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STUDIES ON SKIN PARASITC DISEASES OF HYBRID TILAPIA

(With 3 Tables and 4 Figures)

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دراسات على امراض الجلد الطفيليه فى البلطى الهجين

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قامت هذة الدراسه على ٣٠٠ سمكه بلطى (١٠٠ سمكه من كل من البطى النيلى ، الأوريا، البلطى الهجين) والتى تم الحصول عليها من مركز ابحاث الاسماك بجامعة قناة السويس خلال الفتره من مارس ١٩٩٥م وحتى فبراير ١٩٩٦م بمعدل ٢٥سمكه من كل نوع لكل موسم. وضعت هذه الاسماك تحت الفحص الاكلينيكى والصفه التشريحيه وعزل الطفيليات الخارجيه ثم عمل مقارنات من حيث معدل الاصابه بطفيليات الجلد الخارجيه ونسبة انتشارها على مدار العام وكذلك مدى تأثيرها الهستوباثولوجى فى الانواع الثلاثه ، تم مقاومة هذه الامراض فى البرك وقد وجد أن نسبة الاسمنتيه باضافة الفورمالين بمعدل ١: ٤٠٠٠ (٢٥٠ ملجم /لتر) لمدة ساعه الاصابه فى البلطى النيلى والاوريا والبلطى الهجين هى ٥٣، ٥١ ،٨٤ ٪على التوالى ، بينما ظهرت الاعراض الاكلينيكيه على هذه الاسماك بنسبة ٩ ، ٨ ، ٢٠ ٪على التوالى ٠ كما وجد أيضا أن نسبة أصابة الانواع الثلاثه بطفيليات الجلد المختلفه كانت ٢٨، ٢٦، ٥٠ ٪على التولى للاوليات والتى اشتملت على الترايكودانيا فولتونى ، الكيلودونيلا هكساستيكا ، الميكسوبوليس درماتوبيا ثم ١٠،١١،١٤ ٪على التولى للتريماتودا والتى ا شتملت على الجيروداكتيلس الجانس وحويصلات الميتاسبركاريا ثم ٣،٢،٥٪على التولى للكلراستيشيا (لامبروجلينا موندايي) بينما كانت نسبت العدوي المشتركة من الاوليات والتريماتودا هى ١٢،١٢،١٥٪على التوالى وتمثلت الاعراض المرضيه والصفة التشريحية فى ظهور الحركات العصبيه وحك الجلد فى الأجسام الصلبه وزيادة نسبة الطبقة المخاطيه على الجلد وسقوط القشور مع وجود النقط النزيفيه والقرح بينما ظهرت البقع السوداء فى حالة الاصابة بحويصلات الميتاسركاريا . ومن الناحيه الهستوباثولوجيه فقد وجد أن التنكرز فى خلايا الأبيدرم مع التغيرات الهلاميه هما الصفه السائده

الفورمالين فى التغلب على هده الأمراض حيث تم اختفاء طفيليات الجلد المسببه . وقد نجح وكذلك زوال الأعراض المرضية تدريجياً.

SUMMARY

One hundred of each *Oreochromis niloticus, Sarotheroden aureus* and hybrid tilapia (all male), 25 fish / season, were collected from Fish Research Center, Seuz Canal University during the period from March 1995 through February 1996. The fishes were examined for clinical signs, postmortem lesions and skin ectoparasites. A comparative studies were done for the skin ectoparsitic affection among the three species of tilapia along with their prevalence,seasonal occurance and the histpathological changes. Besides, the control of detected skin ectoparasitic diseases among tilapia species in the reared ponds was performed using the static procedure by formalin. The skin ectoparasitic prevalence among *O. niloticus, S. aureus* and hybride tilapia was 53, 51 and 84% respectivelly while the clinically diseased fishes were 9, 8 and 20% respectivelly. The prevalence of different skin ectoparsites among *O. niloticus, S. aureus* and hybrid tilapia were 28, 26 and 50% for protozoa including *Trichodina fultoni, Chilodonella hexastica* and *Myxobolus dermatobia* ; 10, 11 and 14 for trematodes including *Gyrodactylus elegans* and encysted metacercaria (*Postaodiplostomum cuticula*); 3, 2 and 5% for crustacea (*Lamproglina mondi*) ; and 12, 12 and 15% for mixed infection of protozoa and trematodes respectivelly. The clinical signs and P.M. lesions of skin ectoparasitic diseases were restlessness, rubbing the body against hard objects, excessive mucous secretion, roughness of the skin with scale loss, petichial hemorrhages and focal to large hemorrhagic ulcers. In casesinfected with encysted metacercaria, the lesions were skin black spots. Histopathologically, vacuolar degeneration and necrosis in the epidermis were commonly observed in most infested cases. Formalin at concentration of 1 : 4000 (250 mg / L) for one hour in static procedare succeded to control the detected skin parasitic diseases among different tilapia species indicated by absence of the skin ectoparsites and gradual disappearance of the clinical signs.

