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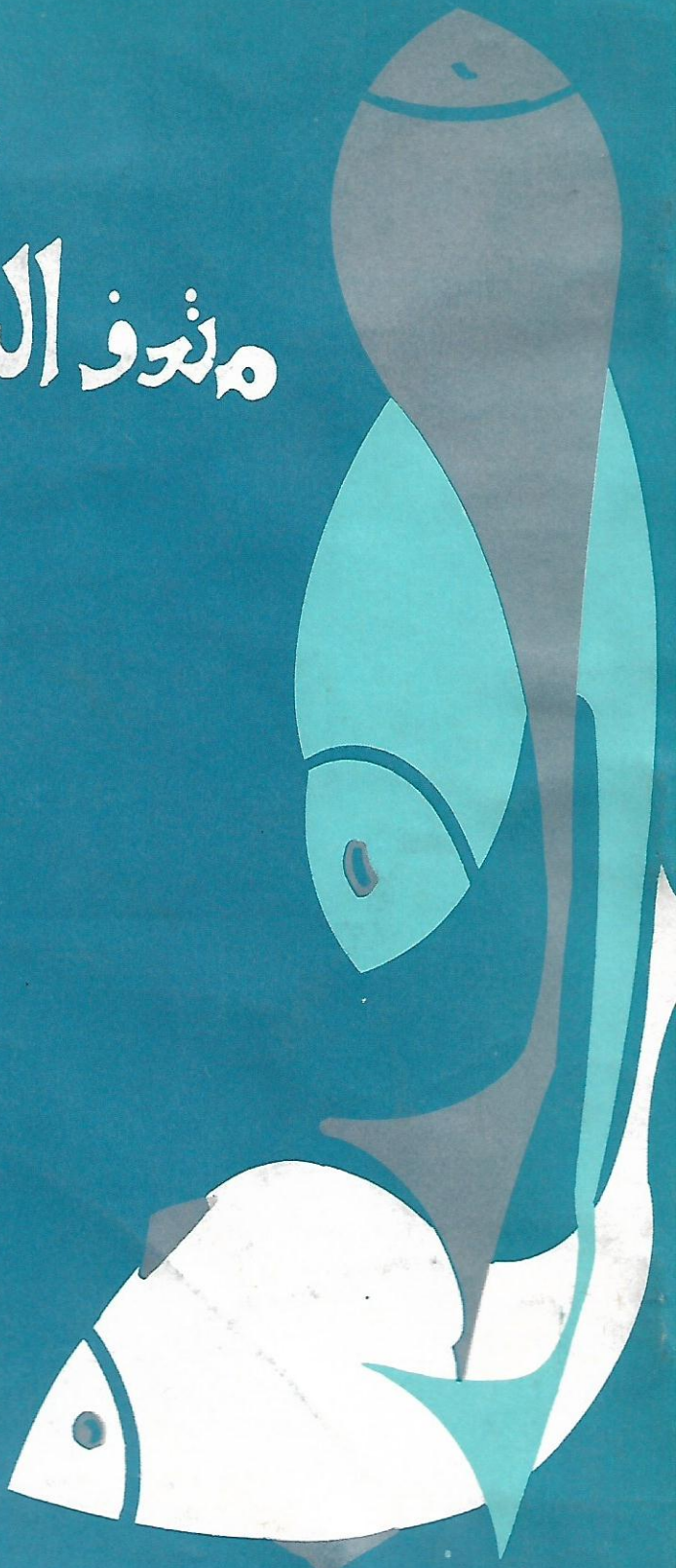

جامعة البصرة ـ العدد الرابع ـ تشرين أول ١٩٧٧

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تحريـــر المجلـــة

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BULLETIN OF

BASRAH NATURAL HISTORY MUSEUM

Volume 4 October 1977

CONTENTS

Bull. Basrah nat. Hist. Mus.
Vol. 4 : 3-15, 1977

GROSS ANATOMY OF THE ALIMENTARY CANAL OF *ONCOPELTUS FASCIATUS* DALLAS (HETEROPTERA : LYGAEIDAE)

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An understanding of the general plan of the anatomy of the digestive system is a necessary prerequisite to the detailed study of the histological features of the various parts of the tract. The earliest work on the alimentary canal of Hemiptera was carried out by Dufour (1833), followed by Locy (1884) on the family Nepidae, Pantel and Licent (1910) and Licent (1912) on some Homoptera Auchenorrhyncha. One of the earliest investigations on small species of Homoptera was made by Lubbock (1858) on *Coccus hesperidium* (Coccidae), followed by Kershow (1910) on the candle fly *Pyrops candelaria.*

Feir (1974) in her review shows that very little work has been done on the alimentary canal and its physiology in*Oncopeltus fasciatus.* Apart from a brief study on the anatomy and histology of the digestive system of this insect provided by Hood (1937), some investigations on the physiology of its digestive organs were made by Bongers (1968, 1970). There is, therefore, reason to hope that further detailed work on the anatomy and histology of the midgut of *O. fasciatus* will provide a more reliable account of this terrestrial seed-sucking Heteroptera species.

MATERIALS AND METHODS

To study the general anatomy of the alimentary canal, freshly killed specimens of *Oncopeltus fasciatus* Dallas of both sexes were used (fifty specimens). For this purpose dissection was done in 70% alcohol, all illustrations and measurements were made under the dissection microscope with the aid of an eye piece graticule and micrometer.

OBSERVATIONS

The development of the mouth parts in *Oncopeltus fasciatus* has been traced by Butt (1949) and Newcomer (1948). Acording to Newcomer the mandibular lever in *Oncopeltus* is secreted by the wall of the mandibular setal sac after hatching, while the lever of the maxillary stylet is produced from a simple diverticulum of the maxillary setal sac.

The alimentary canal of *O. fasciatus* Dall. (Lygaeidae) is of a moderate length, about two and a half times that of the body, and divided as in other insects, into three major portions the stomodaeum or foregut, the midgut (mesenteron or ventriculus) and the hindgut or proctodaeum (Fig. I). *Stomodaeum* (*Foregut*) : The hypopharynx in Hemiptera is a well developed structure arising from the venter of all the gnathal segments (Heymons 1899). According to Newcomer the hypopharynx arises from the three gnathal and the intercalary segments in *Oncopeltus fasciatus* It forms the ventral floor of the

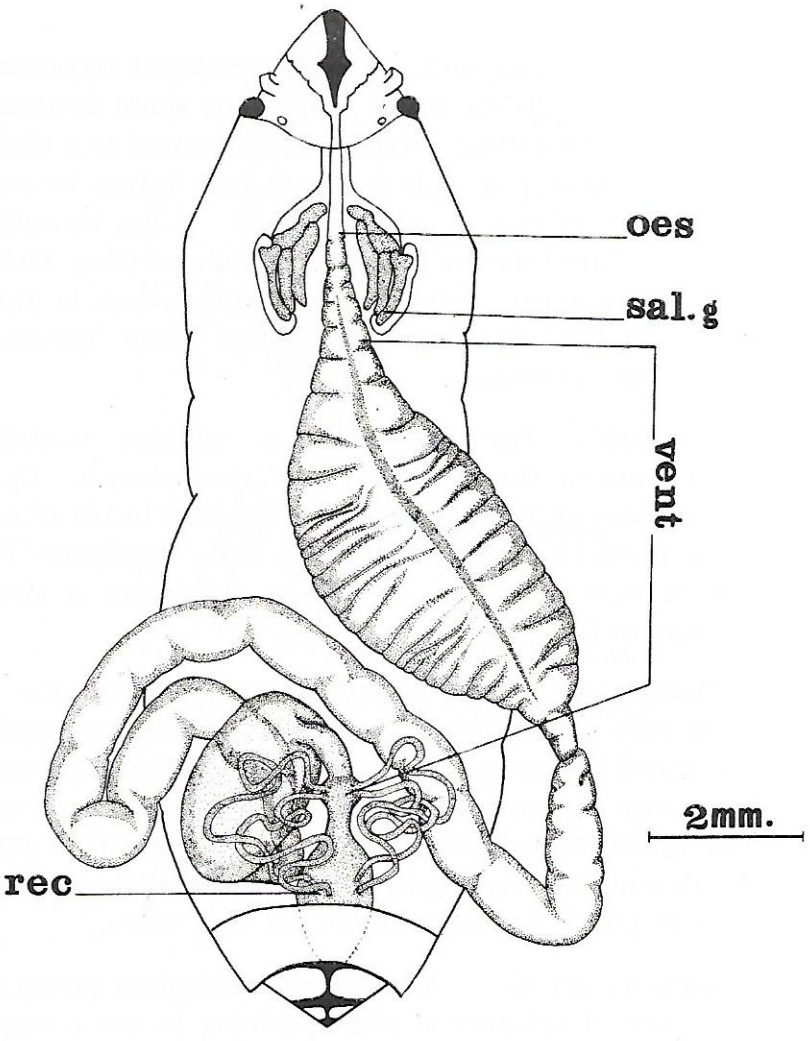

Fig. 1. Dorsal view of *Oncopeltus fasciatus* digestive system. oes=oesophagus, rec=rectum, sal. g=salivary gland, v=ventriculus.

food canal medially and a greatly developed hypopharyngeal wing laterally on either side of the small hypopharngeal lobe. The salivary syringe in Hemiptera is a modified salivarium, equipped with a piston and valves to control the direction of flow of salivary liquid. It lies beneath the food pump and between the hypopharyngeal wing, Matsuda (1965). The upper surface of the hypopharynx is grooved apically to form the floor of the tube which carries the food to the cibarium.

Pharynx : The pharynx is a tubular connecting region between the cibarium and oesophagus. Various authors such as Tower (1914) have referred to the cibarium as the pharynx, but Weber (1930) and Snodgrass (1935) made it clear that the pharynx of Hemiptera is situated posterior to the cibarium.

Oesophagus : The oesophagus is a short and thin walled tube which passes between the circum oesophageal connectives in the head and posteriorly into the prothorax. It is a very narrow region joining the enlarged first ventriculus where the oesophageal valve is located. It is difficult to determine exactly where this region ends from its gross anatomy but it seems to terminate in a valve.

Salivary glands : According to Snodgrass (1935) these glands are of ectodermal origin, arising in the embryo as paired invaginations just behind the bases of the rudiments of the second maxillary appendages. They are therefore treated here in connection with the stomodaeum.

In *O. faciatus* the salivary or libial gland consist of a pair of trilobed principal glands and a pair of tubular accessory glands with associated ducts. They lie on either

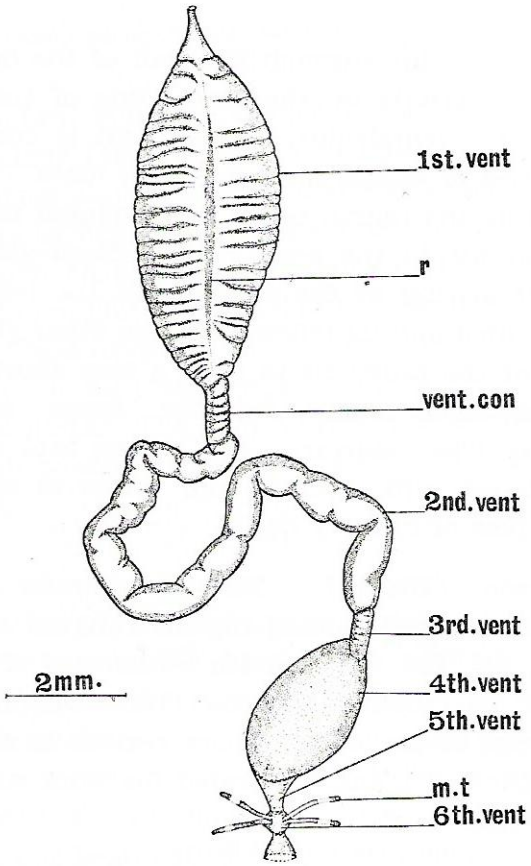

Fig. 2. Midgut of *Oncopeltus fasciatus*. m. t = malpighian tubules, v = ventriculus, ven. con = ventricular constriction.

side of a medium line through the wall of the oesophagus and extend posteriorly on the dorsal side of the anterior end of the first ventriculus. Each gland is composed of four parts, two of which form pyriform lobes. The third is bilobed while the fourth forms a convoluted tubule with its distal end within the head cavity. Each gland has a straight duct arising at the junction of the lobes of the gland. This duct and its fellow from the other gland unite at the base of the proboscis to form a very short common salivary duct which empties into the space below the hypopharynx. The salivary duct runs into a salivary syringe equipped with a piston and valves to control the direction of flow of salivary liquid.

Mesenteron (*Midgut*) : The mesenteron is differentiated into six well defined regions referred to here as the 1st, 2nd, 3rd, 4th, 5th, and 6th ventriculus (Fig. 2) and are described as follows. Glasgow (1914) was among the first to attempt to homologise these regions as they occur throughout the order and illustrated his work with a long series of figures.

