

A MONOGENIC TREMATODE (*DACTYLOGYRUS* SP.) ASSOCIATED WITH HYBRID TILAPIA (*OREOCHROMIS NILOTICUS* X *O. AUREUS*) MORTALITY

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ABSTRACT

During a routine monitoring programme of Wadi Hanifah stream, some of the hybrid tilapia (*Oreochromis niloticus* x *O. aureus*) was found dead in the stream water. The occurrence of a disease in hybrid tilapia in Wadi Hanifah stream is described. Mortalities of tilapia are considered to have been caused by heavy infections of a monogenic trematode (*Dactylogyrus* sp.). Moribund fish were dark in color, weak, swimming alone and have taken shelter in the marginal areas and moved very slowly when disturbed. It was found that the parasites were localized in the gills only. No exotic parasites were observed in guppy (*Poecilia reticulata*) molly, (*P. latipinna*), platy (*Xiphophorus maculatus*) and *Pteroplichthys* sp.

INTRODUCTION

Tilapias are among the most important commercial freshwater fish species in the tropics. It has become the main species cultured in Saudi Arabia (Siddiqui and Al-Harbi, 1995a). A sizeable population of exotic tilapia fish has been established in the water channels of Wadi Hanifah stream. Being a prolific breeder, tilapia is found in large numbers in the lakes, where flow of water is moderate (Siddiqui and Al-Harbi, 1995b).

Parasitism is one of the most serious problems for cultured fish (Scholz, 1999). Several species of monogenea have been implicated in the mortality of cultured fish (Thoney and Hargis, 1991). *Dactylogyrus* Diesing, 1851 is the largest genus of parasitic helminths, with 971 species, approximately 95% of which are parasites of the gills of fish in the Cyprinidae (Gibson *et al.*, 1996). These parasites are commonly found on cyprinid fish throughout Asia, Europe and North America (Beverly-Burton, 1984). During a routine monitoring programme of Wadi Hanifah stream, in Saudi Arabia, some of the hybrid tilapia (*Oreochromis niloticus* x *O. aureus*) was found dead in the stream water. The present paper describes the occurrence of monogenean trematode (*Dactylogyrus* sp.) on the gills of wild hybrid tilapia for the first time in Saudi Arabia.

MATERIALS AND METHODS

Study Area

Wadi Hanifah stream is located in the Arriyadh region of

Saudi Arabia and flows from north of Badiyah to South-east of Al-Hair city covering a distance of about 50 km (Fig. 1). The main source of stream water is sewage effluent, agriculture runoff and pumped shallow ground water from Arriyadh city. Along with establishment of a permanent flow of water a luxuriant flora has developed in the main channel and on the banks of the stream. Some wetlands with extensive growth of reed plants, *Typha domingensis*, have also developed along the course of the stream.

Physicochemical parameters

Water samples for physicochemical parameters were taken from several representative areas. Water temperature, dissolved oxygen (DO), pH, and total dissolved solids (TDS) were determined at the site of sample collection by a universal pocket meter multiline P₄ (WTW, Weilheim, Germany). For other water quality parameters, samples were transported to the laboratory in an ice-box and were analyzed immediately using a HACH DR/4000 analysis unit (HACH Co., Loveland, Colorado).

Sampling and processing

A total of 40 live hybrid tilapia (*Oreochromis niloticus* x *O. aureus*) weighing 20-50 g were examined during the study. Out of these, 15 moribund fish were collected from the lake stations and 25 apparently healthy fish were collected from all the 15 stations of Wadi Hanifah stream. Besides, 20 specimens belonging to each of guppy (*Poecilia reticulata*) molly (*P. latipinna*) platy (*Xiphophorus maculatus*) weighing 5-15g and *Pteroplichthys* sp. weighing 100-200g were caught

