	2	4	9
Sylvia mystacea	8	0	4	0	12
Prinia gracilis	6	1	0	5	12
Phylloscopus trochilus	22	2	0	4	28
Phylloscopus collybita	178	62	39	60	339
Muscicapa semitorquata	0	0	1	3	4
Muscicapa striata	13	0	3	18	34
Remiz pendulinus	2	0	1	3	6
Passer domesticus	648	0	232	303	1183
Passer hispaniolensis	13	0	0	0	13
Passer moabiticus	30	0	1	0	31
Petronia xanthocollis	4	0	0	0	4
Sturnus vulgaris	414	122	122	49	707
Oriolus oriolus	3	0	0	1	4
	2263	**382**	**930**	**1080**	**4655**

الخلاصـــة

تم وضع حلقات معدنية في أرجل الطيور المصطادة في محطة دراسة هجرة الطيور في منطقة الشافي بمحافظة البصرة ، .وقد تم وضع حلقـات لـ (٢٣٩٢) طائر يعودون لـ (١٠٥) أنواع مختلفة وذلك للاعـوام ١٩٧٧ ـ ١٩٧٩ ..

NEW RECORD OF THE FIG WASP *BLASTOPHAGA QUADRATICEPS* MAYR WITH REMARKS ON THE INTRODUCTINO OF THIS INSECT TO IRAQ AND ON THE *DISPERSAL OF ITS HOST PLANT FICUS RELIGIOSA L.*

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The fig wasps are microscopic Hymenoptera belonging to the families Agaonidae, Torymidae (Callimomidae) and Eurytomidae. They breed in the ovaries of the flowers inside the syconia (receptacles) of more than 700 species of *Ficus* (Moraceae) found mostly in the tropical regions of the world. The well known inter-relationship (symbiosis) of the true fig wasps (Agaonidae) and of their host plants (species specific *Ficus*) is a good example of plant-insect mutualism and inter-dependence. In return for a milieu for breeding and food for the development of their immature stages offered by the host plants inside their syconia, these fig wasps bring about cross—pollination permitting the development of fertile seeds.

The present paper deals with a new record of a species of *Blastophaga* breeding in the syconia of *Ficus religiosa* L. in Basrah and with remarks on the manner in which the insect might have been introduced into Iraq and on the role of certain syconia feeding birds in the dispersal of the plant.

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Ten mature syconia (just starting to ripen) of *F. religiosa* were collected periodically from five different localities in Basrah from October 1979 through March 1980. Each collection of syconia was kept in a separate glass jar (6 inches height × 4 inches diameters). The mouth of the jar was closed with a layer of thin muslin cloth and fastened by means of a rubber band. Within about two days of each collection, emergence of female fig wasps usually took place. On the third day after the first emergence of female wasps in each jar, the syconia of each collection were dissected to remove the male fig wasps which usually do not come out of the interior of the syconium. The female and male wasps collected were preserved in 70% alcohol for identification and further study.

The number of annual generations of syconia that developed on the *Ficus religiosa* trees (from which the collections of syconia were made) and the number of generations of wasps that developed in these (generations of syconia) were noted.

The type of birds regularly visiting the above mentioned *F. religiosa* trees for feeding during the periods of peak abundance of ripe syconia were also noted.

The spring, summer and winter syconia of *F. religiosa* trees growing in Baghdad were collected (1979-80) and examined for the presence or absence of fig wasps and for the development of fertile seeds in them.

1. *Identification of the Fig Wasp* :

The wasps collected from the syconia of *F. religiosa* in Basrah were determined as *Blastophaga quadraticceps*

Mayr (1885) and confirmed by comparison with the description given by Grandi (1923) based on fig wasps collected from the syconia of *F. religiosa* from Ceylon (Sri Lanka). The female wasps is about 1.5 mm io length ; the male is worm-like and about 1.8 mm in length.

It was noted that none of the parasites or inquilines recorded by earlier authors (Westwood, 1883 ; Joseph, 1953, 1956 ; Wiebes, 1967 ; Abdurahiman & Joseph, 1975) along with *B. quadraticeps* from the syconia of *F. religiosa* in Ceylon and India were met with among the fig wasps that emerged from the collections of syconia maintained in the laboratory all through the period of this study.