1st ventriculus : This is a large thin walled sac-like structure, its size and shape depending very much on the amount of food or air it contains. It is capable of great distension, but it usually extends from the 1st thoracic segments to the 2nd abdominal segment. It was termed the crop by Malouf (1933) the "premier poche de ventricule chylifigue ou stomac" by Dufour (1833), the first stomch by Glasgow (1914), Wooley (1949),Harris (1938), Breakey (1936) and others. It has been called the first stomach of the ventriculus. The wall of the 1st ventriculus are transversely folded especially when empty, with median dorsal and

ventral raphes running almost the entire length of the region. Malouf (1938), states that both the oesophagus and crop have similar histological characters in *Nezara viridula*, and he belived that the terms stomach and ventriculus are erroneous, but Al-Saudouk (1977) supported the interpretation of Dufour and Glasgow. Malouf is apparently wrong in regarding the first ventriculus as the crop, the latter (which is an ectodermal structure) is always absent in the Hemiptera. The first ventriculus is usually distended by air bubbles which eliminate the folded appearance of its walls.

2nd ventriculus : The first ventriculus narrows posteriorly and passes into the 2nd ventriculus. This is a convoluted tube forming the longest part of the mesenteron. The junction between 1st and 2nd ventriculus lying at the posterior end of the 2nd abdominal segment. The 2nd ventriculus turns dorsally then anteriorly and ventrally with its anterior part under the 1st ventriculus. The region has been called the "first stomach" by Malouf, the "portion filiforme" by Dufour, the "intestine posterior" by Ancona and the second stomach of the ventriculus by Glosgow and other later workers. It is very light brownish white in colour and lies in the 2nd — 5th abdominal segment.

3rd ventriculus : The 2nd ventriculus joins the 3rd by a distinct constriction. This short white region is concealed between the convolution of the second ventriculus and lies in the third abdominal segment. It seems not to have been recognzed by Hood (1937), in his study of the alimentary canal of *O. fasciatus*.

4th ventriculus : The third ventriculus passes posteriorly into an ovoidal 4th ventriculus which is usually filled with food material. This organ is the "second stomach" of Malouf, the second "poche gastrique" of Dufour and the "third stomach" of Glasgow. It is dark brownish in colour and usually contains oil droplets when it is filled with food material. Miles (1958), has found that in mature nymphal stages, this part contained only a large droplet of oily materials.

5th ventriculus : The fourth ventriculus narrows posteriorly into a short narrow smooth walled tube called here the 4th ventriculus. This part is deviod of gastric caeca such as occur in many other Heteroptera, Glasgow (1914), Buchner (1953).

6th ventriculus : This is an elargment, considered here as the most posterior section of the midgut, into which the Malpighian tubules enter when they join the alimentary canal. Hood (1937), provisionally called it the pylorus in *O. fasciatus* but seemed boubtful.

This small part of the alimentary canal has been named by some authors working on Pentatomomorph species as the ileum or pylorus and considered as the most anterior segment of proctodaeum. It has been interpreted in this way not because of its histological features but because it received the opening of the Malpighian tubules. In this respect Snodgrass (1935), pointed out that in the majority of insects the Malpighian tubules arise from the proctodaeum. Henson (1932), however believes that the Malpighian tubules in some insects arise from the measenteron or from the undifferentiated zone between the endoderm and ectoderm. What was called the pylorous by Hood (1937) and treated as part of the proctodaeum, is

considered to be the most posterior part of the midgut and is termed the 6th ventriculus, Al-Sandouk (1977).

Proctodaeum (*Hindgut*) : The hindgut or proctodaeum of *O. fasciatus* is short and greatly reduced, being composed of only the rectum (Fig. 1). The latter commences at the ventriculo-rectal valve which is referred to by some workers as the pyloric or the ileo — rectal valve.

Goodchild (1965), claimed that in the Pentatomomorpha the pyloric region was enlarged to accommodate the opening of the Malpighian tubules, thus forming a distinct segment of the hindgut. This is not the case in *Oncopeltus* where the pylorus is histologically similar to the midgut in spite of the restricted opening of the Malpighian tubules, Al-Sandouk (1977).

The rectum is relatively large membranous structure which extends backwards to the posterior part of the last abdominal segment. It become narrow in the 6th abdominal segment and extends to the anus as a narrow tube with the exterior.

SUMMARY

The adult midgut of *Oncopeltus fasciatus* comprises six anatomically distinct ventriculi. The third ventriculus was newly recognized here and the sixth (previously called the pylorus) was shown in the present work to be the most posterior region of the midgut.

ACKNOWLEDGEMENT

This work has been done under the guidance of Mr. R. G. Davies, Zoology Department, Imperial College, London, to whom I am very much indebted for his kind

encouragement during the preparation of my M. Phil, Degree.

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Anatomy of **Oncopeltus fasciatus** alimentary canal

الخلاصـــة

حشرة ٠ تعـود الى رتبـة نصفية الاجنحة ومن *Oncopeltus fasciatus Dall.*
مجموعـة الحشرات التي تمتص عصارة البذور فهي مهمـة اقتصاديا جدا يكشف هذا البحـث ان القنـاة الهضميـة الوسطى التي تتعامل اساسا مع العضـارة المتصـة للبـذور تتألـف من ستة مناطق مميـزة كما جـاء في البحـث وليـس من اربعة مناطـق كما اعتقـد العالـم C. W. Hood فـي سنـة ١٩٣٧ ٠٠

Bull. Basrah nat. Hist. Mus.
Vol. 4 : 17-25, 1977

OBSERVATIONS ON NEMATODE PARASITE (*CONTRACAECUM* SP.) IN SOME IRAQI FISHES

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The Shatt-al-Arab river and its branches form a suitable habitat for the freshwater fishes. Little work has so far been done on helminth parasites infecting the Iraqi fishes. Herzog (1969) working with the Iraqi fishes showed that the larvae and the adults of nematode were about 40 per cent of the total examined fishes.

Shamsuddin *et al* (1971) found that larval nematode in most of the fishes examined by them and the infection was heaviest in *Siluris triostegus* (Heckel) and *Aspius varax* (Heckel). They suggested that these larve belonged to *Contracaecum multipapillatum, C. microcephalum* and *C. spiculigerum.*

MATERIALS AND METHODS

Fishes were collected by net at monthly intervals for one year starting from October 1975 from the Shatt-AL-Arab river at Basrah All fishes caught were examined for nematodes. These fishes were dissected and the larvae were microscopically examined. The number of larvae, its location in each different sites were recorded. Search for adult nematodes was made in the large fishes, as *Silurus triostegus* and *Aspius vorax.*

Five species of bird occurring in Basrah marshes were collected with shotgun and the proventriculi were immediately examined for the adult nematodes.

Nematodes were fixed in 70 per cent alcohol and cleared in lactophenole and identified. This identification was later confirmed by the British Museum (Natural History).

RESULTS

Table 1 shows the fish host, nematodes, the site and percentage of infection. The most heavy infection occured in three species of fishes, *S. triostegus, A. vorax* and *Mugil hishni.* All nematode larvae were in the third stage (Fig. 1) and (Fig. 2). The adults which were collected only from Purple Heron identified as *C. microcephalum* (Fig. 3) and (Fig. 4).

A comparision between *Contracaecum* larve collected from Mugil and the immature forms found in herons indicated that they belong to the same species. The food contents found in Purple Heron were *M. dussumieri, M. hishni, Saccobranches fossilis* and shrimps. All birds examined were infected with *Contracaecum* sp. (Table 2). A large number of larvae found in Cormorant (Fig. 5) were frequently noted as penetrating the wall of the proventriculus.

Larvae of *Cucullanus* and *Spiruroid* observed in *Barbus sp.* are not previously reported from Iraq and therefore the present finding form the first record for these two genera.

DISCUSION

Most fishes examined were infected with nematodes (Table 1). Herzog (1969), found that 40 per cent of the total fishes examined were suffered from nematode infection. Shamsuddin (1971) *et al* confirmed the same results

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Table 1. Site and percentage of nematode infection of some Iraqi fishes.

Fish host	nematode larvae	Percentage infection	No. of fish fish	Site of infection.
Siluris triostegus (Heckel)	*Contracaecum sp.*	100	82	mesentry, stomach
Aspius vorax (Heckel)	= = = = =	84	64	surface.
Mugil hishni (Misra)	= = = = =	71	1273	mesentry, stomach surface, liver kidney, gonad.
Mugil dussumieri (Cuvier & Valenciennes)	= = = = =	54	49	mesentry
Saccobranchus fossilis (Bloch)	= = = = =	53	38	mesentry, stomach surface.
Barbus luteus (Heckel)	= = = = =	44	230	mesentry.
	Cucullanus sp. *	10		=
	Spiruroid *	5		=
Barbus sharpeyi (Gunther)	*Contracaecum sp.*	42	114	
Barbus xanthopterus (Heckel)	=	25	26	= =
Barbus grypus (Heckel)	=	30	33	=
	Spiruroid *	5		=
Mystus pelusius (Solander)	*Contracaecum sp.*	11	16	

* Recorded for the first time in Iraqifishes.

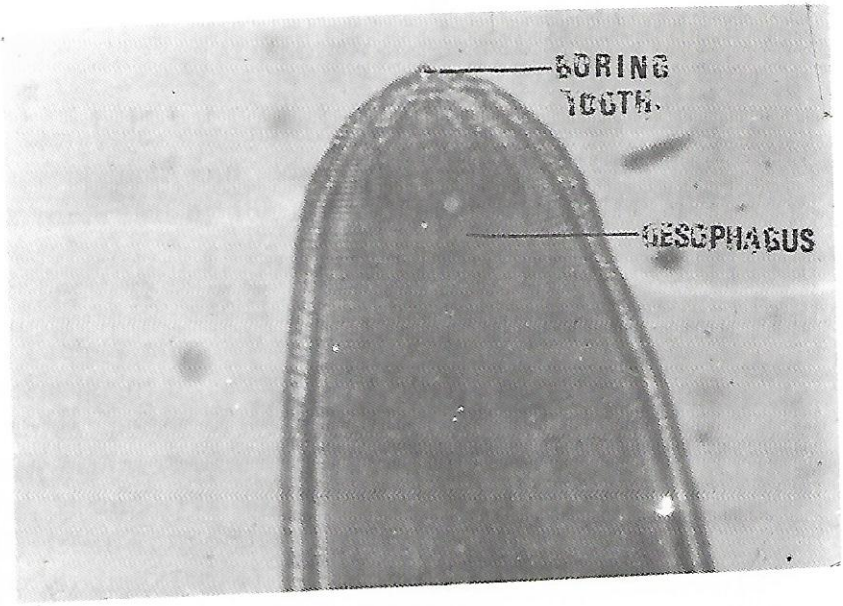

Fig. 1. The anterior end of *Contracaecum* larva.

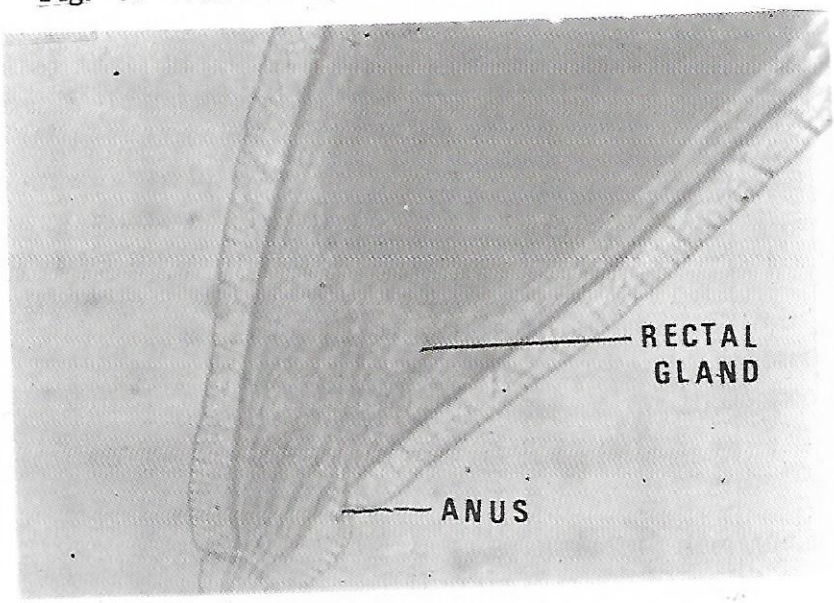

Fig. 2. The posterior end of *Contracaecum* larva.

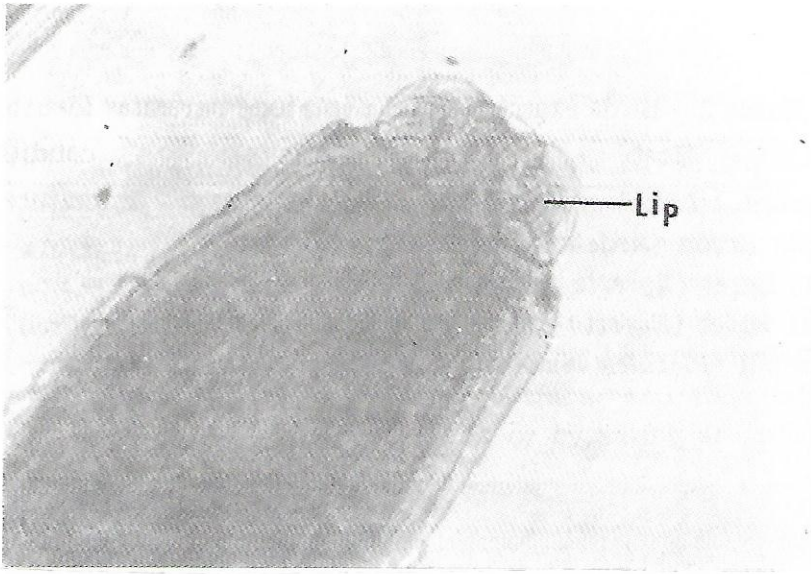

Fig. 3. The anterior end of adult *Contracaecum microcephalum* from Purple Heron.

