

***Myxobolus* Infections of the Cyprinid Fishes
from Lesser Zab and Greater Zab Rivers,
North of Iraq with the Record of Seven
Species of *Myxobolus*
for the First Time in Iraq***

S.M.A. Abdullah, F.T. Mhaisen

Department of Biology, College of Education, University of
Salahaddin

Department of Biology, College of Education (Ibn Al-Haitham),
University of Baghdad

Abstract

A total of 1453 freshwater fishes, belonging to 14 species of the family Cyprinidae was collected from Lesser Zab and Greater Zab rivers in north of Iraq during the period from November 2000 to the end of November 2001. The inspection of skin, gills and different internal organs revealed the infection of these fishes with a total of 14 species of *Myxobolus* which included seven species that represented their first record in Iraq. These species included *M. bulbocordis* from both *Barbus sharpeyi* and *Chondrostoma regium*; *M. karuni* from *B. grypus*; *M. mesopotamiae* from *B. luteus*; *M. molnari* from *B. esocinus*; *M. persicus* from both *B. grypus* and *Cyprinion macrostomum*; *M. shadgani* from both *B. barbulus* and *B. rajanorum* and *M. sharpeyi* from both *B. sharpeyi* and *C. regium*. With this record, the total number of *Myxobolus* spp. in Iraq reached 25 species infecting 31 species of freshwater fishes.

Introduction

Myxobolus spp. are common parasites belonging to family Myxobolidae, order Bivalvulida, class Myxosporea, phylum Myxozoa (1). They cause serious fish diseases such as knot or pimple disease, bump disease, boil disease ...etc. (2). The genus *Myxobolus* comprises

* Part of a Ph. D. thesis of the first author.

many species. Shul'man (3) reported more than 150 species from freshwater fishes of the previous U.S.S.R. Hoffman (1) included 56 species from freshwater fishes of North America. Landsberg and Lom (4) noted 444 valid species, the majority of which were reported from Eurasia and North America.

In connection with Iraq, Herzog (5) was the first one who reported *Myxobolus* from freshwater fishes of Iraq. He reported *M. mülleri*, *M. oviformis* and *Myxobolus* sp. Subsequently, Fattohy (6), Abdul-Ameer, (7), Abdullah (8, 9), Al-Naimy (10), Asmar *et al.* (11), Al-Nasiri (12) and Al-Jadoaa (13) reported new species of *Myxobolus* in Iraq, bringing the total number of such species to 18 species (14). The present paper surveys *Myxobolus* infections among 14 different species of cyprinid fishes from Lesser Zab and Greater Zab rivers in north of Iraq.

Materials and Methods

A total of 1453 fishes belonging to 14 species of the family Cyprinidae (Tables 1 & 2) was collected from Lesser Zab river near Alton Kupri town, about 45 km south of Erbil city and from the Greater Zab river near Iski-Kalik town, about 40 km west of Erbil city, north of Iraq during the period from November 2000 until November 2001. All fishes were freshly examined. Skin, fins, gills, body cavity, liver, heart, kidneys, gonads and intestine were searched for myxosporidian parasites under light microscope.

Spores were obtained from mature cysts found in infected organs. An average of 30 spores were measured according to parameters recommended by Shul'man (3) and Lom and Arthur (15). Permanent preparations were done by placing some spores in glycerine gelatine and mounting them with D.P.X. The structure of polar capsules and iodophilous vacuoles was studied under Olympus microscope. The presence of vacuoles was identified by the use of Lugol's solution (16). Fixation of myxosporidians was done with methanol and stained with Giemsa (17). Measurements of parasites was achieved by ocular micrometer. All figures were drawn by using a camera lucida. Scientific names of fishes followed Coad's (18) list. Classification of the parasites followed some major accounts (19, 3, 20, 1, 21).

Results

The present study revealed the presence of 14 species of *Myxobolus*. The distribution of these parasites in the fish host body and percentage of infection are summarized in Tables (1 & 2). The following is an account on description and measurements of these parasites, especially those which appeared here for the first time in Iraq.

1- *Myxobolus bulbocordis* Masoumian, Baska et Molnár, 1996

(Figs. 1 & 2):

This species was found on the gills of *B. sharpeyi* and *C. regium* from Lesser Zab river (Table 1).

Description of the species: Vegetative forms (sporocysts) are small, oval or round cysts. Spores are large, ovoid in frontal view, lemon shaped in side view, with a sutural edge moderately emerging over the surface of the spore and with a distinct triangular intercapsular process deeply intruding between the two polar capsules. Spores are 17.1-18.6µm long, 13.7-15µm wide and 13-14µm thick. Two polar capsules are ellipsoidal in shape and equal in size, 8-8.8µm long and 5-6µm wide. The ratio of capsule length to spore length is about 1:2. Polar filaments are closely coiled with 8 turns. The length of the polar filaments 50-55µm. There is a large distinct iodophilous vacuole in the sporoplasm.

2- *Myxobolus cyprinicola* Reuss, 1906:

This species was found on the gills, fins and skin of *C. carpio* from Lesser Zab river (Table 1).

Description of the species: Vegetative forms are oval cysts. Spores oval with narrow suture wall and relatively short pyriform polar capsules. Intercapsular process small. Length of spores 9-12µm, width 7-9µm, thickness 5-5.5µm. Length of polar capsule 4-5µm. Polar filaments are closely coiled with 7 turns.

3- *Myxobolus iranicus* Molnár, Masoumian et Abasi, 1996:

This species was obtained from the gills of *B. luteus* and *B. lacerta* from Greater Zab river (Table 2).

Description of the species: Vegetative forms are round milk-white cysts, 0.3 to 0.4mm in diameter. Spores relatively large, ovoid, with narrow and rounded anterior pole in frontal view, lemon shaped in side view. The wall seems to be enlarged at the anterior end, but the thickness of this part comes from the emerging sutural edge. Spores are 13-13.8µm long, 7.9-9µm wide and 5.5-6µm thick. Two polar

capsules elongated, ellipsoidal in shape, tapering only at the discharging canals of the polar filaments. They are unequal (or occasionally equal) in size. The larger 6.8-7.3 μ m long, the smaller 6.5-7 μ m long. The larger polar capsule is slightly longer than half length of the spore. The spore has a distinct intercapsular process. Polar filaments closely coiled with 7 turns in the larger and 6 in the smaller polar capsule. A large and distinct iodophilous vacuole is found in the sporoplasm.

4- *Myxobolus karuni* Masoumian, Baska et Molnár, 1994

(Figs. 3 & 4):

These sporocysts were obtained from the gills and intestine of *B. grypus* from Lesser Zab river (Table 1).

Description of the species: Vegetative forms are cysts of different sizes and shapes. Spores are large, oval in front view, lemon shaped in lateral view. Spores are 13-14.2 μ m long, 9-9.9 μ m wide and 6.5-7.5 μ m thick. Two polar capsules are ellipsoidal in shape and equal in size, 6.5-7 μ m long and 3.3-3.5 μ m wide. The length of them is longer than half length of the spore. Polar filaments are closely coiled with 10 turns, and their length 65-69 μ m. The spore has long prominent intercapsular process.