2. The breeding of *B. quadraticeps* in Basrah.

Three annual generations of *B. quadraticeps* have been observed developing in three annual generations (spring, summer and winter) of *F. religiosa* syconia in the Basrah area. During the year 1979-80 the mature and ripe syconia were most abundant in March (Winter generation) and May (summer generation).

3. *Birds feeding on ripe syconia of F. religiosa in Basrah* :

During the above mentioned periods of peak abundance of ripe syconia, large numbers of the Mesopotamian Bulbul (*Pycnonotus leucotis mesopotamiae* Ticehurst), House Sparrows (*Passer domesticus Linn.*) and some Collared Doves (*Streptopelia decaocto* Frivaldszky) were observed to make several sorties to the *F. religiosa* trees both in the morning and afternoon and to feed on the syconia.

Discussion and Conclusions :

1. The observation that the fig wasp *B. quadraticeps* breeds in the receptacles of *F. religiosa* in Basrah is a new record for Iraq as well as for the entire Arab Gulf Region. The earlier records of this insect are from Ceylon (Westwood, 1883 ; Grandi, 1923), Singapore (Mayr, 1885), India (Joseph, 1953) and from some West Asia Countries (Galil and Eisikowitch, 1968).

In the Indo-Malayan region of Asia (considered to be the original home of *F. religiosa*), as already stated above, several parasites and inquilines have been obtained from *F. religiosa* syconia along with *B. quadraticeps*. But in Iraq (Basrah) and some other Middle East Countries where this plant has been introduced, only the agaonid pollinator has been able to establish. This selective distribution of *B. quadraticeps* but not of its parasites and inquilines remains unaccounted for.

2. *F. religiosa* is an excellent garden and avenue tree and so has been introduced into Iraq, especially in Baghdad and Basrah. Although the Baghdad trees regularly bear syconia, as the wasp *B. quadraticeps* does not breed in their syconia, no pollination is brought about and no fertile seeds are produced. The inability of this wasps to breed in the syconia of the Baghdad trees is most probably due to the lower winter temperature there as compared with Basrah.

3. It is known that F. *religiosa* was introduced into Iraq through cuttings. Most probably *B. quadraticeps* could have entered Iraq as wasp larvae developing inside the ovaries of phase C (interfloral) syconia (Galil &

Bisikowitch, 1968) on the branches used as cuttings. In places like Basrah where the environmental conditions were favourable for the completion of their life-cycle, these wasps bred successfully and established themselves.

4. The role of birds in effecting the dispersal of the seeds of various plants is well known. Indeed, several species of birds are to a great extent responsible for the dispersal of the seeds of *F. religiosa* and *F. benghalensis* in the Indo-Malayan region (Ridley). According to Chakravarty (1976), "the ripe syconia of both these species of *Ficus* are eaten by crows and other birds and the seeds germinate well when they pass through the alimentary canal of the birds and hence they are often found germinating as epiphytes upon other trees or on old buildings where the droppings of the birds fall". In fact, several cases of *F. religiosa* growing in similar situations have been observed in Basrah by the present author.

It is reasonable to state that the ripe syconia of *F. religiosa* contribute an important item of food (during periods when they are aboundant) for the birds mentioned earlier. Naturally vast quantities of the seeds of this plant pass through the alimentary canal of such syconia-feeding birds. What is the benefit that these seeds derive as a result of their passage through the alimentary canal of such birds ?

In the case of the seeds (with very thick endocarp) of the sapotaceous tree *Calvaria major* of Mauritius, Temple (1977) concluded that only those seeds that were ingested by the extinct bird Dodo (*Raphus cucullatus*) and which through their passage through the alimentary canal, were sufficiently abraded and scarified by the gizzard of

the bird, were capable of germinating. It is therefore reasonable to suppose that the seeds of *F. religiosa* that are ingested and pass through the alimentary canal of birds are acted upto by the gizzard and also possibly by the digestive enzymes of these birds. This process might make their seed coat thinner and softer, thus giving them better chances of germination. Their further growth depends on the nature of the substratum on which they are deposited by the birds concerned.

Thus, besides the active role of man in the propagation and dispersal of *F. religiosa* by raising this plant from cuttings, the birds which feed on its syconia play an important but passive role in its dispersal through seeds.