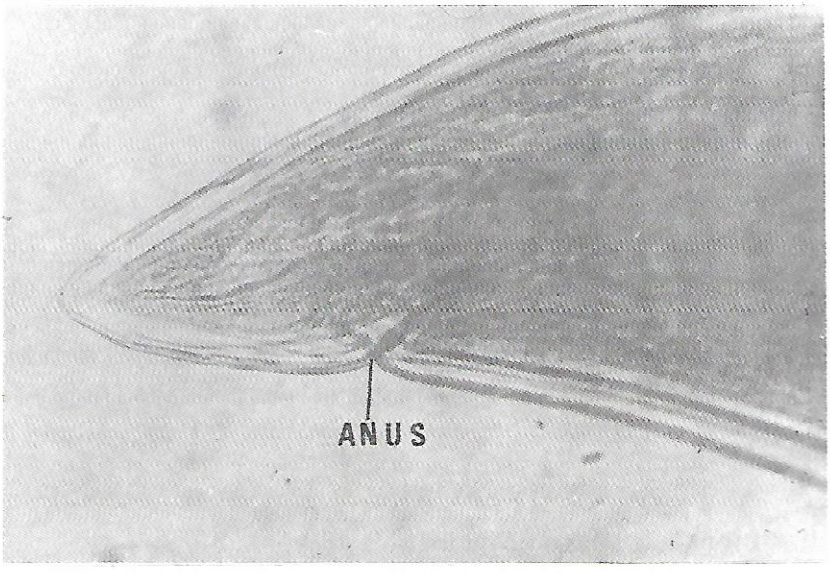

Fig. 4. The posterior end of adult *Contracaecum microecphalum* from Purple Heron.

Table 2. Birds examined and nematode parasites identified

Host	parasite	condition
Cormorant (*Phalacrocorax sp.*)	*Contracaecum*	Immature
Purple Heron (*Ardea purpurea L.*)	=	=
Little Egret (*Egretta* garzetta L.)	=	=
Great Egret (*Egretta* alba L.)	=	=
Spoonbill (*Platalea leucordia* L.)	=	larvae

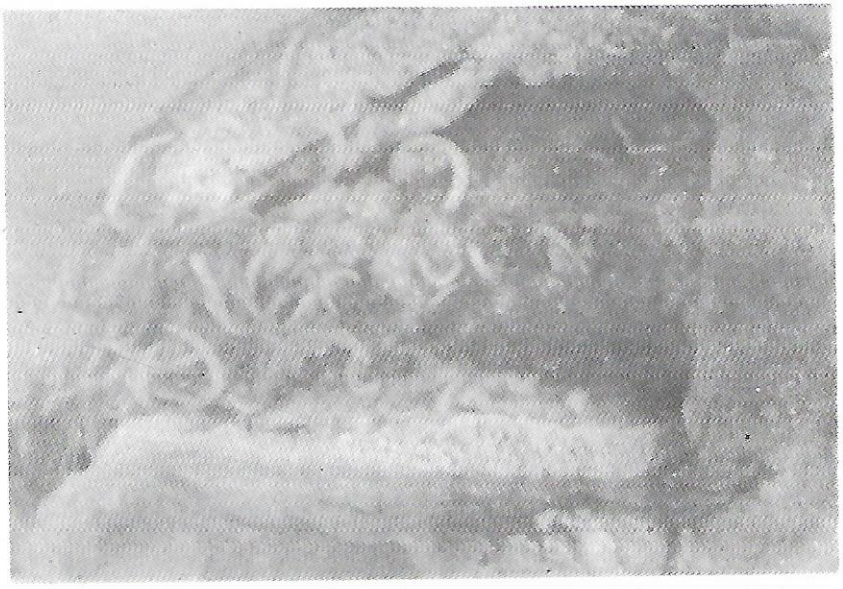

Fig. 5. Proventriculus of Cormorant opened to show heavy infection by *Contracaecum* larve.

In the proventriculus of the Purple Heron the adult nematodes laid their eggs in early stages of development which pass out with the faeces of bird into the water, where it develops to infected juvenile having a cuticular boring tooth. This stage is eaten by the intermediate host which is usually invertebrates. The fishes are infected by two pathways either by feeding of the second stage larvae directly (Thomas, 1937 & 1937 b) or by eating an infected Copepod.

After reaching the intestine of the host, the larvae penetrate the intestinal wall and get into the body cavity of the host from where they migrate into different organs to become capsulated by the host tissues and reach the third stage. This third stage larvae find their way to the Purple Heron when the latter feed on the infected fishes. In the final host (Purple Heron) the third stage of nematode looses its borinmg tooth and changes into adult. Transfer of the larvae between the hosts is possible during a predatory-prey relationship involving small and large fishes.

The adult nematodes from the Purple Heron were identified as *C. microcephalum*. Shamsuddin *et al* (1971) after morphological studies on *Contracaecum* larvae from *Mugil* belived that they belonged either to *C. microcephalum*, or *C. multipapillatum*, or *C. spiculigerum*.

SUMMARY

The adult stage of *Contracaecum microcephalum* have been recovered from the Purple Heron. Two pathways of life cycle are suggested for this parasite. The second stage could reach the fish either through the eating of infected copepod or by direct consumption of the first stage larvae.

ACKNOWLEDGEMENT

We are thankful to the British Museum (Natural History), London, for identification of nematodes.

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Observations on nematode parasite in Iraqi fishes

الخلاصـــــة

فحصت عشرة انواع من الاسماك وخمسة انواع من الطيور في منطقة البصرة لغرض التعرف على دورة حياة طفيلي (الكونتراسيكم) وقد تم عزل وتشخيص الطور البالغ للطفيلي من طيور مالك الحـزين سنجابي – شهيبي كما سجلت لاول مرة اصابة الاسماك العراقية بنوعين جديدين من الديدان الخيطيـــــة ٠

Bull. Basrah nat. Hist. Mus.
Vol. 4 : 27-40, 1977

FEEDING ECOLOGY OF A MUGILID FISH, *LIZA ABU* (HECKEL) IN BASRAH, IRAQ

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Feeding ecology of few fishes have been properly delineated. This delineation is a prerequisite for an understanding of interspecific relations, proper management and future studies in secondary productivity. As stated by Hela and Laevastu (1961), there is often a positive correlation between the quantity as well as the specific type of plankton and abundance of fish. Some food species can also be used as indicators of the abundance of fish.

The mullets (Mugilidae) with their tasty and rich flesh are valued commercially. Some species of the mullets are also adapted for cultivation in brackish water ponds. Mookerjee *et al.* (1946), working on the food of Indian mullet, *Mugil parsia*, made a suggestion to culture it in fresh water ponds Fagade and Olaniyan (1973) studied the food and feeding interrelationships of some other Mugilid species (*Liza falcininuis*, *L. grandisquamis, L. dumerilii, Mugil banaensis, M. cephalus,* and *M. curema*). But our knowledge on the feeding ecology of *Liza abu* which abounds in the fresh waters of Iraq is very meagre, and little attention has been devoted to the subject in Iraq. The present work, therefore, is an attempt to determine the types of food eaten by *Liza abu* and some of the ecological conditions which may influence the feeding of the species.

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MATERIALS AND METHODS

Samples of the fish were taken during the months of December, 1975, February and April, 1976 by cast nets from a station, Nahar Jasim at the Salihiya channel of the Shatt al-Arab River. Shatt al-Arab is virtually the tidal estuary of two great rivers of Iraq, the Tigris and the Euphrates, flowing down to the Arab Gulf. The waters of these rivers, as found by Saad and Kell (1975), are biologically different. Shatt al-Arab is also influenced by tides from the Arab Gulf to which it flows.

A total of 51 fish were collected. Ecological data viz., time of day, air and water temperatures and water transparency were recorded during each sampling. Water samples for dissolved oxygen and chlorosity were collected by a standard water sampler (Casella No. 16700 made in England) from a depth of 1 meter. Samples for oxygen were duly fixed soon after collection. Temperatures were measured with a simple thermometer graduated to 0·2°C, and the water transparency was determined with a white enamelled Secchi disc 25 cm in diameter. Fish samples collected were taken to the laboratory and frozen in order to reduce posthumous digestion to the minimum, for later examination.

The standard length in mm of all fish collected were determined in the laboratory. The stomachs were then removed and preserved in 5 percent formalin. The chemical analyses of the water samples were completed the same day on return from the field trip. The Winkler method was followed for determination of dissolved oxygen. The chlorosity was determined by the ordinary Mohr's method. Contents of the gizzard — like stomach were analysed both qualitatively

and quantitatively. The "points" method of Hynes (1950), slightly modified by Sarker (1973), was followed. Data analyses were based on occurrence, average index of fullness of the stomachs, average number of points per stomach and four categories of the stomach contents. All the points for each category were added up and converted into percentages of the total number of points allotted for all categories in different months. Food items were identified as far as possible with the help of an inverted microscope.

RESULTS AND DISCUSSION

The results of the present study have been summarized in Tables 1 to 3. Fish ranged in standard length from 83 to 140 mm. Only three of the 51 stomachs examined were found empty. The principal groups of stomach contents found in this study were phytoplankton, aquatic plant parts, sand grains and organic detritus. Of these four categories, sand grains and organic detritus comprised the bulk of the stomach contents, and they occurred in almost equal proportions, as shown by average points per fish and percentage of total points (Table 1). Acquatic plant parts and phytoplankton, on the other hand, were found to rank nearly equal in importance as food of the species, when judged by both average number of points and percentage of total points. In respect of percentage of occurrence, both phytoplankton and organic detritus ranked equally important and, therefore, may be tied for first position, sand grains standing a close second. The relative importance of the various categories may, however, be seen from the mean percentage composition of the stomach contents for whole period of investigation (Organic detritus 42·8, sand grains 41·2, phytoplankton 8·6 and aquatic plant parts 7·4). Sand grains are not considered as food of the

Table 1. General pattern of feeding of *L. abu* by food catego-ries (based on 51 fish examined)

	Food Categories			
	Phytoplankton	Aquatic plant parts	Sand grains	Organic detritus
Occurrence	48 (94·1%)	40 (78·4%)	47 (92·2%)	48 (94·1%)
Average points per fish	3·6	3·3	17·0	17·7
Percentage of total points	8·6	7·4	41·2	42·8

species. They may have been ingested while the fish was searching for food on the detritus. The fish, therefore, fed mainly on organic detuitus. The next preferred food was phytoplankton, as many as 37 types belonging to three classes of algae (Cyanophyceae, Bacillariophyceae and Chlorophyceae) shown in Appendix — 1. The list of phytoplankton has been prepared after Prescott (1970).

The diatoms (Bacillariophyceae) alone comprised 50% of the phytoplankton while the blue green algae (Cyanophyceae) and green algae (Chlorophyceae) accounted for 14% and 36% respectively. If the numberical abundance method had been applied in analysis, the diatoms could have formed the bulk of the food organisms. This finding of the present study is thus in agreement to that of Fagade and Olaniyan (*op. cit.*) who worked on the closely related *L. falcininnis*. Again, in our study, the Pennales accounted for about 74% and the Centrales about 26% of the diatoms.

Of the aquatic plant parts, broken and fragmented leaves of *Vallisneria* were most freqquently encountered in the stomachs. Leaves and stems of other aquatic plants, namely *Potamogeton* and *Polygonum*, were also found in the stomachs, but these items occurred only rarely, and the consumption of these plant parts may be regarded as accidental.

Monthly Patterns of Feeding :

The monthly feeding patterns in the fish have been shown in Table 2 and Figure 1. Judged by the frequency of occurrence of various categories, it can be seen that three of the four categories viz., phytoplankton, sand grains and organic detritus occurred in 100% of fish collected in April and in 93·3% of fish collected in February (Table 2). In December, the per-

Table 2. Monthly patterns of feeding of *L. abu* by food categories (N = number of fish examined, P = number of total points, Occurrence = number of fish in which occurred).