5- *Myxobolus mesopotamiae* Molnár, Masoumian et Abasi, 1996

(Figs. 5 & 6):

This species was reported from the gills and liver of *B. luteus* from Greater Zab river (Table 2).

Description of the species: Vegetative forms are small round cysts. Spores are round, short ellipsoidal in frontal view, lemon shaped in side view, with distinct sutural line and small indistinct intercapsular process. Spores are 8.8-9.1 μ m long, 7.5-8.2 μ m wide and 5.3-5.8 μ m thick. Two polar capsules are pyriform in shape, equal in size, 3.5-4 μ m long and 2.5-2.7 μ m wide. Polar capsules are smaller (or equal) than half length of the spores. Polar filaments are closely coiled with 7 turns.

6- *Myxobolus molnári* Baska et Masoumian, 1996 (Figs. 7 & 8):

Spores of this parasite were found on the skin, gills and ovaries of *B. esocinus* from Lesser Zab river (Table 1).

Description of the species: Vegetative forms are small round cysts. Spores are large, ellipsoidal in front view. They are wider at the anterior than at the posterior part. The spores are lemon shaped in lateral view, with a slight projection at the two ends due to the

thickness of the spore wall and the expressed suture. The wall of the spore seems to be thick, but this thickness is due to the emergence of the sutural line over the surface of the spore. Spores are 13.1-14 μ m long, 10-11 μ m wide and 7-7.5 μ m thick. Two polar capsules are ellipsoidal in shape and equal in size, 6.2-7 μ m long and 3.8-4 μ m wide. The length of them is slightly less than half length of the spore. Polar filaments are closely coiled with 6-7 turns. The spore has a distinct intercapsular process. There is a large round iodophilous vacuole in the sporoplasm.

7- *Myxobolus oviformis* Thélohan, 1882:

This species was recovered from the air bladder and intestine of *A. vorax* from Lesser Zab river (Table 1).

8- *Myxobolus parvus* Shul'man, 1962:

These sporocysts were obtained from the gills of *C. carpio* from Lesser Zab river (Table 1).

Description of the species: Vegetative forms are round cysts. Spores small and round, 6-7 μ m long, 5.5-6 μ m wide and 4-4.5 μ m thick. Pyriform polar capsules relatively large, 3.5-4.5 μ m long. Polar filaments are closely coiled with 6 turns.

9- *Myxobolus persicus* Masoumian, Baska et Molnár, 1994

(Figs. 9 & 10):

This species was found on the gills of *B. grypus*, and in the kidneys of *C. macrostomum* from Lesser Zab river (Table 1), and also on the skin and gills of both *B. grypus* and *C. macrostomum* from Greater Zab river (Table 2).

Description of the species: Vegetative forms are oval or lenticular cysts, 0.2-0.7mm in diameter. Spores oval in front view, lemon shaped in lateral view. Spores are 9-10 μ m long, 6.5-7.5 μ m wide and 5.2-6 μ m thick. Two polar capsules are pyriform in shape and unequal in size, the larger 4.5-5.5 μ m long, the smaller 4.3-5.1 μ m long. The larger polar capsule slightly longer than half length of the spore. The polar filament is closely coiled with 8 turns in the larger capsule and 7 in the smaller capsule. The spore has small intercapsular process.

10- *Myxobolus pfeifferi* Thélohan, 1895:

These sporocysts were obtained from the gills of *A. marmid* from Lesser Zab river and Greater Zab river (Tables 1 & 2), and from the gills, intestine and liver of *V. umbla* from Lesser Zab river (Table 1).

11- *Myxobolus poljanski* Shul'man, 1962:

The sporocysts of this protozoan parasite were noticed on the gills of *B. grypus* from Lesser Zab river (Table 1).

Description of the species: Vegetative forms are small round or oval cysts. Spores ovate, narrow at anterior rounded pole. Polar capsules pyriform. Length of spores 12-15 μ m, width 9-10 μ m and thickness 5-6 μ m. Length of polar capsules 5-6 μ m. Polar filaments are closely coiled with 6-7 turns. Length of polar filament of them 50 μ m.

12- *Myxobolus rotundus* Nemecek, 1911:

Spores of this parasite were found on the gills of *L. lepidus* from Lesser Zab river (Table 1).

Description of the species: Vegetative forms are white ovate cysts. Spores round or highly flattened. Polar capsules pyriform, occupy not more than half of spore cavity. Intercapsular process barely discernible. Length of spores 9-10 μ m, width 9-10 μ m and thickness 3.5-4 μ m. Length of polar capsule 5-6 μ m. Polar filaments are closely coiled with 5-6 turns. Length of polar filament 50 μ m.

13- *Myxobolus shadgani* Molnár, Masoumian et Abasi, 1996

(Figs. 11 & 12):

This species was obtained from the gills of *B. barbulus* and *B. rajanorum* from Greater Zab river (Table 2).

Description of the species: Vegetative forms are round or elongated-oval white cysts reaching 0.4mm in diameter. Spores are relatively large, of round shape in frontal view, lemon shape in side view, with distinct sutural line and small indistinct intercapsular process. Spores are 13-14 μ m long, 13 μ m wide and 8 μ m thick. Two polar capsules are pyriform in shape but relatively wide, unequal (or occasionally equal) in size. The larger capsule 7.8-8.2 μ m long, the smaller 7.5-8 μ m long. The polar capsules are longer than half length of the spore. The polar filament is closely coiled with 8 turns in the larger capsule and 7 in the smaller one. A large and distinct iodophilous vacuole is found in the sporoplasm.

14- *Myxobolus sharpeyi* Molnár, Masoumian et Abasi, 1996

(Figs. 13 & 14):

This species was found on the gills of *B. sharpeyi* and *C. regium* from Lesser Zab river (Table 1).

Description of the species: Vegetative forms are cysts of various sizes and shapes. Spores are relatively small, the majority of the

spores are short ellipsoidal in frontal view and lemon shaped in side view. The spores have an indistinct sutural line, a protruded sutural edge at the anterior end, and a small intercapsular process. Spores are 9-9.5 μ m long, 7.4-8 μ m wide and 4.5-5 μ m thick. Two polar capsules are pyriform in shape and equal in size, 3.4-4 μ m long and 2-2.4 μ m wide. They are equal to the half length of the spore. Polar filaments are closely coiled with 5 turns. A small indistinct iodophilous vacuole is found in the sporoplasm.