Key words: *Tilapia-skin-parasitic diseases*

INTRODUCTION

Overpopulation resulted from uncontrolled spawning of tilapias in production ponds became of critical problem in the Egyptian fish farms. The main objectionable result of this problem was the reduction of fish growth where about 70% of produced fish were of small unmarketable size (*Ishak et al. 1979*). Monosex culture of Tilapia species has been recognized as one of the best solutions of this problem, meanwhile male as monosex grows faster than female. Practically, monosex of tilapias was produced either by sex reversal (*Guerrero 1976 and Badran and Danasoury 1991*) or hybridization between different tilapia species *(Hickling 1960 and El-Etreby et al. 1992*). On the other hand, the susceptability of fish to fungal (saprolegniosis) and baterial (columnaris) skin diseases was directly proportional with the percentage of males in the fish groups *(Badran and Danasoury 1991)*. Moreover, the prevalence of Ichthyophthirius, Scphidia, Trichodina, Ichthyobdo, Gyrodactylus and saprolegnia was greater in sexually mature male brown trout and salmonid fish than in mature female or immature fish of both sex (*Robertson 1979 and Pickering and Christie 1980).* For these reasons, this work was directed to study the prevalence and seasonal dynamic of skin ectoparasitic diseases of hybrid tilapia in comparison to that of *Oreochromis niloticus* and *Sarotherodon aureus*, and to threw the light on the morphologic criteria of the detected parasites and their pathological impact of all naturally infected fishes. Besides, the study was directed to control the detected diseases in the reared ponds.

MATERIALS and METHODS

FISH :

One hundred of each tilapia species (Oreochromis niloticus, Sarotheroden aureus and hybrid tilapia), 25/season, were collected randomly from the concrete ponds of Fish Research Center, Suez Canal University during the period from March 1995 through February 1996. The hybrid tilapiae were obtained by mating between female O. niloticus and male S. aureus.

Clinical and P.M. Examinations:

The collected fish species per each season were subjected to full clinical and postmortem examinations according to the method given by Amlacher (1970).

Parastological Examination:

For parasitological examination, the body surface of each fish as well as its skin scraping was carefully examined grossly and with hand lens, finally with dissecting microscope for detection of metazoan parasites. The detected parasites were collected, prepared and examined (Kruse and Pritchard, 1982). Smears were done from skin scraping and slimes, fixed in absolute methanol and stained with Giemsa (Levine, 1985) for detection of skin ectoparasitic protozoa. Besides, pieces of about 1g was removed from the skin and muscles, compressed between two slides and examined microscopically for detection of metacercarae. The detected metacercarae were fixed (in 10% neutral buffered formalin), prepared and examined (Kruse and Pritchard, 1982). Crustacea were fixed in 5% glycerine alcohol, cleared in xylene, mounted in canada balsam and examined microscopically (Faisal et al. 1988). The identification of all isolated parasites were performed according to Wellbarn (1967), Hoffman et al(1979) and Lucky and Hoffman(1980).

Histopathological Examination:

Specimens from affected skin and muscles were immediately fixed in 10% buffered formalin, dehydrated in ascending grades of ethanol, cleared in xylene, blocked in paraffin, sectioned at 5um thickness and stained with hematoxylin and eosin and periodic acid cheif (PAS),(Luna, 1968).

Field Control Of Parasitic Diseases:

After each seasonal examination, formalin (37-40%) was used at a concentration of 1:4000(250mg/L) for one hour using static procedure (Post, 1987). The treatment of fish using static procedure was established by measuring the volume of water and fish in the concerete ponds to calculate the required quantity of the formalin. The fishes were fasted for 24 hr prior to the treatment (Roberts and Shepherd 1974). Application of formalin in the ponds throughout summer and autumn seasons was performed at 6 p.m. to avoid the time of elevated water temperature. Immediatelly, after the time of treatment, the formalin/water mexture was removed and replaced with freshwater. The effectivness of the treatment was assessed by examining the fishes for presence or absence of the caustave agents (skin ectoparasites).