		Phytoplankton	Aq. plant parts	Sand grains	Organic detritus
December	Occurrence	15	13	14	15
1975	% occurrence	88·2	76·4	82·4	88·2
N=17, P=454	Av. points/fish	3·6	1·6	10·6	10·4
	% total points	13·3	6·0	40·7	40·0
February	Occurrence	14	11	14	14
1976	% occurrence	93·3	73·3	93·3	93·3
N=15, P=455	Av. point/fish	1·9	2·3	12·5	13·6
	% total points	6·2	7·7	41·3	44·8
April	Occurrence	19	16	19	19
1976	% occurrence	100	89·5	100	100
N=19, P=1199	Av. point/fish	4·9	5·0	26·1	27·2
	% total points	7·8	7·9	41·3	43·0

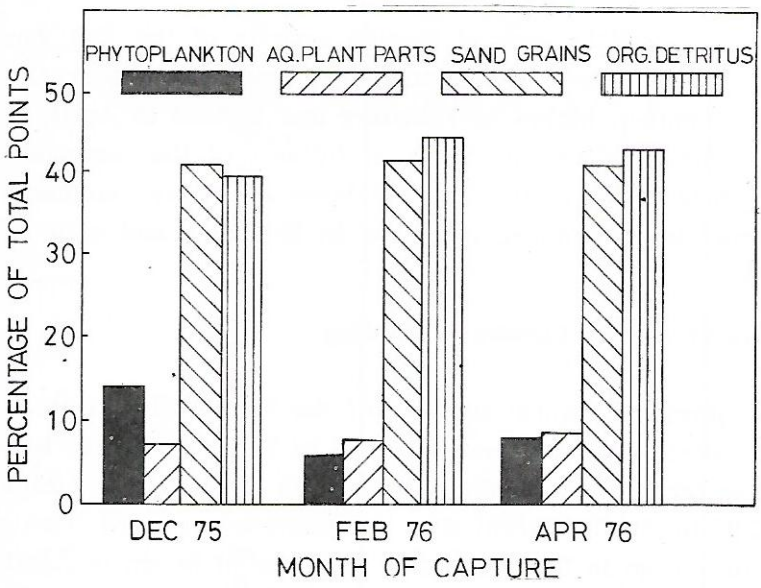

Fig. 1. Percentage contribution of the different categories of Stomach contents in *L. abu* by months.

centage of occurrence for phytoplankton and organic detritus was similar and was higher than those for other categories. Based on both average points and percentage of total points, organic detritus was found to be the most important article of diet during February and April. In December, the data were erratic, probably because, small fish were the dominant size class, and large fish were fewer in this collection. The percentage composition of the various categories showing the variation in the groups comprising the stomach contents and their relative importance during different months may be seen in Figure 1. The pattern of feeding on aquatic plants as shown by percentage of total points was lowest in December, higher in February and highest in April.

A picture of the general feeding activity of the fish has been given in Table 1. The intensity of feeding was generally low in December, higher in February and highest in April, as indicated by both average index of fullness of the stomachs and average food points. The incidence of empty stomachs was two in December, only one in February and none in April.

Relation of Abiotic Factors to Feeding :

The physico-chemical features of the fish habitat at times of fish collections have been indicated in Table 3. Water temperatures ranged from 14·8°C minimum in December to a high of 26·2°C in April. Secchi disc transparency ranged from a low value 32 cm in December to a high one of 64 cm in April. The extinction co-efficient (K values) ranged from 2·65 to 5·3. Dissolved oxygen levels ranged from a minimum of 6·0 mg/l in April to a high of 7·4 mg/l in December. The chlorosity content of the habitat water varied from 0·28 g/l minimum in February to 0·33 g/l in April.

The ecological conditions of the study area as indicated above seemed to have no adverse effects on feeding of the fish. The food organisms found among the stomach contents were mainly phytoplankton. According to Saad (personal communication) who worked on the influence of environmental conditions on phytoplankton populations, most of the dominant species of phytoplankton inhabiting the Shatt al-Arab are eurythermic forms, tolerating a wide range of temperature variations. The difference between the absolute maximum and minimum average values of water temperatures as recorded by him during four different seasons of the year was about 16·0°C. In the present study, the difference in the range was 11·4°C.

Table 3. Some physico — chemical features of the study site at times of fish collection.

Date of collection (Time 10 : 00)	Temperature° C		Transparency		Dissolved	Chlorosity (g/lCl)
	Air *	Water **	Depth (cm)	K	Oxygen (mg/l)	
18 Dec. 1975	18·6	14·8	32	5·3	7·4	0·30
25 Feb. 1976	19·2	16·0	64	3·0	6·8	0·28
19 Apr. 1976	29·5	26·2	57	2·65	6·0	0·33

* 1 m above the water surface ; ** Surface

The transparency of water at the site of collection was found to be quite high and was, therefore, congenial to the growth and survival of phytoplankton groups. The extent of photosynthetic zones at times of fish collections at the study site as calculated after Vatova (1961), on multiplying the secchi disc readings by 3·3, reached values of 1·06 m, 1·9 m and 2·1 m in December, February and April respectively. The depth of fish collections never exceeded these photosynthetic zones. Saad and Kell (1975), working on environmental conditions and phytoplankton blooms in the Rivers Tigris, Euphrates and Shatt al-Arab, concludes that photosynthetic depth values of 1·65 m in Tigris and Shatt al-Arab are favourable for phytoplankton blooms. Alto dissolved oxygen generally showed normal concentrations that account for the availability of phytoplankton in the investigated area.

The data on chlorosity indicate that the study area is a typical fresh water habitat, little influtnctd by the tidal currents and hence by the salinity of the Arab Gulf. As would be expected, the phytoplankton and other aquatic vegetation found in the stomachs are, therefore, typical fresh water forms.

As to the major contribution of the diatoms to the diet among the phytoplankton, our findings approximate those of Kell and Saad (1975) who worked on the phytoplankton and some environmental parameters of the Shatt al-Arab. In their study, the share of the diatoms in the total number of cells amounted to 68%, that of green algae comprised 19% and the blue greens 13%.

SUMMARY

The mean percentage composition of the stomach contents for the whole period of investigations was as follows : organic

detritus 42·8, sand grains 41·2, phytoplankton 8·6 and aquatic plant parts 7·4. In respect of percentage of occurrence, organic detritus and phytoplankton ranked equally important. The diatoms alone comprised 50% of the phytoplankton as food organisms. The Pennales accounted for about 74% and the Centrales about 26% of the diatoms. Aquatic plant parts and phytoplankton ranked nearly equal in importance as food of the fish when judged by both average number of points and percentage of total points. Sand grains might have been unavoidably ingested while the fish fed on bottom food.

Among the food categories, organic detritus formed the highest percentage of food volume in all months of capture. As indicated by both average index of fullness of the stomachs and average food points, the intensity of feeding was generally low in December, higher in February and highest in April.

The data on physico-chemical conditions as found in this study accounted for the availability in the habitat of the food organisms eaten by the fish. Temperatures of water ranged from a minimum of 14·8 in December to a maximum of 26·2°C in April. The range of extinction co-efficient was 2·65 to 5·3. Dissolved oxygen concentrations ranged from 6·0mg/l in April to 7·4mg/l in December and chlorosity content from 0·28g/l in February to 0·33g/l in April.

ACKNOWLEDGMENTS

The authors are thankful to Dr. Khalaf Al-Robaae, Director, Natural History Museum, University of Basrah, Iraq for providing them with space and other facilities to carry on the research work in the museum. Thanks are due also to Mr. Jabbar Khuttar Zuuar, one of their colleagues for assistance at times of need.

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APPENDIX 1

LIST OF PHYTOPLANKTON FOUND AMONG THE STOMACH CONTENTS OF *L. ABU*.

CYANOPHYCEAE

Order-Oscillatoriales : *Lyngbya* sp., *Microcoleus* sp., *Oscillatoria* sp., *Phormidium* sp.,

Order Nostocales : *Anabaena* sp.,

BACILLARIOPHYCEAE

Order-Centrales : *Biddulphia* sp., *Coscinodiscus* sp., *Cyclotella* sp., *Melosira* sp., *Rhizosolenia* sp.

Order Pennales : *Amphora* sp., *Asterionella Japonica, Cyclophora tenuis, Diatoma elongatum, Epithemia* sp., *Fragillaria* sp., *Gyrosigma acuminatum, Meridion* sp., *Navicula halophila, Nitzschia spectabilis N. closterium, Pinnularia angulatum, Pleurosigma* sp., *Surirella ovata, Synedra* spp.

CHLOROPHYCEAE

Order-Tetrasporales : *Tetraspora* sp

Order Chlorococcales : *Ankistrodesmus gracilis, Closteriopsis* sp.

Order Ulotrichales : *Ulothrix* sp.

Order Zygnematales : *Closterium* sp., *Cosmarium* sp., *Conatozygon* sp.,*Mesotaenium* sp., *Mougeotia* sp., *Netrium* sp., *Penium* sp., *Spirotaenia* sp.

الخـلاصـة

كانت النسبة المئوية لمحتويات معـد الاسماك (*Liza abu*) طوال فترة البحث هي/الفتات العضوية ٨ر٤٢ ، الحبيبات الرملية ٢ر٤١ ، الهوائم النباتية ٦ر٨ ، النباتات المائية ٤ر٧ ان الدياتومات كاحياء غذائيـة كانت تؤلف ٥٠٪من مجموع الهوائم النباتية حيث كانت الدياتومات الريشية٧٤٪ والقرصية ٢٦٪ ٠

وجد أن اجزاء النباتات المائية والهوائم النباتية متساوية في الاهمية كغذاء للاسماك ٠ لاتدخل الحبيبات الرملية في عملية الهضم عندما تقتـات الاسماك على الغـذاء القاعي ٠ كونت الفتات العضوية من بيـن مجموعات الغذاء النسبة العليا من حجم الغذاء خلال اشهر الصيد ٠

كانت درجة حرارة الماء تتراوح بين نهاية صغرى في كانـون الاول (٨ر١٤ م) ونهاية عظمى في نيسان (٢ر٢٦ م) ومعامل درجة نقاء المـاء تتراوح بين ٦٥ر٢ الى ٣ر٥ ٠ امـا تركيز الاوكسجين المذاب فتراوح بين ٦ ملغم/اللتر في نيسان و ٤ر٧ ملغم/اللتر في كانون الاول ٠

Bull. Basrah nat. Hist. Mus.
Vol. 4 : 41-49, 1977

SOME OBSERVATIONS ON SOME PHYSICO-CHEMICAL FEATURES OF TWO SIDE BRANCHES OF THE SHATT-AL-ARAB RIVER

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Limited limnological works have been done on the Shatt-Al-Arab river and its branches. Some hydrographical characteristics of the Shatt-Al-Arab and its adjacent areas were reported by Arndt and Al-Saadi (1975). Mohammad (1965) published his preliminary observations on some environmental conditions of the Shatt-Al-Arab based on a short term data. Keel and Saad (1975) studied the phytoplankton and some environmentatl parameters of the Shatt-Al-Arab. But our knowledge of the environmental factors of the side branches of the Shatt-Al-Arab is still scarce. The present paper, therefore, deals with the physico-chemical features of the two side branches (Sarraji and Mehejran) of the Shatt-Al-Arab river. Such ecological investigations on aquatic habitats are needed for solving agricultural and fisheries problems. Further these water bodies harbour numerous fauna and flora which are influenced by the physico-chemical conditions of these habitats.

STUDY AREA

The Sarraji and Mehejran are two side branches of the Shatt-Al-Arab. The width of the Sarraji at the upper portion is 23m, and at the lower portion 12m. It has a mean depth of

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STUDY AREA

The Sarraji and Mehejran are two side branches of the Shatt-Al-Arab. The width of the Sarraji at the upper portion is 23m, and at the lower portion 12m. It has a mean depth of

approximately 2m, maximum depth being 3·25m at the middle portion, minimum 0·8m at the lower portion.

Mehejran canal has a mean width of 12m with a maximum depth of 3·4m and a minimum of 2·05m. Depths of both canals vary with the tide action of the Shatt-Al-Arab.

In both canals huge amounts of submerged plants are found. Vegitations and trees grow on both banks. And there are also some influences from drainage and populated areas on both sides.

MATERIALS AND METHODS

Collection of data presented herein were made on monthly basis between January and August 1977. Three different stations were selected in each of the two study sites, stations I, II, and III, representing upper, middle and lower reaches respectively.

The physical factors selected were temperature, transparency and specific gravity, while pH, dissolved oxygen and chlorosity were selected as chemical factors.

Stations were visited by means of a boat. Water and air temperatures were taken with a simple thermometer graguated to 0·5°C. Water transparency was measured with a white enamelled Secchi disc 25 cm in diameter. Specific gravity was determined with simple hydrometer graduated to 0·005 unit. Water sampler for dissolved oxygen, and chlorocity were collected with a standard water sampler (Casel a, London). Samples for oxygen were fixed soon after collection. The chemical analysis of the water samples were completed the same day on return from the field trip. The Winkler method

Table 1 : Physical characteristics observed at the three different stations of Sarraji and Mehejran.

	Sarraji canal									Mehejran canal							
	Station 1		Station 2		Station 3		Air Temp.	Water Temp.		Station 1		Station 2		Station 3		Air Temp.	Water Temp.
	Depth cm	K	Depth cm	K	Depth cm	K				Depth cm	K	Depth cm	K	Depth cm	K		
Jan.	128	1·33	232	0·73	full	——	13·3	10·3	104	1·63	99	1·71	180	0·94		13·3	10·0
Feb.	100	1·70	166	1·46	73	2·32	18·0	16·8	116	1·46	140	1·21	126	1·35		19·0	18·3
Mar.	116	1·46	144	1·18	76	2·23	22·8	18·0	118	1·44	135	1·26	129	1·32		23·0	18·5
Apr.	93	1·83	170	1·00	full	——	26·6	22·5	120	1·42	192	0·88	full	——		27·6	24·1
May	160	1·06	200	0·85	180	0·94	36·5	31·0	104	1·63	160	1·06	full	——		37·0	31·2
June	104	1·63	204	0·83	124	1·37	33·5	27·8	120	1·42	170	1·00	full	——		34·3	30·6
July	140	1·21	170	1·00	160	1·06	34·0	32·2	115	1·48	120	1·42	full	——		34·3	30·0
Aug.	120	1·41	240	0·70	full	——	34·0	30·0	180	0·94	198	0·86	full	——		33·0	31·0

was followed for determination of dissolved oxygen. The chlorosity was determined by the ordinary Mohr's method. The hydrogen ion concentration was determined by using ordinary pH paper.