Discussion

The first record of *Myxobolus* in Iraq was by Herzog (5). He found three species from different sites in Iraqi freshwater fishes, namely:

M. mülleri from *B. xanthopterus*; *M. oviformis* from *A. vorax*, *B. esocinus*, *B. grypus* and *B. sharpeyi* and *Myxobolus* sp. from *B. esocinus*, *B. grypus* and *B. xanthopterus*. Fattohy (6) managed to isolate *M. pfeifferi* from *A. marmid* from the river Tigris in Mosul city. Subsequently, Abdul-Ameer (7) reported both *M. dispar* and *M. sphaerica* from *C. regium* and both *M. dogieli* and *M. nemachili* from *Liza abu* in Tigris river in Salah Al-Dien province. Abdullah (8, 9) entertained six other species from some freshwater fishes in Iraq, namely: *M. poljanski* from *B. grypus*; both *M. cyprinicola* and *M. parvus* from *C. carpio*; *M. macrocapsularis* from *B. barbulus*; *M. rotundus* from *L. lepidus* and *M. sandrae* from *L. abu* in Dokan lake in north of Iraq. Al-Naimy (10) found *M. iranicus* and *M. koi* from *Silurus glanis* from Tigris river in Mosul city. Asmar *et al.* (11) found *M. bramae* from *B. xanthopterus* from Al-Qadisiya dam lake. *M. pseudodispar* was detected from both *A. marmid* and *B. luteus* in a man-made lake at Al-Amiriya region, Baghdad (12). Al-Jadoaa (13) reported *M. ellipsoides* from *C. macrostomum* in Al-Diwaniya river.

By consulting Mhaisen's (14) index- catalogue of the parasites and disease agents of fishes of Iraq, it seems that *V. umbla* now represents a new host record for *M. pfeifferi* in Iraq. Also, both *B. luteus* and *B. lacerta* are now considered as new hosts for *M. iranicus* in Iraq. On the other hand, seven other *Myxobolus* spp., namely *M. bulbocordis*, *M. karuni*, *M. mesopotamiae*, *M. molnári*, *M. persicus*, *M. shadgani* and *M. sharpeyi* were never reported from fishes of Iraq. So, they are

now considered as new items to be added to the parasitic fauna of fishes of Iraq.

It appears from Tables (1 & 2) that the fishes of Lesser Zab river were more infected than those from Greater Zab river (12 species against 6 species). Also, these tables showed that *M. pfeifferi* and *M. persicus* were common between fishes of both rivers. *B. grypus* was infected with three species of *Myxobolus*. *B. luteus*, *B. sharpeyi*, *C. regium* and *C. carpio* were infected with two species each, and the rest of fishes were infected with one species each.

References

- 1.Hoffman, G. L. (1998) Parasites of North American freshwater fishes, 2nd edn. Comstock Publ. Ass., Cornell Univ., London: 539pp.
- 2.Duijn, van C. Jnr. (1973) Diseases of fishes, 3rd edn. Iliffe Books, London: 372pp.
- 3.Shul'man, S.S. (1966) Myxosporidia of the USSR. Nauka Publ., Moscow: 631pp., (Engl. Transl. Amerind. Publ., New Delhi, 1988),
- 4.Landsberg, J.H. and Lom, J. (1991) Syst. Parasitol., 18: 165-186
- 5.Herzog, P. H. (1969) Arch. Fischereiwiss., 20(2/3): 132-147.
- 6.Fattohy, Z. I. (1975) Studies on the parasites of certain teleostean fishes from the river Tigris, Mosul, Iraq. M.Sc. Thesis, Univ. Mosul: 136pp.
- 7.Abdul-Ameer, K. N. (1989) Study of the parasites of freshwater fishes from Tigris river in Salah Al-Dien province, Iraq. M. Sc. Thesis, Univ. Baghdad: 98pp., (In Arabic),
- 8.Abdullah, S.M.A. (1990) Survey of the parasites of fishes of Dokan lake.M. Sc. Thesis, Univ. Salahadden: 115pp., (In Arabic),
- 9.Abdullah, S.M.A. (1998) ZANCO, Special Issue, 1: 14-20.
- 10.Al-Naimy, B.H.S. (1997) A study on parasites of the fish *Silurus glanis* L. from Tigris river in Mosul city with special reference to the histopathological effects caused by some infections. M. Sc. Thesis, Univ. Mosul: 116pp. (In Arabic)
- 11.Asmar, K.R.; Balasem, A.N.; Mhaisen, F.T.; Al-Khateeb, G.H. and Al-Jawda, J.M. (1999) Ibn Al-Haitham J. Pure Appl. Sci., 12(1): 52-61
- 12.Al-Nasiri, F.S. (2000) Parasitic infections of fishes in a man-made lake at Al-Amiriya region, Baghdad. M. Sc. Thesis, Univ. Baghdad: 133pp. (In Arabic),

13. Al-Jadoaa, N.A. (2000) Parasitic infections and pathological changes of some local and culture fishes at Al-Qadisiya and Babylon provinces. Ph. D. Thesis, Univ. Al-Qadisiya: 148pp., (In Arabic)
14. Mhaisen, F. T. Index-catalogue of parasites and disease agents of fishes of Iraq, (Unpublished).
15. Lom, J. and Arthur, J.R. (1989) *J. Fish Dis.*, 12: 151-156.
16. Masoumian, M.; Baska, F. and Molnár, K. J. (1996) *J. Fish Dis.*, 19: 15-21.
17. Kostoingue, B.; Diebakate, C.; Faye, N. and Toguebaye, B. (2001) *Acta Protozool.*, 40: 117 – 123.
18. Coad, B.W. (1991) *Syllogeus*, 68: 49pp.
19. Bykhovskaya-Pavlovskaya, I. E.; Gusev, A. V.; Dubinina, M. N.; Izyumova, N. A.; Smirnova, T. S.; Sokolovskaya, I. L.; Shtein. G. A.; Shul'man, S. S. and Epshtein, V. M. (1962) Key to parasites of freshwater fish of the U.S.S.R. Akad. Nauk, S.S.S.R., Moscow: 727pp., (In Russian),
20. Molnár, K.; Masoumian, M. and Abasi, S. (1996) *Arch. Protistenkd.*, 147: 115-123.
21. Masoumian, M. and Pazooki, J. (1999) *Iran. J. Fish. Sci.*, 1(1): 35-46.

Table (1): The distribution of species of *Myxobolus* in fish hosts from Lesser Zab river.

Fish host	No. fishes examined	No. fishes infected	% infection	Site of infection	Species of <i>Myxobolus</i>
<i>Acanthobrama marmid</i>	96	9	9.3	Gills	<i>M. pfeifferi</i>
<i>Aspius vorax</i>	60	10	16.6	Air bladder, Intestine	<i>M. oviformis</i>
<i>Barbus esocinus</i>	34	5	14.7	Skin, Gills, Ovaries	<i>M. molnari*</i>
<i>B. grypus</i>	21	2	16.6	Gills,	<i>M. karuni*</i>
		3	25	Intestine	<i>M. poljanski</i>
		3	25	Gills	<i>M. persicus*</i>
<i>B. sharpeyi</i>	11	2	18.8	Gills	<i>M.</i>
		3	27.2	Gills	<i>bulbocordis*</i>
<i>Cyprinus carpio</i>	300	12	4	Gills, Fins, Skin	<i>M. sharpeyi*</i>
		20	6.6	Gills	<i>M. cyprinicola</i>
<i>C. macrostomum</i>	46	10	21.7	Kidneys	<i>M. parvus</i>
		10	21.7	Kidneys	<i>M. persicus*</i>
<i>Chondrostoma regium</i>	84	6	7.1	Gills	<i>M.</i>
		7	5.9	Gills	<i>bulbocordis*</i>
<i>Leuciscus lepidus</i>	10	1	10	Gills	<i>M. sharpeyi*</i>
<i>Varicorhinus umbla **</i>	172	1	10	Gills	<i>M. rotundus</i>
		13	7.5	Gills, Intestine, Liver	<i>M. pfeifferi</i>

* New parasite record in Iraq.