RESULTS

The infestation of skin ectoparasites among examined *O. niloticus, S. aureus* and hybrid tilapia were 53, 51 and 84% respectivelly while the clinically diseased tilapias were 9, 8 and 20% respectivelly (Table 1) . The prevalence of different skin ectoparasites *among O. niloticus, S. aureus* and

hybrid tilapia were 28,26 and 50% for protozoa including *Tricodina fultoni* (Fig. 1A),*Chilodonella hexastica* (Fig. 1B) and *Myxobolus dermatobia* (Fig 4B); 10, 11 and 14% for Trematodes including *Gyrodactylus elegans* (Fig 2A) and encysted metacercaria (Fig 2B) ; 3, 2 and 5% for crustacea (*Lamproglina mondi*, Fig 2C) and 12, 12 and 15% for mixed infection (protozoa and tremadodes) respectivelly (Table 2). The prevalence of these skin ectoparaites among different species of tilapias were high in the summer than other seasons (Table 3).

The clinical signs and P.M. lesions of diseased tilapias were the same of most cases, and characterized by restlessness with nervous signs, the fishes rubbed themselves against hard objects, excessive mucous secretion, roughness of the skin with scale loss, focal petechiae and focal to large hemorrhagic ulcers. These signs were more obvious in hybrid tilapia (Fig. 3). In some cases the characteristic lesions were skin black spots of variable size, shape and number.

Hisopathologically, the skin of tilapias infected by protozoan and monogenitic parasites revealed vacular and/or ballooning degeneration of most epidermal cells. Some cells showed pyknotic nuclei, while others were necrotic and ruptured (Fig. 4A). In sever infestation, complete epidermal cell desquation and/or skin ulceration were evident. In some cases, Myxobolus spores were evident between necrotic epidermal cells that exhibited karryolytic nuclei (Fig. 4B). The dermis showed edema, congestion, easinophilic granular cells infiltration and some melanomacrophages. In skin infected by Trichodina, the underlying muscle exhibited edema, and hyaline degeneration. In some ceses, oval to round parastic cysts were observed between the muscle and resulted in a fibrous tissue proliferation and pressure atrophy in the surrounding muscles

Formalin at concentration of 1:4000 for one hour in static procedure succeeded to control the detected parasitic diseases among different species of tilapia. The fishes examined after each treatment appeared free from any of the ectoparasites. The signs indicating ectoparsitic diseases were gradually disappeared and the fishes were swimming in a normal manner.

DISCUSSION

Mucous layer covering the external body surface of fish provides the first line of defence against infection by prevention of colonisation of bacteria, fungi and parasites and thus act as a chemical defence barrier (Jakowska, 1963). It is secreted by specialised goblet cells present in the

epidermal layer (Harris et al., 1973 and Pickering, 1974). The depletion of mucous-secreting goblet cells accompained with age, sex and state of maturity (Pickering, 1977) or with sex modification (Pottinger and Pickering 1985) favour the parasitic invasion and colonisation through the skin. This phenomenon is supported by the results obtained from the present study where the high prevalence of skin ectoparasites including protozoa, trematodes and crustacea was recorded in high level (84%) among hybrid tilapia (100% males). The results coincided with those reported by Robertson (1979) and Pickering and Christie (1980) who found that sexually mature male salmonid fish and brown trout were more frequantly and severly infested by species of Ichthyophthirius, Scyphidia, Tricodina, Icthyobodo, and Gyrodactylus than immature fish of either sex or mature female fish. Yet, Richards and Pickering(1978), Willoughby(1978) and Badran and Danasoury(1991) reported that the prevalence of some skin diseases (saprolegniosis and columnaris) was greater in mature male brown trout, salmonid fish and *O. niloticus* than in mature females or immature fishes of both sex. Moreover, the adult of bony bream fish, rather than juveniles, were affected with mycotic dermatitis as a result of hormonal changes associated with sexual maturation (Puckridge et al. 1989). On the other hand the results disagree with those reported by Waston and Dixk (1980) who found that, the infection of pick with metazoon parasites was correlated to the host age and season rather than the host sex. This difference was attributed to the route of metazoan infection to fish which was either by ingestion of infected host or through gills according to metazoan species.