RESULTS AND DISCUSSION

Temperature

Seasonal fluctuations in the temperature conditions of the two study areas are presented in Table 1. It was found that air temperature and water temperature were closely-related variables. The water temperatures coincided with air temperatures. As stated by Lagler (1956), air temperature has an important influence on the temperature of the water. Minimum water temperature was recorded in January at both canals, and the maximum in July at Sarraji. At Mehejran, the higher water temperature of 31·2*C was recorded in May and 31·0°C in August. The lowest and the highest air temperatures were recorded in January and May respectively at both the study areas. Arndt and Al-Saadi (1975), recorded minimum water temperature in January and maximum in August for the Shatt-al-Arab River. No significant difference between the air and water temperatures of the two canals and of the stations was observed.

Transparency of water

Al-Sarraji the transparency of water was quite high and was, therefore, congenial to the growth and survival of phytoplankton. Mehejran's fluctuations, in the Secchi disc transparency at the different stations of each canal are shown in Table 1.

On examining the data three facts are noted : First; in the both canals, the water of station 1 is less transparent than

those of the other stations, perhaps due to the water flow in the Shatt-Al-Arab causing a continuous disturbance. Second; there is no seasonal differences in transparency, the K values during the different months being not much different. Third; there is a greater transparency of water at the stations of lower portions (station 3). This may be due to the effect of the abundance of the submerged aquatic plants which cover the bottom in these stations. Further the area in shallow and away from the effect of the water flow in the Shatt-Al-Arab.

The extent of photosynthetic zones as calculated after Vatova (1961) on multiplying the Secchi disc readings by 3·3, showed photosynthetic depth values closer to those obtained by Keel and Saad (1975), and are therefore, in good agreement with phytoplankton blooms of this area. On comparing the present data with those of Arndt and Al-Saadi (1975) and Keel and Saad (1975) the transparency of these areas was found much more higher than that of the Shatt-Al-Arab and the adjacent areas.

Specific gravity

The specific gravity of the water in both study areas ranged between 0·990 and 0·960. the most frequent one was 0·985. Little difference was observed among the stations as well as among the seasons.

Water pH

The pH values are given in Table 2. The pH ranged between 7·5 and 8·0. Accordingly the water of the two canals tend to be alkaline as that of the Shatt-Al-Arab, pH of which was found to be 7·27 — 8·33 (Arndt and Al-Saadi, 1975). The huge amount of submerged aquatic plants in this area may account for this.

Dissolved oxygen

Table 2 shows monthly fluctuations in dissolved oxygen values for the two canals. Values varied from a minimum of 2·82 mg/1 in August to a maximum of 13·10 mg/1 in January. Dissolved oxygen trends in both areas seemed to be generally similar, showing a higher levels of oxygen during the winter months than during the summer. This would be expected from the greater solubility of exygen in water at low temperatures than at high ones. Exceptions to these general trends were noted in station I of both the study areas were high values were obtained during June in Sarraji, and during July in Mehejran. These are doubtless reflections of the high level of photosynthetic activities of the numerous aquatic plants available in the canals at that time. Generally the dissolved oxygen showed normal concentrations, with the exception of August values at the lower reaches of the canals.

Chlorosity

The chlorosity of Sarraji canal varied from 0·20 g/1 minimum to 1·35 g/1 maximum. Mehejran showed a variation from 0·21 g/1 minimum to 0·90 g/1 maximum (Table 2). These data on chlorosity indicate that the study area is not much influenced by the tidal currents and hence of the Arab Gulf salinity.

With the exception of (station III) in Sarraji canal, the chlorosity values never exceeded 0·90 g/1. The higher chlorosity values at this station might have resulted from a high evaporation rate from the shallow waters. Further this portion act as drainage for the irrigation of the nearby agricultural fields. The same conclusion can be drawn for the high value of chlorosity in (station III) of Mehejran canal. Seasonal variation in chlorosity was encountered in this area.

Table 2 : Chemical characteristics observed at the three different stations of Sarraji and Mehejran canals.

	Saraji Canal							Mehejran Canal						
	pH	02 Content			Chlorosity			pH	02 Content			Chlorosity		
	All	S 1	S 2	S 3	S 1	S 2	S 3	All	S 1	S 2	S 3	S 1	S 2	S 3
Jan.	8·0	10·48	10·48	13·10	0·23	0·38	1·31	7·5	10.66	10·68	12·70	0·42	0·60	0·90
Feb.	7·5	8·47	8·87	7·26	0·33	0·67	1·35	7·5	7·66	7·66	7·66	0·21	023	0·43
Mar.	7·5	8·87	9·68	8·87	0·48	0·60	1·29	7·5	7·44	7·44	7·67	0·30	0·35	0·42
Apr.	7·5	8·06	7·66	8·06	0·20	0·33	0·61	8·0	6·85	6·45	7·25	0·33	0·29	0·61
May	7·5	6·45	6·05	5·64	0·34	0·38	0·55	7·5	6·05	6·05	6·45	0·29	0·33	0·48
June.	7·5	6·85	6·55	6·05	0·36	0·43	0·82	8·0	6·45	5·64	6·05	0·30	0·32	0·44
July	8·0	5·24	4·03	4·03	0·37	0·39	0·45	7·5	6·85	6·05	5·24	0·36	0·35	0·39
Aug.	7·5	6·05	5·24	2·82	0·33	0·33	0·35	7·5	4·86	4·03	3·63	0·58	0·58	0·63

SUMMARY

Temperature, light penetration, specific gravity, pH, dissolved oxygen and chlorosity were measured at three stations in each of the two main branches, Sarraji and Mehejran of the Shatt-All-Arab river between January and August 1977.

The air temperatures ranged from 13·3°C to 34·3°C and water temperature from 10·3°C in January to 32·2°C in July. Minimum water temperatures were recorded in January at both canals and the maximum in July at Sarraji, and in August at Mehejran.

The transparency of the water was very high due to the abundance of aquatic plants and little influenced by water flow, without seasonal variation. Specific gravity was about 0·980, the water pH was between 7·5 and 8·0. Dissolved oxygen level was normal (13·10—2·82 ppm), showing a higher level during the winter months. The upper and middle reaches of both the canals showed typical freshwater character except the lower reaches.

ACKNOWLEDGMENTS

We are grateful to Dr. Sufian K. Al-Nasiri, head of the Department of Fisheries, college of Agriculture, University of Basrah. Dr. Khalaf Al-Robaae, Director, Natural History Museum, University of Basrah, for encouragement and necessary laboratory facilities, and Dr. Abdul-Latif Sarker, Department of Fisheries of the same University for his revision of the original manuscript.

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الخلاصة

تناول البحث دراسة بعض الخواص الفيزياوية والكيمياوية مثل : درجات الحرارة ، توغل الضوء ، الوزن النوعي ، درجة الحموضة ، كمية الاوكسجين المذاب ، درجة الملوحة لمياه فرعين من فروع شط العرب هما مهيجران والسراجي ولثلاث محطات في كل فرع . في الفترة الواقعة بين كانون الثاني ـ آب ١٩٧٧ .

Bull. Basrah nat. Hist. Mus.
Vol. 4 : 51-57, 1977

SEASONAL VARIATION IN THE POPULATIONS OF *MOINA MACROCOPA* STRAUSS AND *MOINA MICRURA* KURZ (CRUSTACEA : CLADOCERA) IN ZOAFARANIYA*H* POOLS

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Many cladoceran species were listed from several parts of Iraq (Gurney 1921, Mohammad 1965, Khalaf and Smirnov 1976). But there is little information concening biological and ecological aspects of some of these species. However Khalaf *et. al.* (1977, 1978) studied the growth of *Simocephalus vetulus* Schodler under different food conditions and Lazim (1977) did a bio-ecological study on *Daphnia lumholtzi* Sars. Moreover Shihab (1977) has investigated the relationship between some environmental factors and the growth, reproduction and longevity of *Moina micrura* Kurz. The present work is an attempt for making a comparison between *Moina macrocopa* Strauss and *M. micrura* in respect of their seasonal population changes in Zoafaraniyah pools, Baghdad.

MATERIALS AND METHODS

Samples were taken at about weekly intervals from 1st July 1976 to 30th June 1977 at 10 a.m. Specimens were then preserved in 4% formalin in small specimen bottles. Ten subsamples of one ml each were taken from the original samples by a pipette and the number of animals were counted under a microscope. The number of animals per liter was then calculated.

Water and air temperatures were measured with a mercury thermomater and the determination of dissolved oxygen was carried out according to Winkler method as described by Welsh and Smith (1967). The pH was determined using a pH meter model 388. The chlorisity of habitat water was measured by the titration method with (0·02) N AgNO3.

RESULTS

Temperature :

The monthly average values of air temperature and surface water temperature during the study period are given in table 1. The air temperature varied between 8·3°C in January and 37·6°C in July. The monthly average of water temperature varied from a maximum of 33°C in July to a minimum of 8·9°C in January.

Hydrogen ion concentration :

The pH of the surface water ranged between 7·2 and 7·8. In general pH values have showed slight differences throughout the year.

Dissolved oxygen :

The monthly average maximum and minimum values of 12·3 and 2·4 ppm were recorded for the dissovled oxygen in January and July respectively.

Cholorosity :

It is clear from the data that chlorosity showed slight variations, during the study period. The monthly average of chlorosity during the study period ranged between 0·043-0·058 ppt.

Population Cycle :

M. macrocopa :

Population size of *M. macrocopa* throughout the course of the study is given in Table 2. One population maxima occurred during October. This was 11815/L. During winter months the population density gradually decreased from 1145/L in November to 73/L in December. In early December 12% of the females were observed to carry ephippia. A few males were also observed in November and December. The percentage of the males were 8% and 6·5% respectively. However no reproduction could be noticed between January and August.

M. micrura :

M. micrura seems to have two population cycles during the year (Table 2). The first cycle was noticed to begin from the middle of August until the late of December, whereas, the second cycle begins from the middle of March until the late of June. Two peaks in the population have been noticed; one in October and the other was during April. These two peaks were 13125/L and 11000/L respectively.

DISCUSSION

A comparison between the population cycles of the *M. macrocopa* and *M. micrura* throughout the year, shows that there is a clear difference between the two species. As it was found *M. macrocopa* has been one developmental cycle, whereas, *M. micrura* has a dicyclic development. The numbers of the two species reached a maximum in October when the temperature having a range of 22-28·5°C.

At this time the population of *M. micrura* is very close in size to that of *M. macrocopa* although *M. micrura* has a

Table 1 : The seasonal changes in temperature, O_2, pH and chlorosity during the course of the study.

Months	Air temp.	Wat. temp.	O_2 (ppm)	pH	Chlorosity (ppt)
J	8·3	8·9	12·3	7·8	0·043
F	21·6	16·1	9·5	7·6	0·049
M	24·8	17·4	8·1	7·8	0·046
A	28	23·7	4·7	7·4	0·047
M	29·1	20·3	5·2	7·2	0·046
J	33·4	30 6	3·8	7·4	0·043
J	37·6	33	2·4	7·7	0·042
A	35·1	27·1	4·1	7·3	0·051
S	34·1	27·3	4·2	7·5	0·053
O	30·5	24·3	4·6	7·3	0·058
N	26·3	19·5	5·4	7·8	0·051
D	17·1	13·2	6·7	7·8	0·049

Table 2 : The seasonal variations in the populations of **M. macrocopa** and **M. micrura** during the course of the study.

	Jan	Feb	Mar	Apr	May	Jun
M. macrocopa	0	0	0	0	0	0
M. micrura	0	0	200	11000	4380	450
	Jul	Aug	Sept	Oct	Nov	Dec
M. macrocopa	0	0	248	11815	115	73
M. micrura	0	350	9800	13125	2450	4

carapace differ in size to that of *M. macrocopa*. The maximum lengths during October were 1·3 and 1·8 mm. respectively. It seems from the results that the two species could not co-evist for a long period of time since it was noticed populations of both species decline and then they disappear later (Table 2). Although the two species are belonging to the same genus (*Moina*) it appears that they have no similar response to environmental factor. The comparison of results and observation in nature shows that the two species completely disappear from the field in January when the temperature having a range of 4-9°C. However, *M. micrura* occurs in the field five to six month earlier than *M. macrocopa*. Terao and Tanaka (1928) have investigated the effcts of various temperatures upon reproduction of *M. macrocopa* and found that the minimum temperature of tolerance is 8°C. Brown (1929) also found that the same species did not reach sexual maturity at 10°C. Similar observation have also been obtained under laboratory conditions for *M. micrura* (Shihab 1977).