** New host record in Iraq.

Table (2): The distribution of species of *Myxobolus* in fish hosts from Greater Zab river.

Fish host	No. fishes examined	No. fishes infected	% infection	Site of infection	Species of <i>Myxobolus</i>
<i>A. marmid</i>	105	12	11.4	Gills	<i>M. pfeifferi</i>
<i>B. barbulus</i>	68	5	7.3	Gills	<i>M. shadgani</i> *
<i>B. grypus</i>	100	15	15	Skin, Gills	<i>M. persicus</i> *
<i>B. lacerta</i> **	3	1	33.3	Gills	<i>M. iranicus</i>
<i>B. luteus</i> **	220	6	2.7	Gills	<i>M. iranicus</i>
		4	1.8	Gills, Liver	<i>M. mesopotamiae</i> *
<i>B. rajanorum</i>	3	1	33.3	Gills	<i>M. shadgani</i> *
<i>C. macrostomum</i>	120	10	8.3	Skin, Gills	<i>M. persicus</i> *

* New parasite record in Iraq.

** New host record in Iraq.



Fig. (1): Spores of *M. bulbocordis* (500 x)

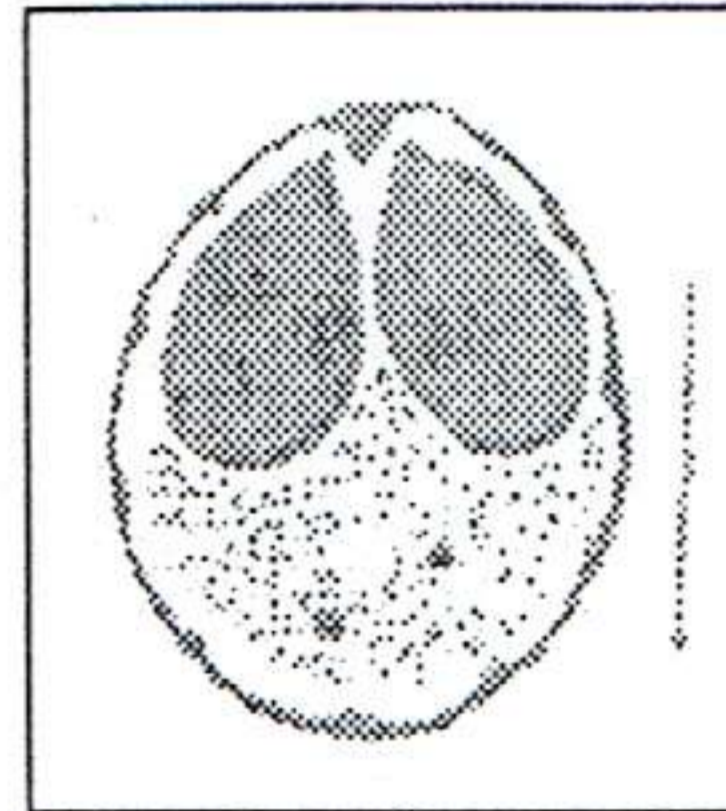


Fig. (2): Spores of *M. bulbocordis* (Scale bar=10 µm)

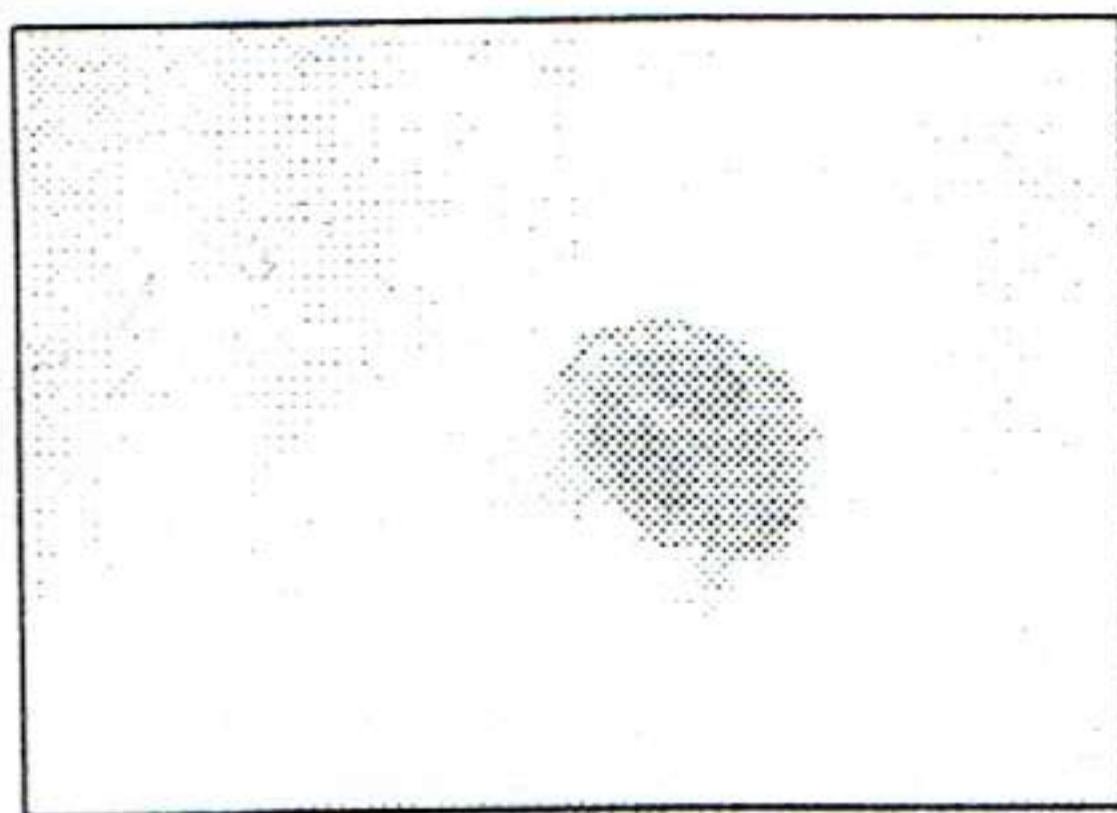


Fig. (3): Spores of *M. karuni* (1200 x)