On the other side, the prevalence of skin ectoparasites among *O. niloticus and S. aureus* was 53 and 51% respectivelly. This agrees with those reported by Hassan(1992), El-Gawady et al.(1992), Aly (1994) and Mohamed(1996).

The seasonal occurrance of the skin ectoparsites among the three types of tilapia was high in the summer than other seasons. These results agree with those reported by Abu Elwafa (1988) for protozoa, Mohamed (1996) for monogenia but reverse to that observed by El Khatib(1989) for crustacia, where the lamproglena was high in the spring than other seasons.

The clinical signs and P.M. lesions reported here and those by many authors (Egusa, 1992; El-Gawady et al. 1992, Eissa et al., 1993 and Aly 1994 and Mohamed 1996) were restless with nervous signs, the fish rubbed themselves against hard objects, excessive mucous secretion, roughness of skin with scale loss, focal petechiae and focal to large hemorrhagic ulcers. In the cases infected with encysted metacercaria (Posthodiplostomum cuticula)

the lesions were characterized by black spots on the skin which varied in size, shape and number.

Histopathologically, the degenerative and necrotic changes that observed in most infested cases could be a result of the local , scraping and suckling activities, and/ or toxic effect of the parasites. Similar picture was recorded by Aly (1994) and Mohamed (1996). The hyaline degeneration that noticed in the muscles of Trichdina infested cases resulted from the burrowing of this protozoan deeply through the skin. Similar destructive effect was observed by Aly (1994) and Mohamed (1996).A marked dermal tissue response (edema and congestion) was noticed while the body defence was represented by the presence of eosinephilic granuler cells and some melanomacrophages. The fibrous tissue proliferation observed in the muscles resulted from the chronic effect of the parasitic cyst while the atrophied muscles caused by the local and / or toxic effect of this encysted metacercaria.

Formalin is one of the disinfectants that has bactericide, protozoacide, parasiticide and fungicide and so used to control infection of organismes on the outside surface of fishes and eliminate or reduce the potential pathogens (Brown and Gratzek, 1980; Kabata, 1985; Post, 1987 and Egusa, 1992). In the present study formalin was succeeded to control the detected skin ectoparasitic diseases among tilapia species throughout the four seasons. This succeess was indicated by gradual disappearance of the clinical signs and freedom of the fishes from the skin parasites. On the other hand, the most important disadvantage of formalin is the oxygen depletion particularly during the summer monthes (Kabata, 1985). For this reason, the fishes were fasted pre-treatment to reduce the oxygen consumption and amonia production, and application of formalin to the ponds at the day time of low water temperature. Moreover, the treated water in the concrete ponds was drained rapidly after the time of treatment and replaced with freshwater.

From the present study, it was concluded that:

1- The hybrid tilapia (all male) were highly affected with different skin parasitic diseases in comparison with *O. niloticus* and *S. aureus.*
2- The high prevalence of different skin ectoparasites among tilapia species was appeared throughout the months of high water temperature.
3- Static procedure treatment with formalin is useful for control of skin ectoparasitic diseases among fishes reared in relativelly small holding facilities or in those which can be drained rapidly.

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Table 1: The percentage of infested and clinically diseased Tilapia species.

Fish species	No. of examined fish	Infested fish No. (%)	Clinically diseased fish No. (%)
O. niloticus	100	53	9
S. aureus	100	51	8
Hybrid tilapia	100	84	20

Table 2: The prevalence of different skin ectoparasites among Tilapia species.

Parasite	O. niloticus No. (%)	S. aureus No. (%)	Hybrid tilapia No. (%)
I-Protozoa	28	26	50
a-Trichodina fultoni	20	17	35
b-Chilodonella Hexastica	6	6	10
c- Myxobolus dermatobia	2	3	5
II-Trematodes	10	11	14
a-Gyrodactylus elegans	7	7	10
b-Encysted metacercaria	3	4	4
III-Crustacea(Lamproglina mondi)	3	2	5
VI-Mixed infection	12	12	15
a- I a and II a	8	7	9
b- I b and II a	4	5	6

Table 3: Seasonal prevalence of skin ectoparasites among Tilapia species.