Johnson (1952) concluded that the low temperature was the most important single physical factor in determining the life cycle of *M. macrocopa*. A similar finding was also noticed during the course of this study. On the other hand, no reproduction could be seen for the two species in July This indicates the response of *M. micrura* and *M. macrocopa* to high temperatures. Terao and Tanaka (1928) have also reported that no reproduction of *M. macrocopa* could be noted at 39°C. Similar results were also obtained for *M. micrura* at 38°C by Shihab (1977). Although the ability of both species to tolerate extreme temperatures is quite similar. there was a clear difference in the time of their reproduction. The reproduction of *M. macrocopa* was found to take place from 2nd September until late of December while that of *M. micrura* takes place from 15th

March till late of July and from 13th August till late of December. Such a difference would probably due to the unfavourable hatching conditions for the resting eggs of the optimal hatching conditions of this species only within a very limited period of time.

SUMMARY

One year study on the seasonal population changes in *Moina macrocopa* Strauss and *Moina micrura* Kurz as observed in Zoafaraniyah pools, Baghdad, Iraq is presented and discussed.

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الخلاصة

شمل البحث الحالي دراسة ميدانية للتغيرات الموسمية في كثافة نوعين من براغيث الماء خلال الفترة الواقعة من (١ تموز ١٩٧٦ ، ٣٠ حزيران ١٩٧٧) في مزرعة الاسماك التجريبية في الزعفرانية ، وقد تم تحديد درجتي حرارة الماء والهواء والاوكسجين المذاب وتركيز ايون الهيدروجين والكلور خلال تلك الفترة ومدى ارتباطهم بالكائنتين المذكورتين . ووجد بأن المونيا ماكروره لها دورتين حياتيتين ، الدورة الاولى بدأت من ١٥ اذار وحتى اواخر حزيران ، اما الدورة الثانية فقد بدأت من ١٣ آب وحتى اواخر كانون الاول ، في حين اظهرت المونيا ماكروكويا دورة حياة واحدة بدأت من ٢ ايلول وحتى اواخر كانون الاول.

Bull. Basrah nat. Hist. Mus.
Vol. 4 : 59-64, 1977

SOME NOTABLE BIRD RECORDS FROM IRAQ

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Some notable bird records obtained during the mist-netting done in Iraq are given below. All weights are in gram and measurements in millimetre.

Acrocephalus stentoreus (Hemprich and Ehrenberg). The Indian Great Reed Warbler.

In Hor Zichri, deep in the Hor Hammar marshes, on 16 November 1973 one Great Reed Warbler was seen moving in thick *Phragmites communis* reed growing 5-6 m high. Since Great Reed Warblers were not reported in winter for Iraq, the bird was shot and collected. It turned out to be an Indian Great Reed Warbler *A. stentoreus* in fresh plumage with the following wing formula.

Primaries (ascendant) : Emarginated 3rd-4th, 1P : 4 mm short of primary coverts, wing point : 3=4, 2P : 3·5 mm short of wing point falls between 6/7, notch on inner web (17 mm from tip) falls below secondaries. 3P notch falls between 8P and secondaries.

Subsequently six more specimens were mist-netted from the *Phragmites* reed-bed in the Shafi Field Station, 50 km north of Basrah. Measurements of the specimens are as follows :

Date	sex	weight	wing	tail	tarsus	bill	plumage
16 Nov. 1973	?	27·5	83	80	28	damaged	fresh
10 Dec. 1974	male	24·0	88	79	29	19	fresh
22 Aug. 1976	female	19·0	80	66+	27	18	worn out
22 Aug. 1976	female	20·5	82	71+	26·5	19	worn out
29* Aug. 1976	?	21·0	82	68+	30	21	worn out
12 Sept. 1976	male	——	85	74+	28	18	worn out
2 Nov. 1976	female	25·0	83	71	28	17·5	moulting

* This bird was ringed and released; the rest are kept in the Bird Collection.

November 2 bird was completing moult. Wing (descendant) : Primaries ; 8P has little sheath at base, 9P has 8 mm sheath at base, 10P new. Secondaries; moulting 5 & 6S are of same length (7 mm sheath at base), 5 mm shorter than 4S. Tail; central pair have little sheath on the dorsal side.

Except the above, November-December specimens were in fresh plumage, while the August-September specimens were in badly worn out condition.

The moulting and moulted birds were heavier than the unmoulted ones. Moulting of Iraqi wintering *A. stentoreus* appears to take place between September and November as is the case reported for other geographical populations of the species (Williamson, 1974).

Our specimens in plumage and measurements are similar to *A. stentoreus brunnescens* (Jerdon), which has a distribution

ranging from Turkestan (from Aral Sea eastwards to Tadzhikistan), Transcaspia, east and south Iran, Afghanistan, Baluchistan, to India.

This is the first record of the Indian Great Reed Warbler from Iraq and it is the only wintering Great Reed Warbler of Iraq.

Emberiza schoeniclus pyrrhuloides Pallas. The Thick-billed Reed Bunting.

While netting at a roost — mostly of House Sparrows, Central Asian Reed Buntings, and a few white Wagtails — in a small reed-bed at Amusement Park, Baghdad, two female Thick-billed Reed Buntings were collected on 17 and 24 February 1971. Measurements of the specimens are :

No.	date	weight	wing	tail	tarsus	bill	height
INHM 3235	17 Feb. 1971	21·8*	80	72	21	12	8
3236	24 Feb. 1971	—	80	73	21	11	—

*weight taken on next day morning.

The specimens come under the thick-billed reed buntings of the *pyrrhuloides* group. For lack of comparative material they are tentatively put under *E. schoeniclus pyrrhuloides* Pallas, which has the nearest distributional range close to Iraq.

The Central Asian Reed Bunting *E. schoeniclus pallidior* Hartert, the only other subspecies of *E. schoeniclus* recorded forIraq, is a winter visitor. The Thick-billed Reed Bunting— which can be identified from the former by its massive, strongly convex bill — is a new addition to the avifauna of Iraq. Both the specimens are deposited in the Bird Collection of the Natural History Research Center, Baghdad.

Locustella naevia (Boddaert). The Grasshopper Warbler

One female in fresh plumage weighing 17·5 g was collected on the morning of 16 August 1976 from the reed-bed at shafi. It measured : wing 64, tail 54, tarsus 19·5, and bill 11, and had two faint black mark on tongue. This is the second report of the species from Iraq. The first specimen, a male, was collected on 9 September 1974 from the same area (Kainady & Al-Joborae, 1975).

Locustella luscinioides (Savi). The Savi's Warbler

Five specimens were mist-netted from Shafi reed-bed in 1976 (Aug. 23 (1), 29 (2), Sept. 6 (1), and 13 (1)). The Savi's Warbler was first recorded for Iraq based on a female in fresh plumage collected on 7 October 1974 from a reed-bed close to Shafi (Kainady & Al-Joborae, 1975). Except one of the specimens of August 29, which had three black mark on tongue, others had no mark on tongue. August 24 bird was moulting wing and tail feathers, and the body feathers were nearing completion of moult. Rest of the birds were in fresh plumage.

The fresh plumage of August-September birds, with no tongue mark indicating their adult nature, shows the possibility of adults having two moults — one soon after breeding and the second in its winter quarters.

Hippolais icterina (Vieillot). The Icterine Warbler

On 1 May 1976 one specimen was netted at Shafi. The next day it was measured, ringed and released (weight 11·75 g & wing 78). This is the second record of the species from Iraq. The first record is that of Ticehurst *et al.* (1926), who reported of Percy Cox's collection of a specimen from Baghdad on 19 May 1922.

Sylvia hortensis (Gmelin). The Orphean Warbler

Five birds were mist-netted at Shafi in 1976 (Mar. 15, Apr. 12, 19, 20, and Sept. 7). The previous records are of Ticehurst *et. al* (1926), who obtained the first bird from Baghdad on 3 April 1922 and the 'unconfirmed sight records' of Moore and Boswell (1956) from Dohuk on 8 April and from Choarta between 14-22 August 1945. The present finding is the second definite report of this bird from Iraq. The Orphean Warbler appears to be a passage migrant through Iraq.

Carpodacus erythrinus (Pallas). The Common Rose Finch

One female Common Rose Finch weighing 20 g was mist-netted on 26 October 1976 from Shafi. It measured : wing 82, tail 50, tarsus 19, and bill 12. It had a thick layer of subcutaneous fat accumulation. This is the second record of its occurrence in Iraq. George (1969) secured the first specimen, a female, on 7 May 1968 from Zakho, north Iraq. The specimen is kept in the Bird Collection.

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الخلاصة

تسجيل جديد لطيرين هما :

Acrocephalus stentoreus, Emberiza schoeniclus pyrrhuloides

مع خمسة ثانوية هما :

Locustella naevia, L. luscinioides, Hippolais icterina, Sylvia hortensis, Carpodacus erythrinus

وهذه الطيور توجد في العراق .

Bull. Basrah nat. Hist. Mus.
Vol. 4 : 65-68, 1977

THE OVERLAP OF BREEDING AND MOULTING IN SOME IRAQI BIRDS

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The energy demanding processes of breeding and moulting do not usually take place at the same time in birds. However, in a number of tropical land birds these are shown to overlap (Payne 1969, Foster 1975). Such cases reported for the temperate region are few and hence it may be of interest to record a few instances of overlap of breeding and moult I have come across during field work in Iraq.

1. *Vanellus leucurus* (Lichenstein)

A female incubating White-tailed Lapwing collected near its nest with a full clutch of four eggs on 23 July 1974 was moulting wing and body feathers. Wing Primary (descendant) : 1 to 3 new (Rt & Lt); 4 brush (Rt) 65 mm of which 36 mm out, (Lt) 66 mm of which 41 mm out; 5 pin (Rt) 26 mm, (Lt) 23 mm; rest old. Secondary : The penultimate feather pin on both sides, rest old. Tail : No moult, all worn out. Body : Only the head feathers in moult, rest badly worn. The two incubation patches on either side of the body were devoid of any feathers. So also the inner part of both the thighs were naked.

Breeding season : From last week of April to July. The present finding is a very late breeding record.

Status : Since the northernmost wintering area and the southernmost breeding ground of the White-tailed Lapwing coincide in Iraq, the status of this bird is not clear. It is possible that the breeding birds may move southwards in winter or they may as well winter in Iraq.

2. *Charadrius alexandrinus* Linnaeus

A male Kentish Plover, sitting on an incomplete clutch of one egg, collected on 6 July 1974 at 0900, was moulting wing and body feathers. Wing Primary (descendant) : 1 brush (Rt) 23 mm of which 11 mm out, (Lt) 26 mm of which 11 mm out; 2 pin (Rt) 6 mm, (Lt) 3·5 mm; rest old. Secondary : The penultimate feather $\frac{1}{2}$ to $\frac{3}{4}$ grown on both wings, rest old. Tail : No moult. Body : Anterior breast and some feathers of back in moult. The three incubation patches were naked, devoid of any feathers.

Breeding season : Early March to mid July.

Status : Similar to the preceding species.

3. *Pterocles senegallus* (Linnaeus)

A male Asian Spotted Sandgrouse, sitting on a full clutch of three eggs collected on 7 July 1974 at 0630, was undergoing heavy wing moult.

Wing Primary (descendant) : 1 to 6 new, 7 brush, rest old (both wings). Secondary : 1 full grown base in sheath, 2 old, 3 new, 4 pin, 5 new, 6 & 7 old, 8 to 10 new, rest present.

Breeding season : May to August.

Status : Resident with some local movements in winter.

4. *Apus pallidus* (Shelley)

Out of the twenty-nine specimens examined from a collection of Pallid Swifts made from a breeding colony on 5 May 1972, eight were moulting the first innermost primary and its covert. Case history of the moulting birds are as follows : a male and a female incubating in two different nests, two males and two females rearing nestlings in four different nests. Breeding status of a male and a female not known. However, the male had well developed testes and the female had pin head size ova in the ovary.

Breeding season : March to June.

Status : Breeds and winters but moves away during the hot summer months.

5. *Hirundo rustica* Linnaeus

A female Common Swallow, rearing a brood of three nestlings about sixteen days old, collected on 9 June 1974 was moulting the first innermost primary (pin (Rt) 4·5 mm, (Lt) 4·0 mm) and the anterior region of the incubation patch which contained pin feathers. While the male of the nest collected next day showed no wing moult, it was, however, moulting its anterior breast feathers. Another male prospecting nest site collected on the same day did not show any moult (Kainady 1976).

Breeding season : March to June.

Status : Summer breeding visitor.

6. *Pycononotus leucotis* (Gould)

A White-eared Bulbul rearing a brood of four nestlings, which had primary feathers about 5 mm out of sheath, netted on 19 August 1975 had the three innermost primaries and their coverts new on both wings. There was no tail or body moult.

Breeding season : April to August.

Status : Resident

All the birds reported above have a seasonal periodic breeding cycle as is the case with all other birds breeding in Iraq. Clear cut overlap of moulting occurred in *A. pallidus* (male & female) in the middle of the breeding season. In *C. alexandrinus* moulting started at the laying stage. Advanced stage of moult shown by incubating **V.** *leucurus* (female) and *P. senegallus* (male) indicates that they also began moulting during the laying stage or probably earlier. In *H. rustica* the overlap took place in both the sexes while rearing the nestlings.