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SOME EPIZOIC ALGAE FROM SOUTHERN IRAQ

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Substratum is one of the important factors for the growth and distribution of the benthic algae. There are evidences that some benthic algae show preferences for specific types of substratum, while some others do not show substratum preference, particularly those growing in streams and rivers (Whitton 1975). Shells of live turtles and molluscs are special types of substrata which are often found colonized by different benthic forms to be called epizoic algae. The species of *Basicladia* are known to be specifically epizoic on the backs of turtles although they may occur on other hard surfaces (Prescott 1961, Proctor 1958, Islam & Alam 1980).

The present study of some epizoic algae is based on the collections of the following live animals in February and March 1981 : turtle, *Mauremys caspica* (Gmelin), the Caspian Terrapin, from the river Abul Khasib ; the bivalve *Corbicula fluminalis* (Muller) and the gastropod *Theodoxus jordani* (Swerby) from the Shatt al-Arab river near Basrah city, and *Melanoides tuberculata* (Muller) from the river Shafi (these molluscan animals were identified as per Ahmed, 1975). The survey of all the shells of above animals revealed the presence of the following genera and species. This is probably the first report on the occurrence of epizoic algae from the shells of aquatic animals in Iraq.

Descriptions of the algae

CHLOROPHYTA : Order Cladophorales

1. *Basicladia chelonum* (Collins) Hoffman & Tilden (Islam & Alam 1980 ; Prescott 1961 ; Proctor 1958).

Thallus forming green tufts or bushy patches almost all over the back of the turtle ; green erect filament upto 2 cms or little more in length, attached to shell by rhizoids and prostrate green branched filaments from which the erect filaments grew ; cells of erect and prostrate filaments contain compact reticulate chloroplasts with many pyrenoids ; cells of erect filaments cylindrical, narrower and many times longer than broad and gradually becoming shorter and broader towards the upper end from which the zoospores liberate by median pore ; cells 28-60 μm broad and 44-815 μm long ; cell wall 3.5-9 μm thick and lamellate. (Figs. 1-13).

From the shell of *Mauremys caspica* (Gmelin).

Our plants, although fit well with the above species, show variation with respect to prostrate filaments with ramifications from which the erect filaments also grow. At some places the plastids were found to be coming out of the cell by lateral pore on the wall (Fig. 8). The cause and consequence of this have not, however, been ascertained.

2. *Cladophora glomerata* (L.) Kuetz. (Islam & Alam 1980 ; Prescott 1961).

Alternate branching dominant ; cells of main axis 36-100 μm broad and 2½-20 times longer than broad.

On the shells of *Corbicula fluminalis* and *Theodoxus jordani.*

3. *Cladophora profunda* Brand. fa. (Islam & Alam 1980). Opposite branching dominant, sometimes two branches originate from same side and several forming whorls ; cells cylindrical and also irregularly swollen or subcylindric ; cells of main axis 29-57 μm broad, 7-12 times longer than broad. Similar plant has been shown by Islam & Alam (1980, P1. 1, Figs. 5 & 6) from the shells of molluscs from Bangladesh.

From the shell of *Melanoides tuberculata* (Muller).

4. *Lola implexa* (Harv.) Hamel (= *Rhizoclonium implexum* Harvey) (Islam 1973).

Filaments unbranched, dull green, entangled within *Basicladia* filaments ; cells long, cylindrical, slightly contorted with undulate cell wall, 14-18 μm diam. and 17.5-52.5 μm long. (Figs. 14-15).

On the shell of turtle.

Order : Oedogoniales :

5. *Oedogonium* spp. Four different vegetative forms of *Oedogonium* were found on the shells, but could not be identified due to lack of mature oospore formation.

Two of the sterile forms were found on the turtle and other two on the gastropods.