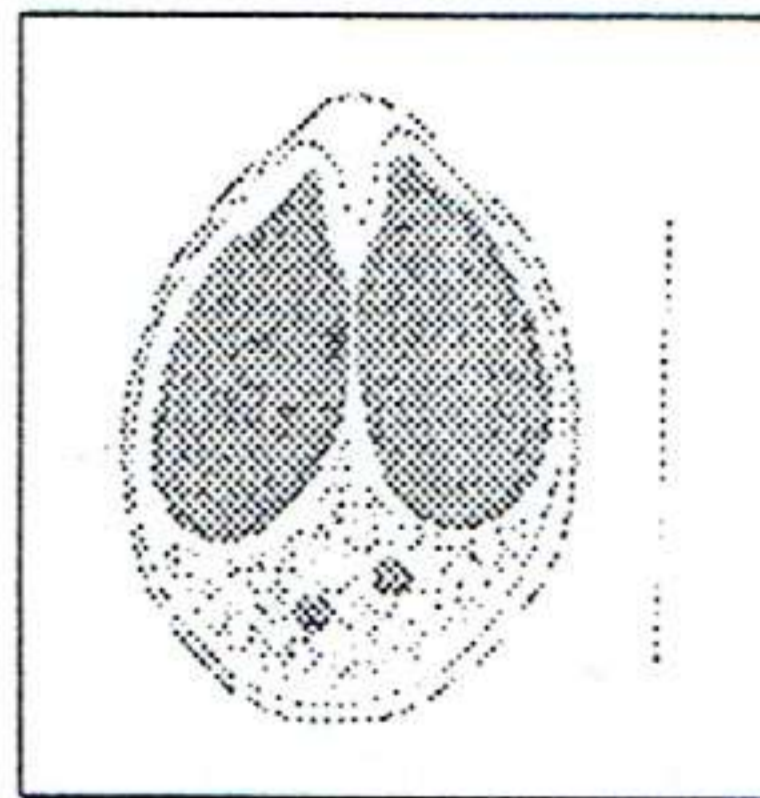


Fig. (4): Spores of *M. karuni* (Scale bar=10 µm).

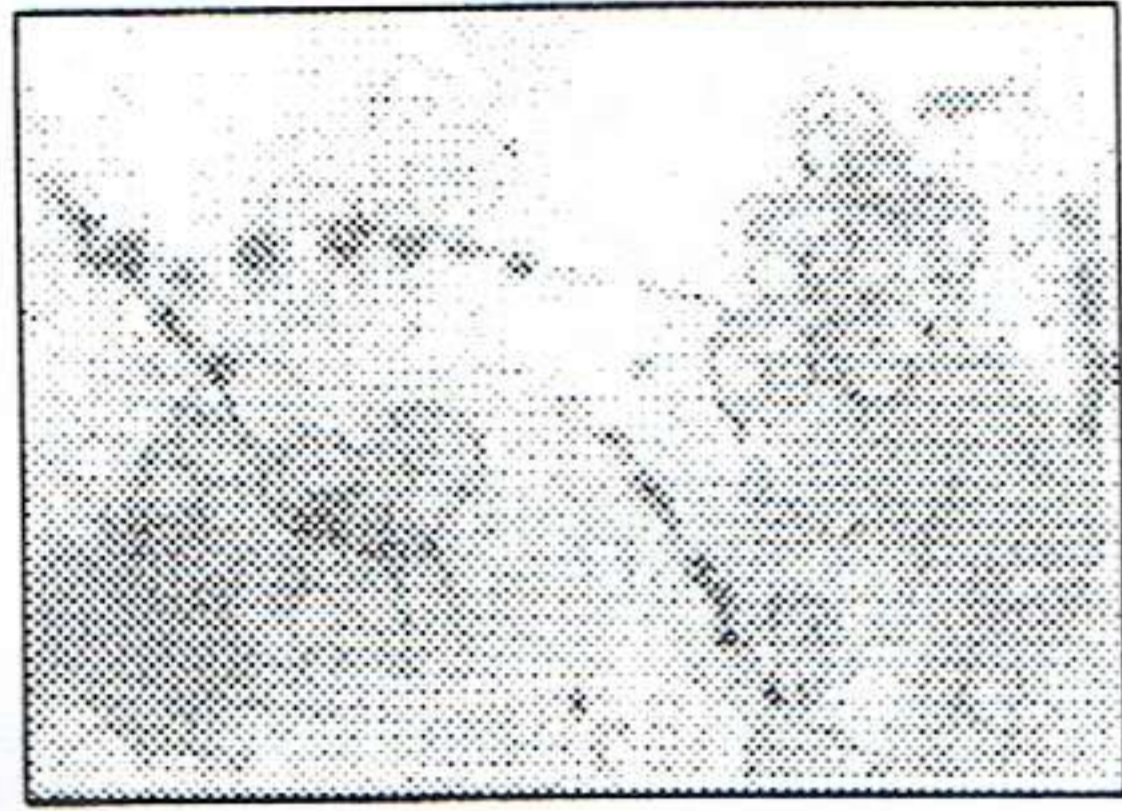


Fig. (5): Spores of *M. mesopotamiae*
(1200 x)

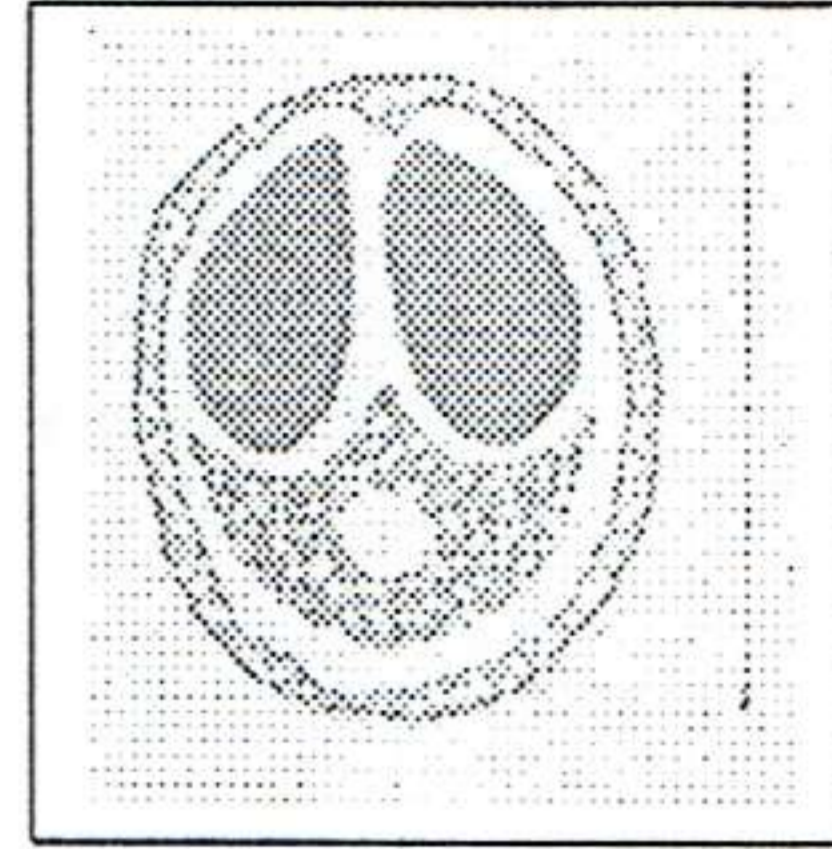


Fig. (6): Spores of *M. mesopotamiae*
(Scale bar =10 µm)