In all cases except *A. pallidus*, moulting occurred towards the close of the breeding season and none showed arrested moult during breeding except *P. leucotis*.

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الخلاصة

في هذا البحث تقرير عن التداخل بين التكاثر وانسلاخ الريش لستة انواع من الطيور العراقية .

Bull. Basrah nat. Hist. Mus.
Vol. 4 : 69-72, 1977

ON A COLLECTION OF AQUATIC PLANTS FROM BASRAH

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Aquatic and marsh plants have been described in various flora by Hooker (1879). A detailed account of the hydrophytes has been given by Arber (1920), Fassett (1940), and Muenscher (1944). Comprehensive studies are made by Al-Rawi (1968) on wild plants of Iraq and their distribution, but no account on aquatic plants of the Shatt Al-Arab river and its surroundings are available.

A collection of aquatic plants was made from the Shatt Al-Arab river, from Karmat Ali to Abu Al-Khasib, the canals flowing on either side within the above region including the puddles and shallower regions. It was made from September 1974 to June 1976. However, no collection of plants was made during July and August 1975. Most of the aquatic plants were identified following the characters given by Prescott (1973). At least one trip in a month was arranged during the period. The collection is kept in the department of Fisheries and Marine Resources, University of Basrah.

List of species collected :

1. Family POTAMOGETONACEAE (5 species).
   Potamogeton crispus Linn., *P. natans* Linn., *P. pectinatus* Linn., *P. perfoliatus* Linn., & *Zannichellia palustris* Linn.
2. Family SCROPHULARIACEAE (3 species).
   Bacopa monnieria (Linn.) Hayata et Matsum, *Limnophila indica* (Linn.) Druc., & *Veronica Anagallis-aquatica* Bernth.

3. Family CYPERACEAE (3 species).
Cyperus rotundus Linn., *C. conglomeratus* Rottl., & *Fimbristylis dichotoma* (Linn.) Vahl.

4. Family HYDROCHARITAECEA (3 species).
Hydrilla verticillata Presl., *Ottelia alismoides* (Linn.) Pers., & *Vallisneria spiralis* Linn.

5. Family GRAMINEAE (3 species).
Panicum repens Linn., *Paspalum distichum* Linn., & *Phragmites communis* Trin.

6. Family JUNCACEAE (2 species).
Juncus acutus Linn. & *J. fontanesii* Gay.

7. Family GENTIANACEAE (2 species).
Nymphoides indicum (Linn.) O. Kuntze. & *N. peltata* Kuntze.

8. Family LEGUMINOSAE (2 species).
Prospis farcata (Banks et Sol.) Eig. & *Trifolium resupinatum* Linn.

9. Family RANUNCULACEAE (2 species).
Ranunculus aquatilis Linn. & *R. muricatus* Linn.

10. Family PARKERIACEAE.
Ceratopteris (*Parkeria*) *thalictroides* (Linn.) Brongn.

11. Family CERATOPHYLACEAE.
Ceratophylum demersum Linn.

12. Family CHENOPODIACEAE.
Chenopodium album Linn.

13. Family ONAGRACEAE.
Jussiaea repens Linn.

14. Family LEMNACEAE.
Lemna Polyrrhiza Linn.

15. Family VERBENACEAE.
Lippia nodiflora (Linn.) Rich.

16. Family MARSILEACEAE.
Marsilea capensis (A.) Brs.

17. Family HALORAGIDACEAE.
Myriophyllum spicatum (Linn.)

18. Family TYPHACEAE.
Typha angustata Chub. & Borry.

19. Family SALVINIACEAE.
Salvinia natans (Linn).

In the collection Marsileaceae and Salviniaceae which belong to Pteridophytes were also included. Although, large mats of *Chara*, *Cladophora*, and *Spirogyra* among the thallophytes were also observed, but these were not collected due to poor identification facilities.

Of the total list of 35 species 19 are aquatics and 16 are wet land plants. *Hydrilla verticillata* Presl., *Lemna polyrrhiza* Linn., and *Nymhoides peltata* Kuntze are new records for Basrah. The aquatic vegetation was richest in the shallower water and poorest in the running water.

ACKNOWLEDGEMENTS

We thank Mr. Sabah A. Karim Omar, Department of Botany, Abu Ghuraib, Baghdad, for identifying plants and Mr. N. A. Salman of the Fisheries Department, College of Agriculture, University of Basrah in helping us in the collection of plants.

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الخلاصة

لم تلق النباتات المائية في المنطقة الجنوبية اهتماما كبيرا من الباحثين وخاصة في شط العرب ، لذلك تركز هذا البحث على جمع اكبر عدد من النباتات المائية في المنطقة بين كرمة علي وابو الخصيب في الفترة بين ايلول ١٩٧٤ الى حزيران ١٩٧٦ ٠

جمعت النباتات المائية مرة واحدة في الشهر وصنفت وحفظت في قسم الاسماك والثروة البحرية ٠ كان مجموع الانواع ٣٥ منها ١٩ نوعا مائية المعيشة و ١٦ نوعا تعيش في الاراضي الرطبة ٠ وجد ان ثلاثة انواع (*Hydrilla verticillata, Lemma polyrrhiza, and Nymphoides peltata*)

من هذه النباتات تسجل لاول مرة في منطقة البصرة ٠ لوحظ عند جمع النباتات انها تتوفر في المياه الضحلة وتقل في المياه الجارية ٠

Bull. Basrah nat. Hist. Mus.
Vol. 4 : 73-74, 1977

REPORT OF THE BIRD MIGRATION STUDY PROJECT OF BASRAH UNIVERSITY — 1976

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Netting and ringing of birds were done in the Shafi Field Station during 1976 except in July. A total of 1,705 birds belonging to fifty species were ringed as detailed in Table 1.

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

Species	1974-75	1976	Total
Ixobrychus minutus		1	1
Streptopelia turtur		1	1
Alcedo atthis		6	6
Halcyon smyrnensis		9	9
Merops superciliosus		6	6
Upupa epops		12	12
Jynx torquilla		3	3
Hirundo rustica	6	14	20
Riparia riparia	10		10
Anthus trivialis		1	1
Motacilla alba	2	14	16
Motacilla flava	23	2	25
Pycnonotus leucotis	17	192	209
Lanius nubicus		3	3
Lanius collurio	5	25	30
Saxicola torquata		7	7
Phoenicurus phoenicurus		52	52
Erythropygia galactotes		3	3
Luscinia megarhynchos		10	10
Luscinia svecica	3	29	32
Erithacus rubecula	3	42	45

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

Species	1974-75	1976	Total
Irania gutturalis		2	2
Turdoides altirostris	5	13	18
Locustella luscinioides		2	2
Acrocephalus arundinaceus	10	36	46
Acrocephalus griseldis		29	29
Acrocephalus stentoreus		1	1
Acrocephalus scirpaceus	38	55	93
Acrocephalus schoenobaenus		3	3
Hippolais icterina		1	1
Hippolais pallida		20	20
Hippolais languida		2	2
Sylvia atricapilla		110	110
Sylvia nisoria		3	3
Sylvia hortensis		2	2
Sylvia borin		26	26
Sylvia communis		12	12
Sylvia curruca		48	48
Sylvia melanocephala		3	3
Sylvia mystacea		8	8
Prinia gracilis	1	5	6
Phylloscopus trochilus		22	22
Phylloscopus collybita		178	178
Muscicapa striata		13	13
Remiz pendulinus		2	2
Passer domesticus	373	275	648
Passer hispaniolensis		13	13
Passer moabiticus	3	27	30
Petronia xanthocollis		4	4
Sturnus vulgaris	59	355	414
Oriolus oriolus		3	3
	558	1705	2263

Bull. Basrah nat. Hist. Mus.
Vol. 4 : 75-77, 1977

AMOUNT OF WATER BROUGHT TO CHICKS BY MALE *PTEROCLES SENGALLUS* IN HIS BELLY FEATHERS

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Members of the family Pteroclididae, a group of desert inhabiting birds, are known to fetch water in their belly feathers to chicks. Cade and Maclean (1967) have shown the highly specialized nature of the ventral feathers, particularly that of the barbules and how well they are adapted for holding water, in all the 14 species of *Pterocles*. By making measurements on dead specimens and pieces of belly skin and plumage they found that a male sandgrouse can absorb from 25 to 40 ml of water in his ventral plumage and estimated that the bird can deliver from 10 to 18 g of water for a distance of 32 km. No report on the actual amount of water thus brought to chicks by adult exists to my knowledge.

I had the opportunity of obtaining male *Pterocles senegallus* (Linnaeus) the Asian Spotted Sandgrouse with soaked belly feathers which had apparently just arrived for watering the chicks. Shortly after landing the bird was shot at 0930 on 5 July 1974 in Kiteban desert. The ventral feathers were so drenched with water that it was in one mass (Fig. 1). To ascertain the amount of water held in the belly feathers immediately we returned to the Museum without waiting for finding out the chicks. Within the next hour, it took 45 minutes to drive back, the wet ventral feathers were removed from the body. Groups of wet feathers cut at their base were soon transferred to a plastic bag to prevent further loss by evaporation. Wet weight of feathers was 27·5 g, which after drying. three days in a close room (32-40°C), scaled 30 g. In other

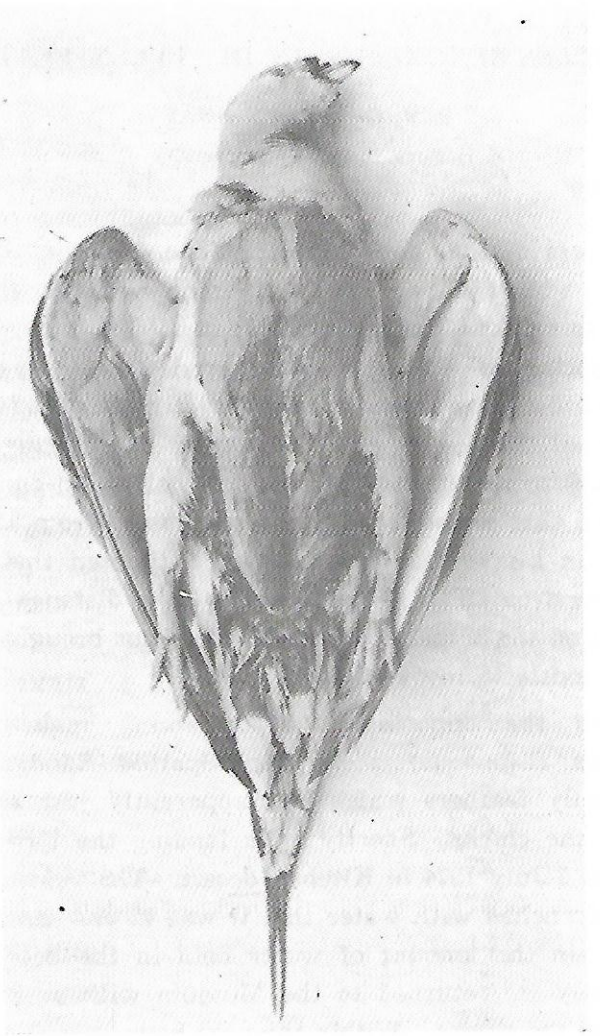

Fig. 1. Male *Pterocles senegallus* shot shortly after landing at 0930 on 5 July 1974 in Kiteban. Note the ventral feathers drenched with water.

words three grams of dry feathers contained 24·5 g. moisture content of water. 24·5 g of tapwater measured 25 ml. The bird with dry feathers weighed 263·5 g. The spot of collection was about 10 km (in a straight line) from the nearest known watering area.

In short the male *P. senegallus* held 24·5 of water (25 ml, 9·3% of its body weight) in his belly feathers for providing the chicks at the end of a flight covering 10 km from the watering area.

REFERENCE

Cade, Tom J . and Maclean, Gordon L. 1967. Transport of water by adult sandgrouse to their young. The Condor 69 : 323-343.

الخلاصة

اصطيد ذكر من نوع القطا المرقط الاسيوي في تموز ١٩٧٤ في صحراء كتيبان وكان يحمل في ريش البطن ٢٤٫٥ غم من الماء (مايعادل ٢٥ سم٣ ، اي ٩٫٣ ٪ من وزن الجسم) وذلك لتجهيز الصغار به بعد نقله مسافة ١٠ كم .

Bull. Basrah nat. Hist. Mus.
Vol. 4 : 79-81, 1977

WETTING OF BELLY FEATHERS IN WHITE-TAILED LAPWING AND AVOCET

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Wetting of belly feathers for the purpose of carrying water either to youngones or to eggs have been reported for six families of waders, and sandgrouse. Maclean (1975) has made an excellent review of the subject.

Five species of *Vanellus*, excluding *V. leucurus*, are definitely known to wet belly feathers. Although Dresser (1902) mentions of *V. leucurus* the White-tailed Lapwing as resting on shores of lakes or in water which reaches up to its belly during the hottest part of the day, he does not state whether these birds thus found were breeding.

In mid summer on 23 July 1974 I shot a female White-tailed Lapwing near Kiteban, about 45 km east of Basrah. This bird was close to its nest containing a clutch of four eggs. Feathers of the belly, three-quarters of the distal portion, extending from anterior part of breast to cloaca were found soaked in water (Fig. 1). The two incubation patches, one on either side of breast, each with a width of 10-13 mm, extended from the anterior part of breast to cloaca, were devoid of any feathers. So also the inner part of both the thighs were naked. The present observation authenticates the belly wetting behaviour of White-tailed Lapwing.