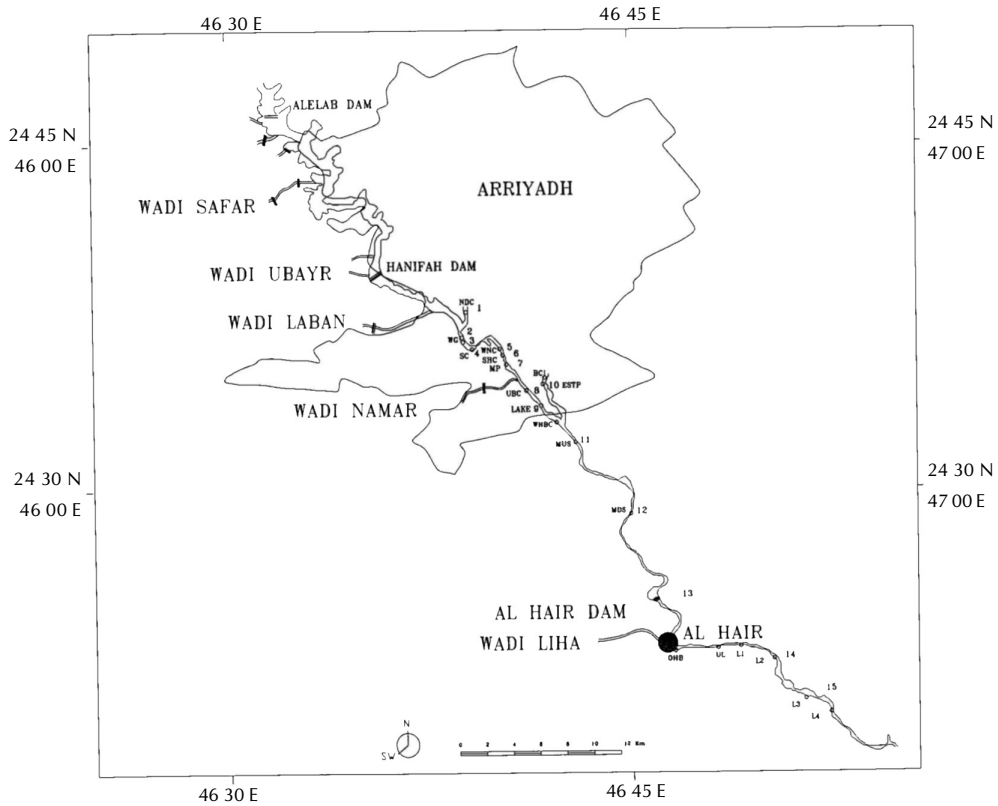


Figure 1: Map of Wadi Hanifah stream, showing the sampling area and station locations

with scoop and hand nets. Fish were transported live in plastic bag containing stream water to the Natural Resources and Environment Research Institute laboratory, King Abdulaziz City for Science and Technology.

Upon arrival, the fish were killed by pithing the brain with a sharp probe and were subjected to a bacteriological and parasitological examination. For bacterial isolation, samples were taken from the kidney, spleen and liver and were inoculated onto plates of brain heart infusion agar (BHIA; Oxoid, Basingstoke, England) and tryptene soya agar (TSA: Oxoid) with incubation at 30°C for 48-72hr. Fish were initially examined for the presence of any parasites or lesions visible to the naked eye. Next, wet mounts of scrapings of body surfaces, fins, gills and intestines from freshly killed fish were examined for presence of any parasites under a stereomicroscope using incident light and a compound light microscope. Specimens were then preserved in 10 % buffered formalin and 70% ethanol for storage prior to further identification.

RESULTS AND DISCUSSION

Water quality measurements of the Wadi Hanifah stream are given in Table 1. There was no significant difference in water quality parameters of samples from the two stations. The stream water is alkaline (pH: 7.3 - 7.5) and total alkalinity as CaCO₃ ranged from 136 to 140 mg/L. The water is well oxygenated (DO: 5.4 - 5.6) with low levels of ammonia, nitrite and BOD. Nitrite levels were comparable to that of a normal stream environment, but phosphate levels were high in areas of the

stream receiving sewage effluent. Stream water is very hard (total hardness 780 mg/L.) with large amounts of total dissolved sold, chloride, sodium, calcium, and magnesium (Table 1). The present results of Water quality of the Wadi Hanifah stream is in agreement with a previous study (Siddiqui and Al-Harbi, 1995b; Al-Ogaily *et al.*, 1999). On necropsy all of the fifteen moribund hybrid tilapia examined, were found to be heavily infected with a monogenean trematode (*Dactylogyrus* sp.) (Fig. 2). No bacterial strains have been isolated from the healthy

Table 1: Water temperature and water quality parameters (mg/L) recorded at two sites of Wadi Hanifah stream

Parameters	Station (14)	Station(15)
Water Temp. (°C)	18.4	19.2
Dissolved Oxygen	5.4	5.6
pH	7.3	7.2
Alkalinity as Ca CO ₃	140	136
Bicarbonates	171	166
Hardness	780	780
EC mmhos/cm	2.30	2.30
NO ₃ -N (ppm)	6.0	6.0
NO ₂ -N	0.20	0.07
NH ₃ -N	0.70	0.35
PO ₄	9.2	8.2
TDS	1472	1472
Chloride	266	266
Sodium	253	275
Potassium	15	15
Calcium	200	200
Magnesium	68	68
BOD	7.2	6.0
COD	48	32