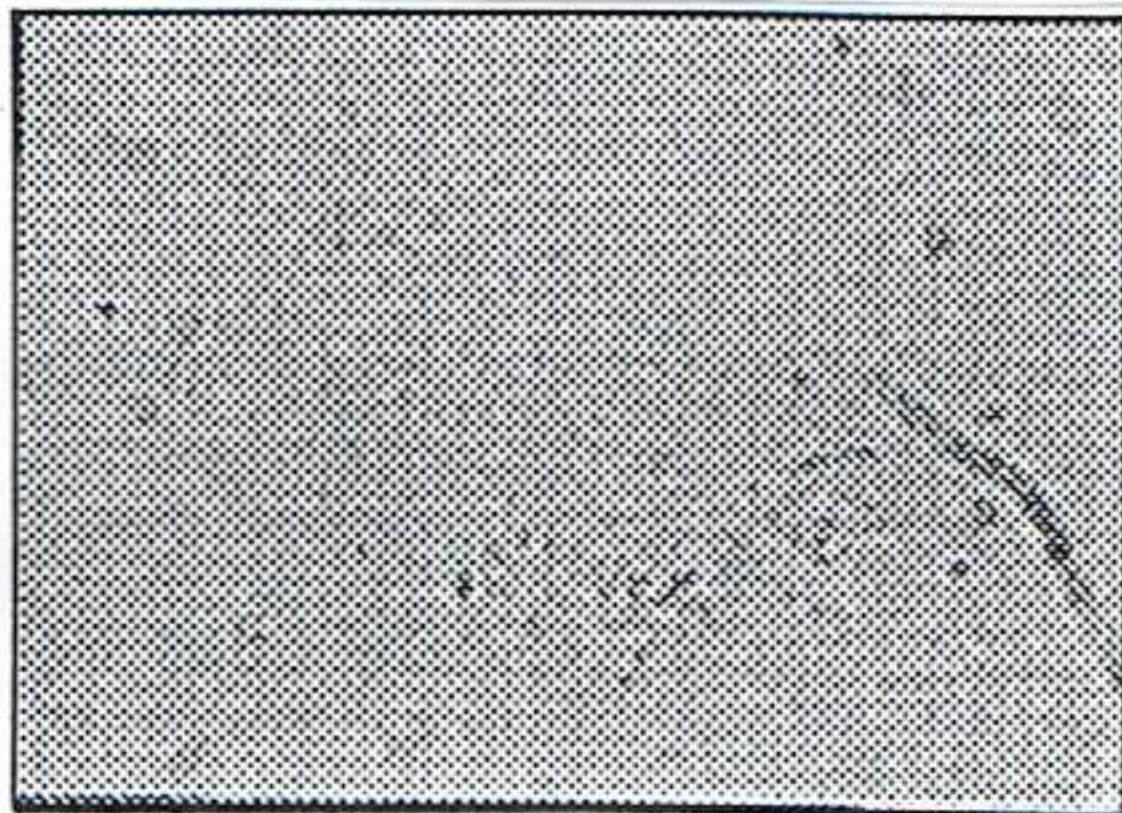


Fig. (7): Spores of *M. molnari*
(500 x)

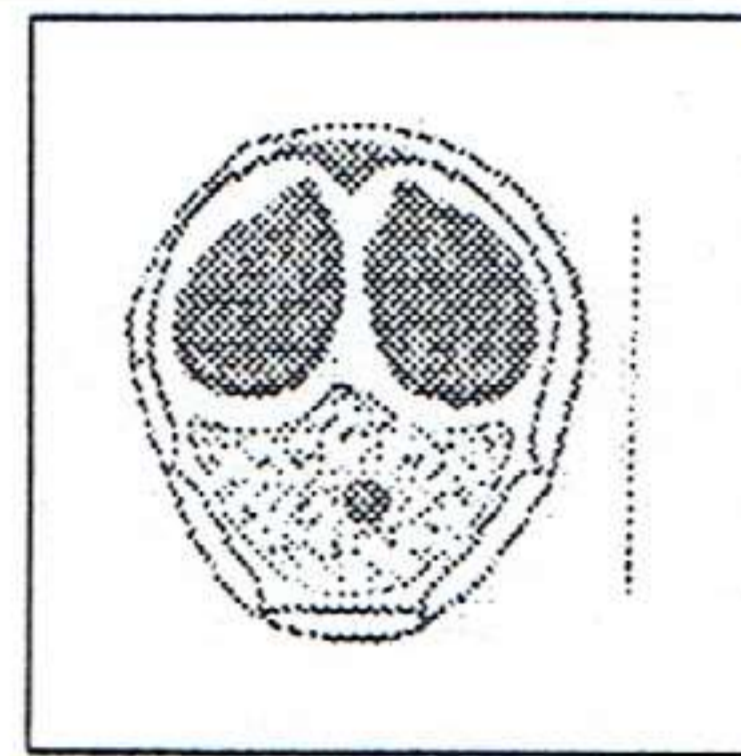


Fig. (8): Spores of *M. molnari*
(Scale bar=10 µm)