J. Walters of the Netherlands informs me of the wetting of belly feathers by *Recurvirostra avosetta*. I quote him :

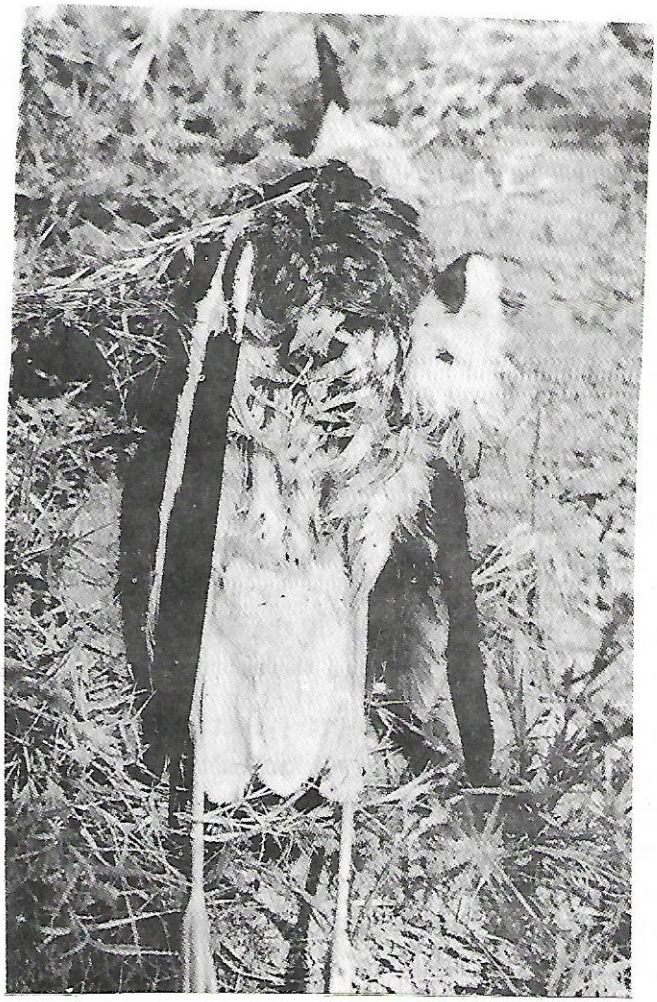

Fig. 1. The female White-tailed Lapwing *Vanellus leucurus* shot near its nest with four eggs on 24 July 1974 from Kiteban, south Iraq. Note the soaked condition of ventral feathers in which the bird carries water to its eggs.

"It was on July 1st, 1961, when I made my observation on wetting of the belly feathers in *Recurvirostra avosetta*. It was in the afternoon and, for the Dutch situation, extremely hot, though I have no exact temperature record. There was one clutch of four eggs, not far from hatching. Both parent birds were observed from a hide. They were little bit shy because of the hide, the female coming first to the clutch and showing several times wetting behaviour. The small shallow pool was only a few metres distant from the nest. The behaviour was not more than sit down in the water, perhaps, but not sure, the belly feathers were spread a little bit as in brooding, but anyhow much less pronounced. The water contained brownish iron-compounds, so that finally the belly feathers also got brownish. I did not get the impression that water of some importance was brought to the eggs. You know of course that 'false brooding' sometimes occurs as a result of conflicting situation (caused by placing a hide 'displacement activity'). The presence of the hide could have stimulated a certain 'pseudo-wetting-behaviour'." I am of the view that the above observation by J. Walters is an adequate evidence for the belly wetting behaviour of the Avocet.

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الخلاصـــة

تسجيل لاول مرة •• تبليل ريش البطن بالماء لطير الطيطوى ابيض الذنب والنكات وذلك لتبريد البيض في العش في الايام الحارة •

Bull. Basrah nat. Hist. Mus.
Vol. 4 : 83-84, 1977

ON THE BREEDING OF THE COMMON SWIFT *APUS APUS* IN IRAQ

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On 8 May 1968 about twenty Common Swifts *Apus apus*, (Linnaeus) were seen going into the thatched roofs of houses at Zakho town, north Iraq. Two *A. apus*, one male and one female, were mist-netted near the houses on the same evening. The female had a well formed egg without shell in the oviduct, and the male had well developed testes.

On 5 May 1972 breeding *A. apus* were collected from the Tobacco Store buildings in Baghdad from a breeding colony of *A. pallidus* (Shelley). Swifts were nesting in the area between the corrugated tin roof and the wall. One *A. apus* (unsexed) was rearing a brood of two nestlings while the other (female) had just laid one egg. All the specimens are deposited in the Bird Collection of the Natural History Research Centre, Baghdad.

Allouse (1961) says that *A. apus* breeds in the northern area as Rassam stresses that it nests in the Yarimja village, between the ceilings of the houses, north of Mosul city. There are two specimens of *A. apus* from Yarimja in the Bird Collection of the Natural History Research Center, Baghdad, one male and one female both collected on 10 April 1957 by Rassam with script (on labels) in Arabic 'nests in roofs'.

In the absence of any mention on whether the collector saw the nest by himself or any note on the gonadal condition

of the collected birds, I wonder whether he got the impression of its breeding by seeing the birds going into the ceilings. However, it is very probable that the birds observed by Rassam were breeding.

The present report forms definite supporting evidence for *A. apus* breeding in north and the first record of its breeding for central Iraq. It is significant to note that in Zakho the breeding colony consisted only of *A. apus*, while in Baghdad a few individuals of *A. apus* were breeding in a colony consisting predominatly of *A. pallidus*.

REFERENCE

Allouse, B. E. 1961. Birds of Iraq. vol. 2 (in Arabic). Ar-Rabitta Press, Baghdad.

الخلاصـــة

دليل قاطع على تكاثر طير السمامة الاعتيادية في شمال العراق ..
وتسجيل جديد لتكاثر السمامة الاعتيادية والسمامة الباهتة في بغـداد .

Bull. Basrah nat. Hist. Mus.
Vol. 4 : 85-86, 1977

SUCCESSFUL HATCHING OF A CLUTCH OF THE HOUSE SPARROW IN THE ABSENCE OF THE FEMALE PARENT DURING THE SECOND HALF OF INCUBATION

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While studying the breeding biology of the House Sparrow *Passer domesticus* in 1972, I collected an incubating female House Sparrow sitting on a clutch of six eggs on 29 May at 1930. On the first examination of the nest on 24 May, five eggs were found and a subsequent checking on 27 May revealed the presence of one more egg. The nest was again inspected on 6 June when it contained one lean and weak live nestling and dead dried up nestlings.

The nest was built at a height of six metres from ground in the space between the corrugated tin roof and the outside wall in one of the buildings of the Tobacco Store at Baghdad. The tin roof of the store was plastered with a thick layer (12 to 15 cm) of mud.

The temperature taken with a maximum and minimum thermometre placed in a similar but a different nest area for the period gave the following readings :

Date		at the time of checking		Temperature °C Max.	Min.
May	29	1830	36·1	43·9	27·8
	30	1845	37·8	42·8	24·4
June	1	1820	34·4	43·9	25·6
	2	1830	40·0	42·2	26·7
	6	1900	42·2	46·1	29·4

The sixth and the last egg was probably laid on 25 May. Allowing an incubation period of twelve days the nestlings might have hatched out between fourth and sixth June.

It is known in the case of the House Sparrow that the death of one of the parents causes the other to desert the nest (Summers-Smith 1967). The male almost certainly would have deserted the nest after the disappearance of the female. This being the case, it may be concluded that the House Sparrow eggs in a hot climate like that of Baghdad could tolerate high ambient temperature and could successfully hatch even in the absence of parental care during the second half of incubation period.

REFERENCE

Summers-Smith, D. 1967. The House Sparrow. Collins, London.

الخلاصة

نجاح الفقس للنصف الثاني في فترة الحضانة بغياب الوالدين عند العصفور الدوري .

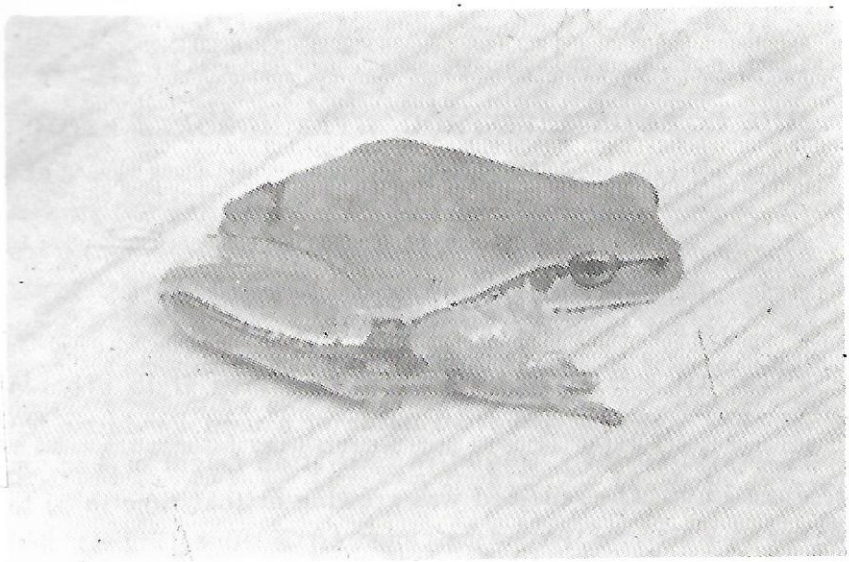

Fig. 1. The Common Tree Frog *Hyla arborea* collected on 26 June 1976 from Shafi Field Station, south Iraq.

REFERENCE

Khalaf, K. T. 1959. Reptiles of Iraq with some notes on the Amphibians. Baghdad.

Terent'ev, P. V. and Chernov, S. A. 1949. Key to the Amphibians and Reptiles. English transalation 1965.

الخلاصة

تسجيل جديد ٠٠ لوجود ضفدع الشجر في اهواز جنوب العراق ٠

NOTICE TO CONTRIBUTORS

The pages of the Bulletin are open to research papers dealing with all aspects of natural history of Iraq and neighbouring countries.

Articles should be addressed to : The Chairman, Bulletin of Basrah Natural History Museum, Basrah Natural History Museum, University of Basrah, Basrah, Iraq.

MANUSCRIPTS : All parts of manuscripts (text, tables, legends, references must be typed, double spaced on only one side of paper approximately 21 by 28 cm. Leave ample margins. Original must be on bond paper; copy may be on thin paper. Number pages through the list of references. Place tables, figures, and legends at the end of the paper.

Send original preferably with two copies inclusive of tables and figures.

TITLE : This should be as brief and informative as possible. Author (s)' name (s) and academic address (es) should be given; present address (if different) should be added as a footnote.

TEXT : Do not underline any words except scientific names. The species names are written in full the first time they appear in the text (e. g. *Hirundo rustica* Linnaeus) but are abbreviated at second and subsequent mention (e. g. *H. rustica*) unless this might be confusing.

Authors should indicate with pencil, in the left hand margins, the approximate positions desired for tables and figures. Avoid footnotes. Use metric system for all measurements.

HEADINGS. The usual main headings are : Materials and Methods, Results, Discussion, Summary, Acknowledgements, and References. Introduction is only used when the introductory section is longer than 300 words. These headings should be typed on a separate line and centred on the pages.

TABLES : Each table should be typed on a separate sheet. Number tables consecutively and give each a short title. If additional explanation is needed use footnotes to tables. Do not use vertical rules.

FIGURES : Figures (line drawings and photographs) are numbered consecutively. It should never exceed 11 by 16 cm. Drawings and graphs should be in Indian ink on good quality paper or tracing paper. Photographs should be supplied as glossy prints with good contrast. Legends should be typed on a separate sheet.

REFERENCES : References are cited in the text thus : Mahdi & George (1969); Ali (1970a); Ali (1970b). The list of references at the end of the paper should be given in the alphabetical order according to the author's names. Titles of the journals should be abbreviated in accordance with the *World List of Scientific Periodicals*. The following style is used :

Kendeigh, S. C. 1934. The role of environment in the life of birds. Ecol. Monographs 4 : 299-417.

Serventy, D. L. 1971. Biology of desert birds. *In* Avian Biology vol. 1 (*eds.* D. S. Farner. J. R. King & K. C. Parkes) : 287-339. Academic Press, New York & London.

REPRINTS : Thirty reprints (40 if more than one author) of each article will be supplied free.

Bulletin of Basrah Natural History Museum

UNIVERSITY OF BASRAH
IRAQ

Volume 4 : October, 1977

The Bulletin of Basrah Natural History Museum, started in 1974, publishes contributions on the fauna and flora of Iraq and neighbouring countries.

Parts will appear as they become ready. Volumes will contain 100 to 150 pages, and will not necessarily be completed within a calender year.

The Bulletin is published at irregular intervals and is available on exchange basis.

Bull. Basrah nat. Hist. Mus. is published by Basrah Natural History Museum of the University of Basrah, Basrah, Iraq.