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First Record of Three Monogenic Parasites Species from Iraqian Freshwater Fishes

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Abstract. Three monogenean parasites species were extracted from 405 fish specimens, belonging to three species namely: *Aspius vorax,* (Shilleg), *Cyprinus carpio,* (Common carp) *and Liza abu,* (Kishni), that were collected from the Hilla river (at Babylon province). These monogeneans are: *Dactylogyrus ersinensis*, *Gyrodactylus menschikowi* and *Gyrodactylus derjavini.* Prevalence and mean intensity was studied. In this study all these parasites are redescribed and reported for the first time from Iraqian freshwater fishes.

Keywords: Monogenean parasites, Dactylogyrus *ersinensis, Gyrodactylus menschikowi, G. derjavini freshwater* fishes, Iraq, Hilla River.

Introduction

The monogenetic trematodes are hermaphroditic flat worms that complete their life cycle on a single host and they mostly commonly live as ectoparasites on the gills or general body surface of freshwater and marine fishes all over the world (Cable *et al*., 1998; Kearn, 1999).

A major identifying characteristic of monogenean parasite is their organ of attachment,(the haptor).This is found at the posterior end and may have 0,1,or 2 pairs of anchors, number of hooks, copulatory organ, gonads and eye spots. Monogeneans may cause severe damage in hatcheries of fish farms and may cause mortality in the wild (Obiakezie and Taege, 1991).

The viviparous monogenean fish parasite genus Gyrodactylus is one of the most specious genera among metazoan animals (Cribb *et al.,* 2000). The estimated global number of taxa might be more than 20.000 (Bakke *et al.,* 2002). Most species descriptions of parasitic worms are based on morphology, but they may also contain important information about ecology, including for example host, life-history or locality. The morphological discrimination of species within the species-rich and diverse genus Gyrodactylus is mainly based on the opisthaptoral hard parts, marginal hooks, ventral bars and anchors of the posterior attachment organ. In particular, the shape of the tiny marginal hook sickles is species specific and fully developed before the mother gives birth to the progeny (Malmberg, 1970). These characters exhibit a range of intraspecific genetic or phenetic variation (Harris, 1988). Recent developments in microscopical techniques and data processing will greatly improve resolution of morphological characters (McHugh *et al.,* 2000).

In Iraq, many surveys of the monogenean parasites of freshwater fishes were carried out by (Ali, 1985; Ali *et al*., 1988; Salih *et al*., 1988; Abdul-Ameer, 1989; Abdullah, 1990; Mhaisen *et al*., 1990, 1997; Al-Zubaidy, 1998; Al-Aubaidy, 1999). Those authors described more than 40 monogenean species in the middle of Iraq (from Tigris and Diyala rivers, a lake and four fish farms), north of Iraq (from Dokan lake) and south of Iraq (from Al-Hammar marsh and Shatt Al-Arab river).

The present work aimed to investigate the presence of monogenean parasites in three fish species from Hilla river middle of Iraq.

Materials and Methods

Monogenean parasites were collected from 405 specimens of three fish species (95 specimens of *Aspius vorax*, 116 specimens of *Cyprinus carpio* and194 specimens of *Liza abu*) from the Hilla river, middle of Iraq, during February 2002 to February 2003. The fishes measured 12-55 cm of total length, and weighted 110-1200g.

The parasites were collected from gills, skin and fins under light microscope and were placed in glycerol-gelatin, then placed under a cover slip and preserved as cover slip preparations. The monogenean species were identified microscopically. Drawings of parasites were made by using of camera Lucida. The measurements of sclerotized elements were taken according to Bykovskaya-Ravlovskaya *et al*. (1962), Ergens and Dulmaa (1969) and Gussev (1985). The terms prevalence (P)

and mean intensity (I) were used according to Bush *et al.*(1997). All parasitic measurements were in mm and were taken by using occular length with graduated scales (Table1).

Results and Discussion

The gills of 28 speciemen of the common carp were found to be infected with *D. ersinensis*. Also, the gills and skin of 37 specimens of the common carp and skin, gills and fins of 87 specimens of mugilid fish were infected with *G.menschikowi,* and the gills, skin and fins of 12 specimens of Aspius *vorax* were infected with G.derjavini. These three monogenean ectoparasites are recorded for the first time in Iraq.

Table 1. Shows the parasite species from three different fish species and site of infection. No. =number, exa. =examined, inf. = infection.