CYANOPHYTA : Order Nostocales

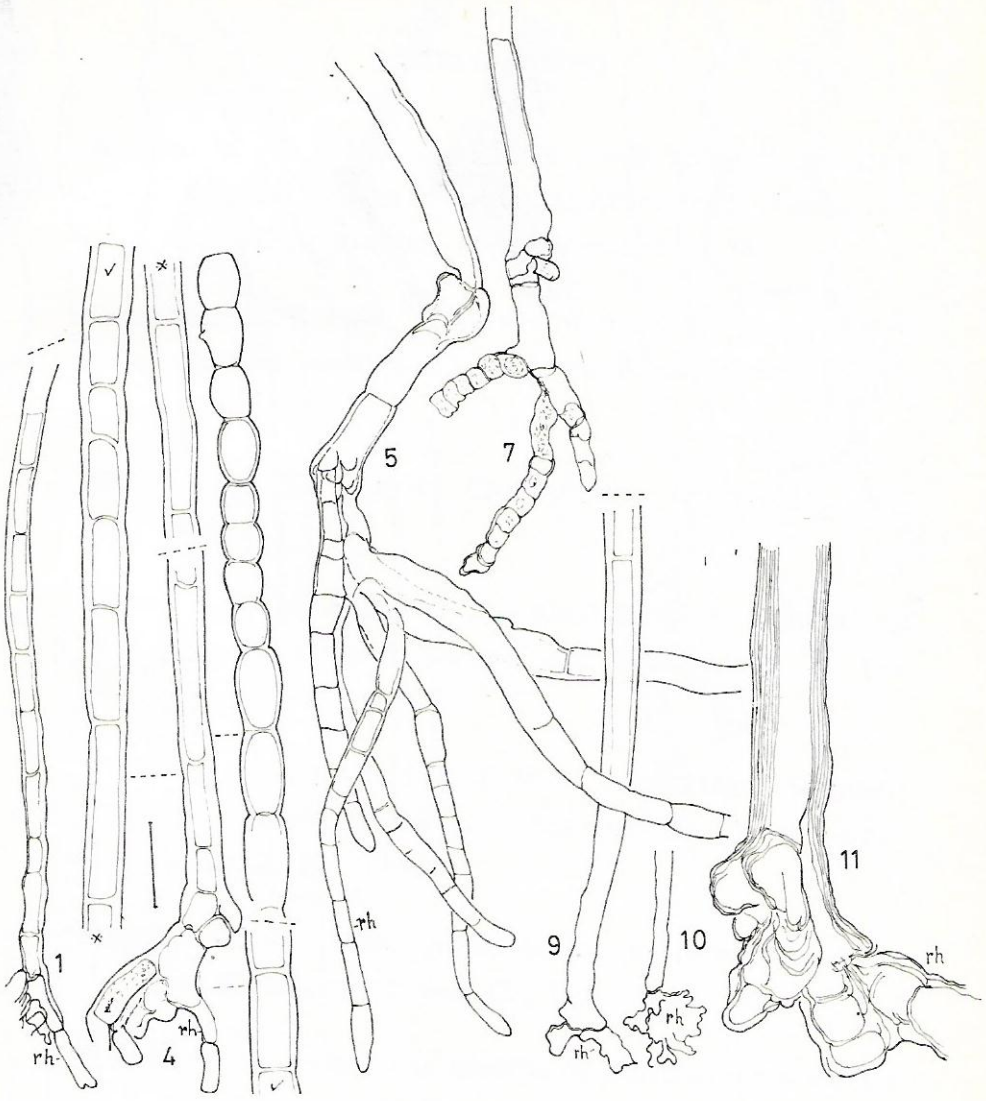
6. *Lyngbya lutea* (Ag.) Gomont (Desikachary 1959 ; Islam 1973). Filaments unbranched, entangled within *Basicladia* filaments, upto 10.5 μm broad, very long, bluish green, more or less straight ; cells rectangular or near quadratic, not constricted, upto 10 μm diam., 7.5 μm long ; apical cell blunt and broad, not tapering, 10 × 10.5 μm ; sheath thin, colourless (Fig. 16).

7. *Nodularia* sp. Filaments unbranched ; vegetative cells bluish, about 2 μm long, 7 μm without sheath and 8.8 μm with sheath broad ; heterocyst 8.8 μm diam., 4 μm long ; akinetes reddish brown, subspherical, 3-5 in a row. (Fig. 17).