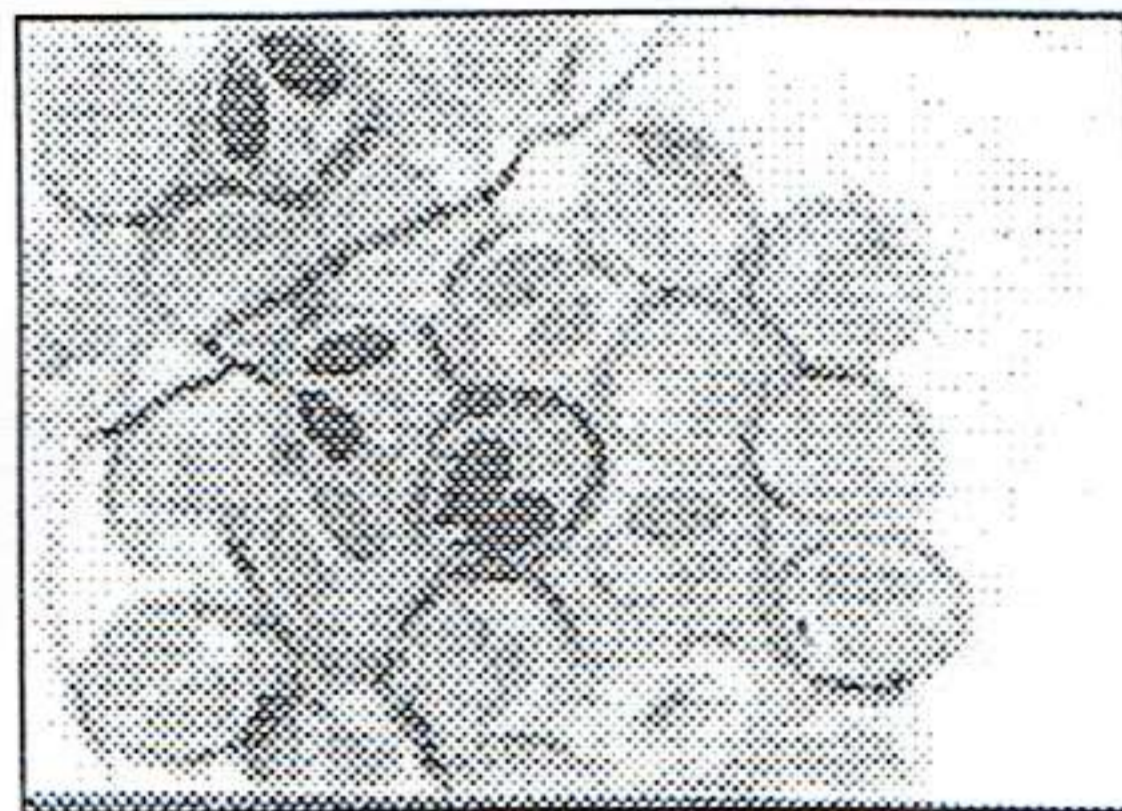


Fig. (9): Spores of *M. persicus*
(1200 x)

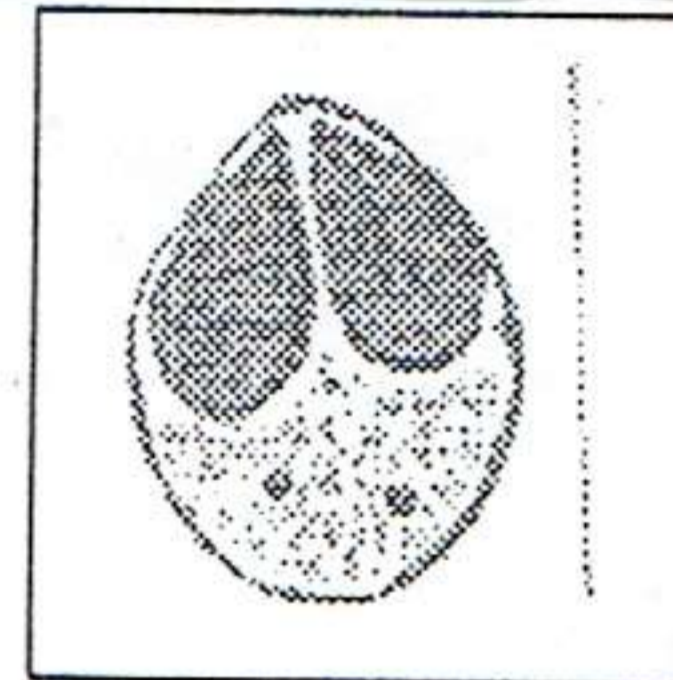


Fig. (10): Spores of *M. persicus*
(Scale bar=10 µm)

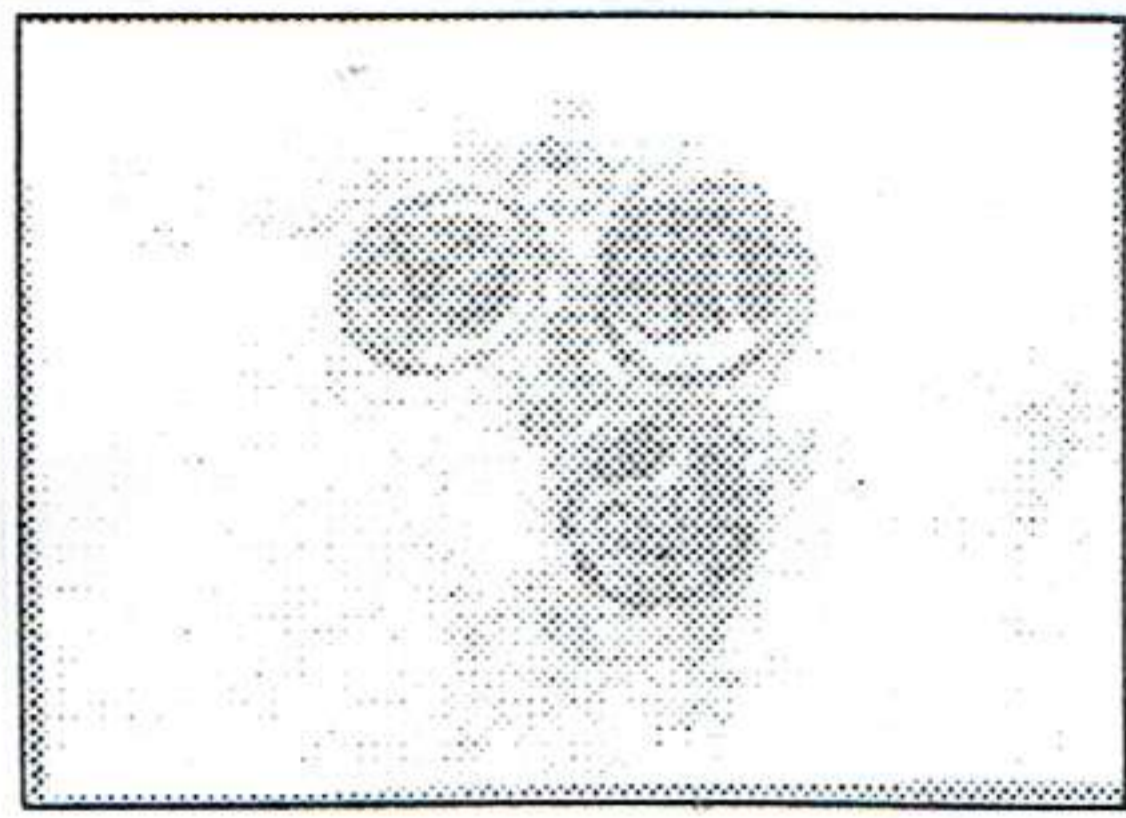


Fig. (11): Spores of *M. shadgani*
(1200 x)

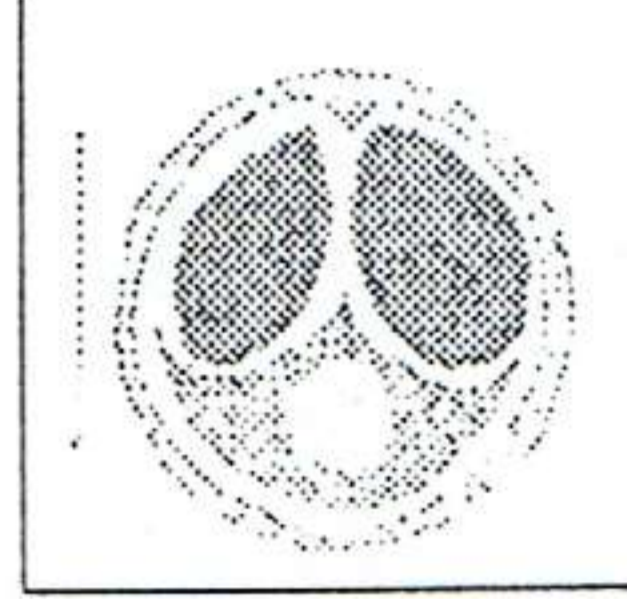


Fig. (12): Spores of *M. shadgani*
(Scale bar=10 µm)