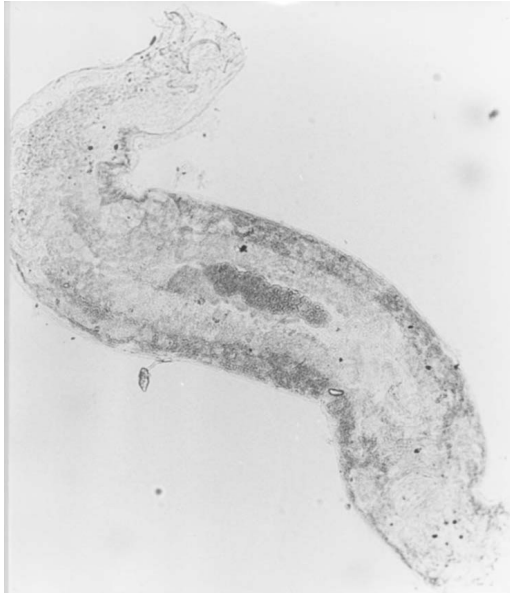


Figure 2: A monogenic trematode (*Dactylogyrus* sp.)

and moribund hybrid tilapia, neither from other fish species. The mortality of tilapia was observed only at the end of the stream (station 14 and 15) where a number of shallow lakes (depth: 0.5-2.0 m) have been formed. The moribund fish were dark in color, weak, and had taken shelter in the marginal areas, and moved very slowly when disturbed. No exotic parasites were observed in guppy (*Poecilia reticulata*) molly (*P. latipinna*) platy (*Xiphophorus maculatus*) and *Pteroplichthys* sp.

The infected fish harbored only one parasite species (*Dactylogyrus* sp.) in both gills. Similar infection of gill by same monogenea trematode (*Dactylogyrus* sp.) have been reported from hybrid tilapia (*Oreochromis niloticus* x *O. aureus*) in Cameroon (Nguenga, 1988). Monogenea are recognized as a serious threat to fish (Thoney and Hargis, 1991) because they have direct single – host life cycle and, given suitable conditions, can reproduce rapidly to reach epidemic proportions. Although metacercaria (*Centrocestus formosanus*) have been reported from tilapia (*Oreochromis niloticus*) from Wadi Hanifah stream (Kalantan *et al.*, 1999), this is the first report of a monogenean trematode (*Dactylogyrus* sp.) on the gills of wild hybrid tilapia in Saudi Arabia. Generally,

Dactylogyrus sp. is known to infest Cyprinidae (Beverley-Burton, 1984; Paperna, 1991; Gibson *et al.*, 1996), it is significant that this parasite has been detected in hybrid tilapia (*Oreochromis niloticus* x *O. aureus*). The finding may stimulate further studies in health care of tilapia in culture.

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REFERENCES

- Al-Ogaily, S. M., Al-Harbi, A. H. and Ali, M. 1999.** Impact of sewage wastes on the heavy metal content of water, soil, plants and fish in wadi Hanifah stream. *Arab. Gulf. J. Sci. Res.* **17**: 382 - 395.
- Beverley-Burton, M. 1984.** Monogenea and Turbellaria. In: Margolis L, Kabata Z, editors. Guide to the parasites of fishes of Canada. Part I. Spec. Pub. *Can. J. Fish. Aquat. Sci.* **74**: 5–209.
- Gibson, D. I., Timofeeva, T. A. and Gerasev, P. I. 1996.** A catalogue of the nominal species of the monogenean genus *Dactylogyrus* Diesing, 1850 and their host genera. *Syst. Parasitol.* **35**: 3-48.
- Nguenga, D. 1988.** A note on infestation of *Oreochromis niloticus* with *Trichodina* sp. and *Dactylogyrus* sp. **117-119**. In R.S.V. Pullin, T. Bhukaswan, K. Tonguthai and J.L. Maclean (Eds.) The Second International Symposium on Tilapia in Aquaculture. ICLARM Conf. Proc. 15, 623 p. Dept. of Fish., Bangkok, Thailand and ICLARM, Manila, Philippines.
- Kalantan, A. M. N., Al-Harbi, A. H. and Arfin, M. 1999.** On the metacercaria of *Centrocestus formosanus* (Trematoda: Heterophyidae) Nishigori, 1924 (Digenea: Heterophyidae) from *Oreochromis niloticus* in Saudi Arabia and its development in various definitive hosts. *J. Parasitol. Appl. Ani. Biol.* **8**: 83-94.
- Paperna, I. 1991.** Diseases caused by parasites in the Aquaculture of warm water fish. *Ani. Rev. fish. Dise.* 155-194.
- Scholz, T. 1999.** Parasites in cultured and feral fish. *Vet Parasitol.* **84**: 317–335
- Siddiqui, A. Q. and Al-Harbi, A. H. 1995a.** Evaluation of three Species of tilapia, red tilapia and a hybrid tilapia as culture species in Saudi Arabia. *Aquaculture.* **138**: 145 - 157.
- Siddiqui, A. Q. and Al-Harbi, A. H. 1995b.** A preliminary study of the ecology of wadi Hanifah stream with reference to animal communities. *Arab. Gulf. J. Sci. Res.* **13**: 695 - 717.
- Thoney, D. A. and Hargis, W. J. 1991.** Monogenea Plathyhelminthes as hazards for fish in confinement. *Ann Rev. Fish. Dis.* **1**: 133-153.

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