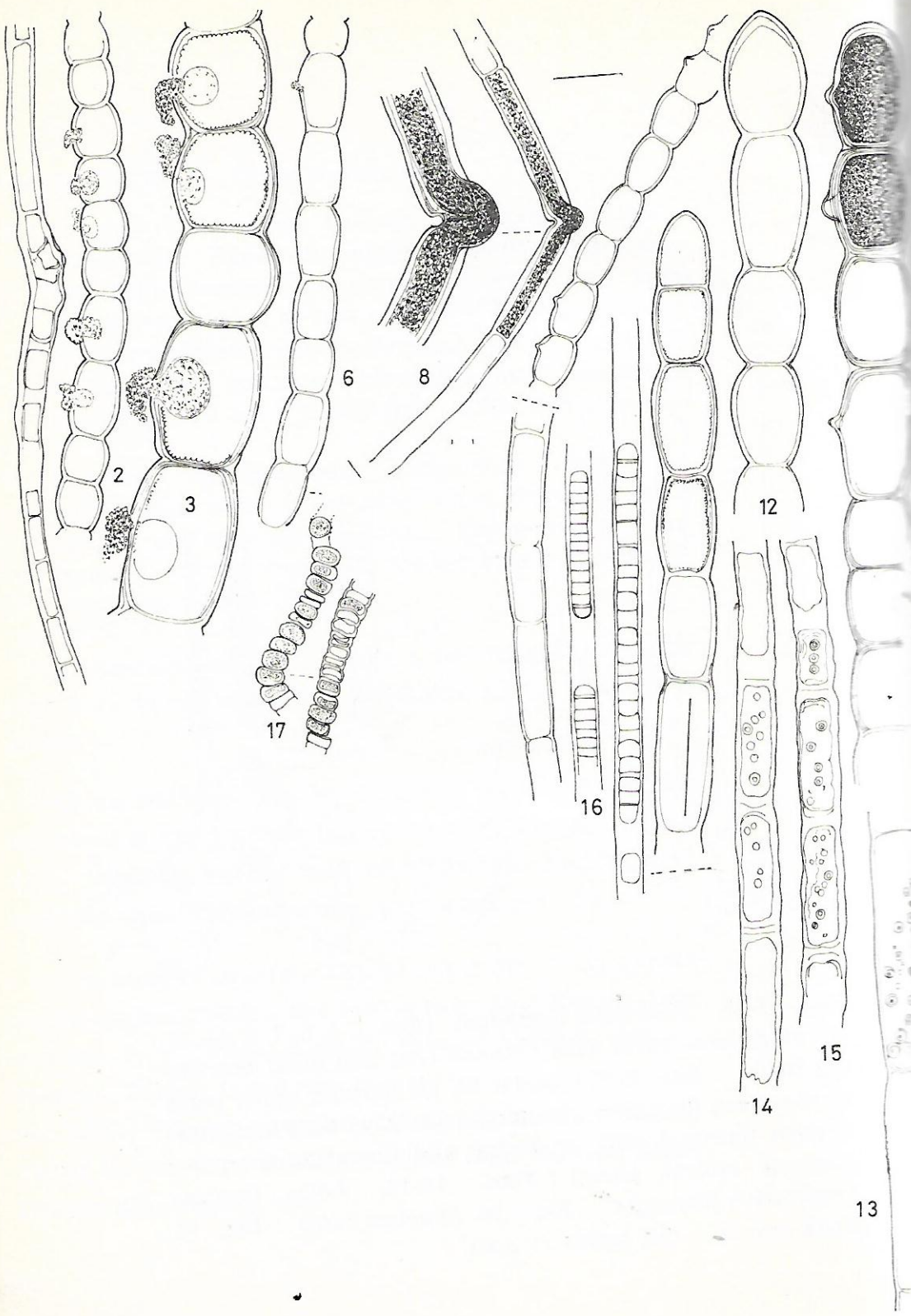
On the shell of turtle. Only a few fragments of this alga were found which are tentatively placed under this genus.

Of all the above species *Basicladia chelonum* was the dominant one and followed by sterile *Oedogonium* spp. and *Lola implexa* on the back of turtle. On the shells of molluscs only *Cladophora* spp. were dominant.

The authors sincerely wish to thank Mr. Thaer Fareed Yousif for bringing the live turtles from Abul Khasib river, and Mr. P. V. George Kainady of the Natural History Museum, Basrah University, Basrah for kindly identifying the turtle. Thanks are also due to Mr. Jamal Yacoub Yousif for collecting the live molluscs from the river Shatt al-Arab near Basrah city.



Figs. 1-13. *Basicladia chelonum* (figs. 1, 4, 5, 7, 9, 10, 11, showing basal parts with rhizoids (rh) and basal branching habit ; figs. 2, 3, 6, 9, 11, 12, 13, showing upper parts of the green filaments with long culindrical cells and short swollen terminal cells producing and liberating zoospores through lateral pores) ; Figs. 14-15. *Lola implexa* (vegetative filaments) ; Fig. 16. *Lyngbya lutea* ; Fig. 17. *Nodularia* sp. (all scales = $\mu\times$).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