Parasite	Season	O. niloticus No. (%)	S. aureus No. (%)	Hybrid tylapia No. (%)
Protozoa	Spring	8	7	10
	Summer	10	12	25
	Autumn	7	5	10
	Winter	3	2	5
Trematodes	Spring	2	3	4
	Summer	5	4	6
	Autumn	2	2	3
	Winter	1	2	1
Crustacea	Spring	0.0	0.0	0.0
	Summer	2	1	3
	Autumn	1	1	2
	Winter	0.0	0.0	0.0
Mixed infection	Spring	2	3	3
	Summer	7	7	9
	Autumn	2	1	2
	Winter	1	1	1

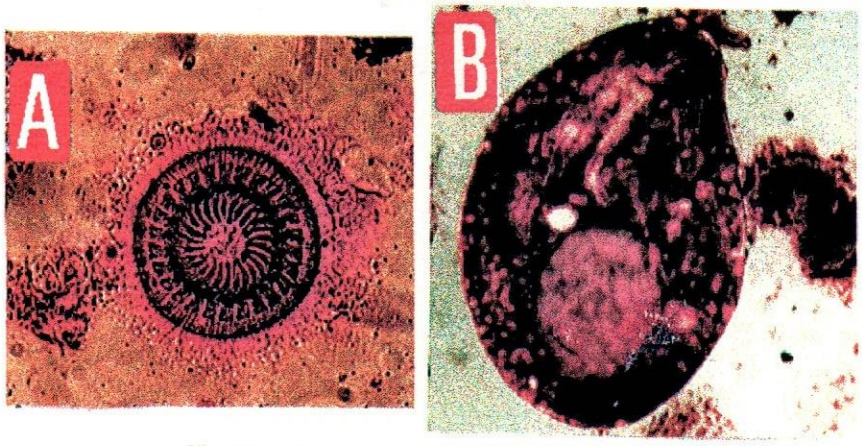


Fig. (1 A & B): Showing Trichodina fultoni (A) and Chilodonella hexastica (B), X100

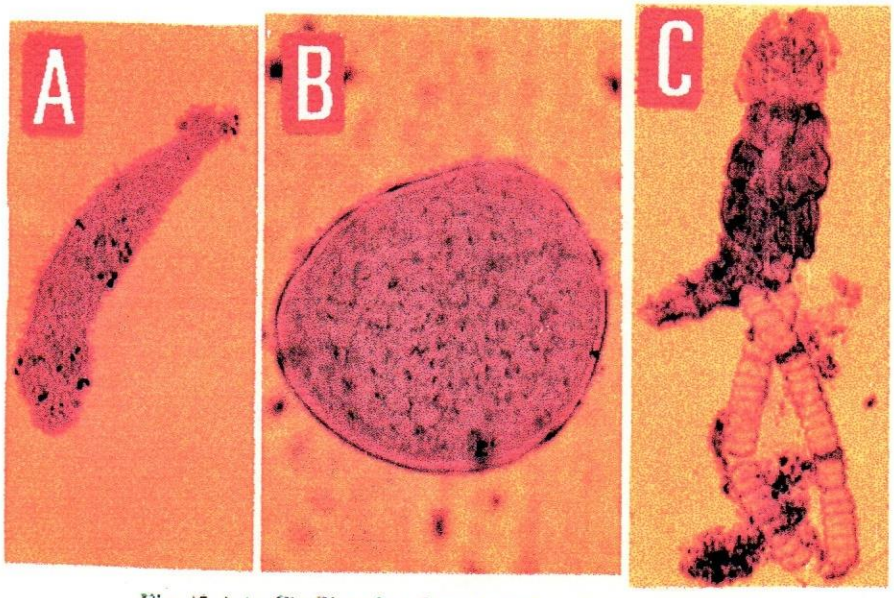
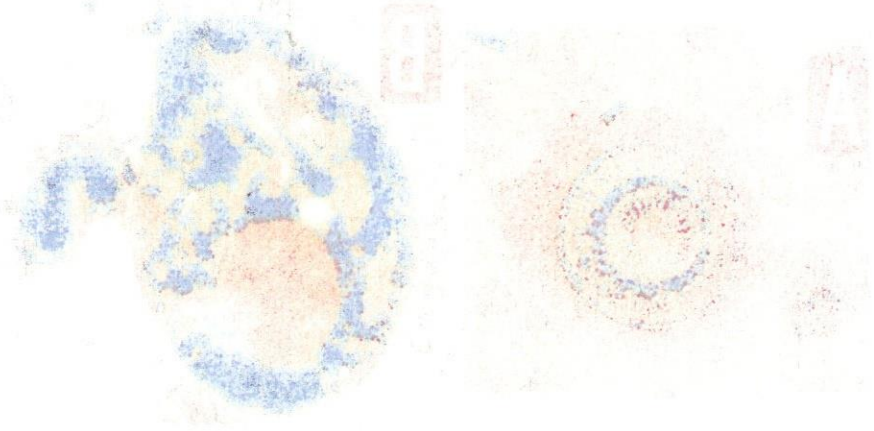