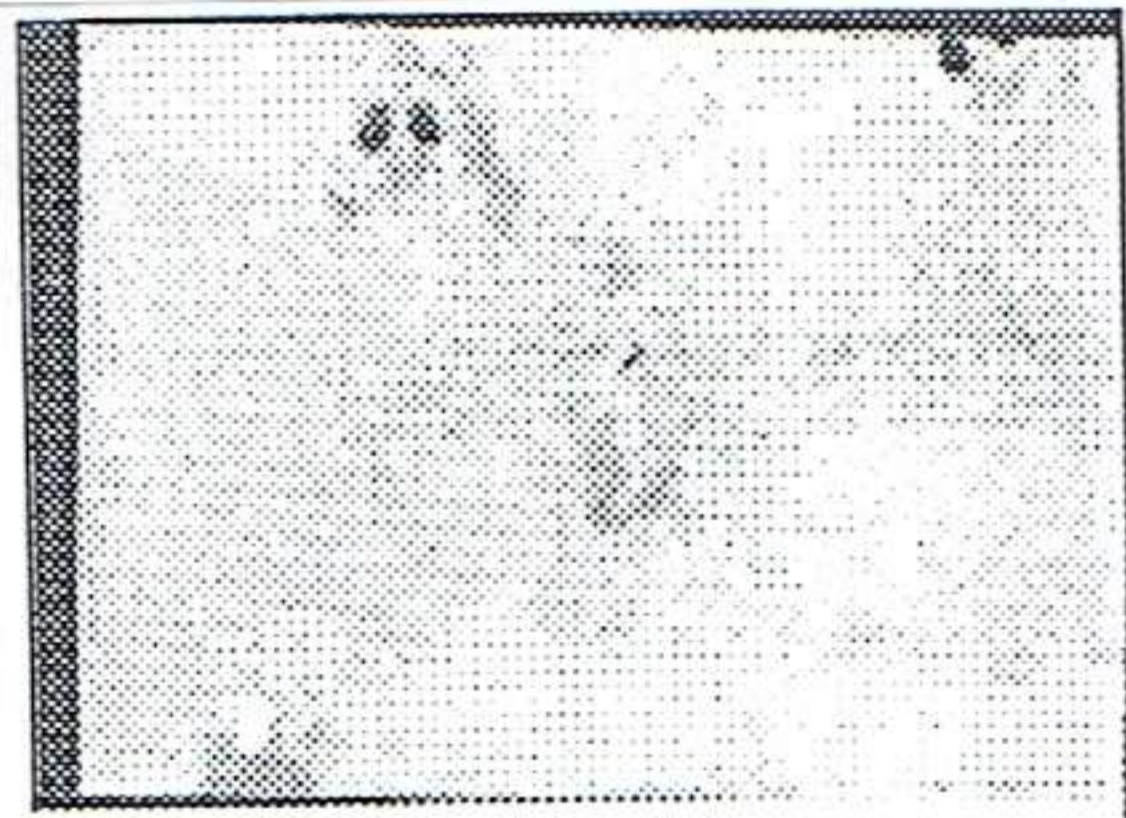


Fig. (13): Spores of *M. sharpelyi*
(1200 x)

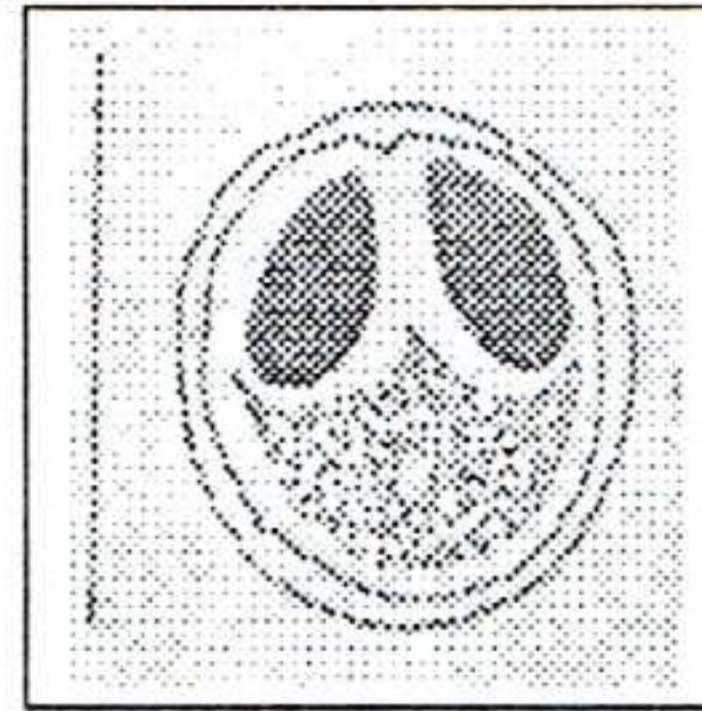


Fig. (14): Spores of *M. sharpelyi*
(Scale bar=10 µm)

الإصابات بطفيليات الجنس *Myxobolus* في أسماك العائلة الشبوطية من نهري الزاب الصغير والزاب الكبير، شمال العراق مع تسجيل سبعة أنواع من الجنس *Myxobolus* لأول مرة في العراق*

شمال محمد أمين عبد الله و فرحان ضمد محيسن
قسم علوم الحياة، كلية التربية، جامعة صلاح الدين
قسم علوم الحياة، كلية التربية (ابن الهيثم)، جامعة بغداد

الخلاصة

تم جمع 1453 نموذجاً من الأسماك العائدة الى 14 نوعاً من العائلة الشبوطية من نهري الزاب الصغير والزاب الكبير في شمال العراق خلال المدة من شهر تشرين الثاني 2000 لغاية نهاية تشرين الأول 2001. لقد تبين من إجراء فحص الجلد والزعانف والغلاصم، ومختلف الأعضاء الداخلية إصابة هذه الأسماك بما مجموعه 14 نوعاً من الطفيليات العائدة للجنس *Myxobolus* من ضمنها سبعة أنواع تسجل لأول مرة في العراق هي *M. bulbocordis* من البني والبلعوط الملوكي و *M. karuni* من الشبوط و *M. mesopotamiae* من الحمري و *M. molnári* من البز و *M. persicus* من الشبوط والبيني كبير الفم و *M. shadgani* من سمكة أبو براطم و شبوط راجانورم و *M. sharpeyi* من البني والبلعوط الملوكي. وبهذا التسجيل وصل عدد أنواع الجنس *Myxobolus* في العراق الى 25 نوعاً موزعة على 31 نوعاً من أسماك المياه العذبة.

* جزء من أطروحة دكتوراه للباحث الأول.