Fig. (2 A to C): Showing Gyrodactylus elegans (A, X100), encysted metacercaria (B, X100) and Lamproglina mondi (C, X25)



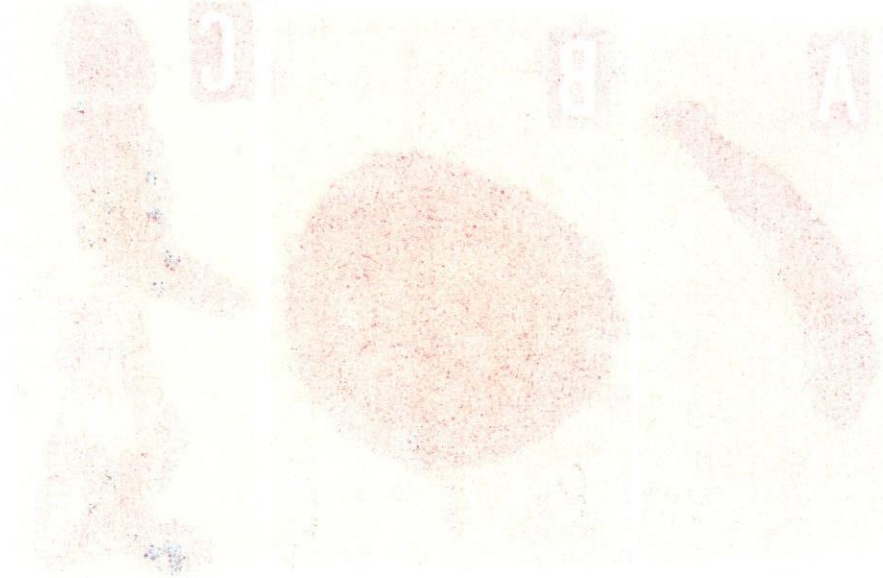


Fig. 3: Hybrid tilapia showing roughled skin with scales losses and hemorrhagic ulcers

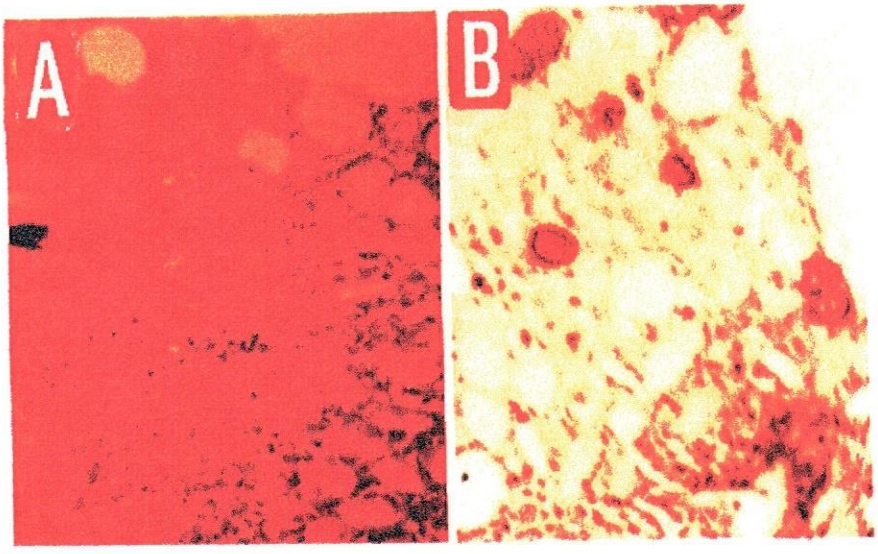


Fig. (4 A & B) Skin of hybrid tilapia showing ballooning degeneration and necrosis in the epidermis (A), myxobolus spores surrounded by necrotic epidermal cells (B), X 400