Parasite species	Fish species	No. Fish exa.	No.Fish inf.	Site of inf.
D. ersinensis	*C. carpio*	116	28	Gill
G.menschikowi	*C. carpio*	116	37	Gill & Skin
	L. abu	194	87	Gill, Skin &Fin
G.derjavini	*A. vorax*	95	12	Gill, Skin &Fin

Dactylogyrus ersinensis Spasskijet Rojtman, 1960

This parasite (Fig.1) was found on gills of 28 specimens of the common carp from Hilla river .The measurement of *D.ersinensis are* based on 18 specimens.

Description: Parasite body length was 0.237-0.370, width 0.046-0.083 (Fig.1a). Haptor length was 0.041-0.055, width 0.070-0.080, total anchor length 0.028-0.032, external processus 0.002-0.006 long, internal processus 0.005-0.008 long, shaft 0.024-0.026 long, point 0.009-0.010 long. Ventral bar length 0.015-0.021, width 0.008-0.012. Dorsal bar length 0.016-0.022, width 0.003-0.004 (Fig.1b). Marginal hook (Fig.1c) length 0.018- 0.022, handle length 0.005-0.008. Copulatory apparatus (Fig.1d) 0.022-0.026 long.

Type host: *Cyprinus carpio* L .1758.
Type locality: Hilla river
Site of infection: Gill
Prevalence: 24.1 %
*Mean intensity***:** 2.3

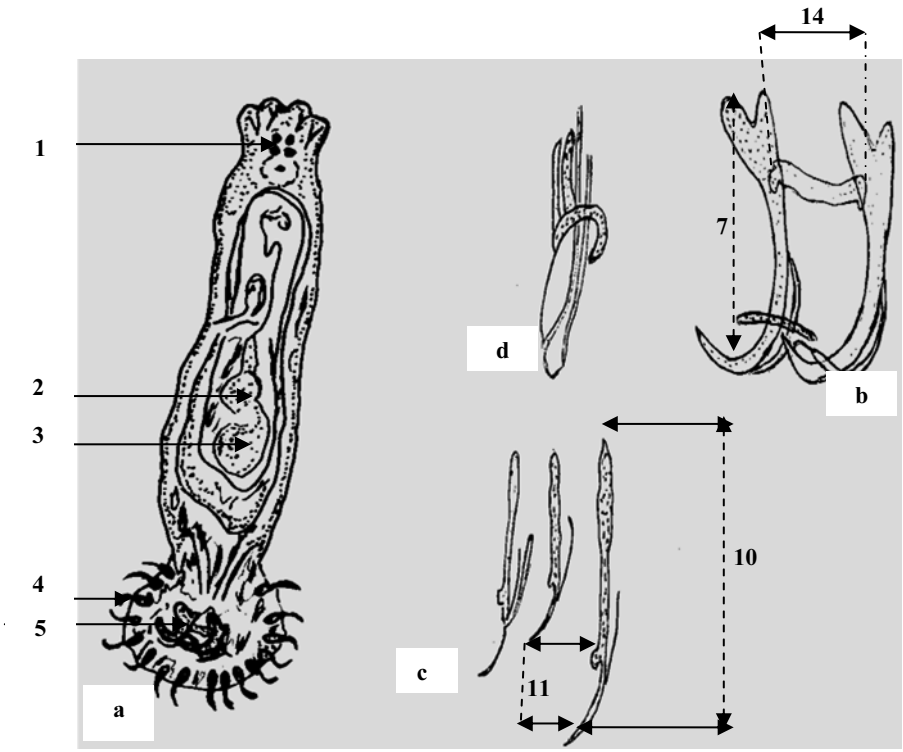

Fig. 1. ***D. ersinensis*** **whole (a) X 150, anchor with bar (b) X640, marginal hooks (c) X640 copulatory apparatus (d) X640.**

This study documents the occurrence of *D.ersinensis* in freshwater fishes from Hilla river, middle of Iraq.The characteristic discription of the specimens studied such as the attachment organ (haptor),anchor, eye spots, copulatory organ and gonads clearly place this species within the genus *Dactylogyrus*. Also, the measurements of D.ersinensis herein are in agreement with those of the holotype of this parasite, which were described for the first time from the gills, skin and fins of *Cyprinus carpio* in U.S.S.R. and from the *Phoxinus percnurus* in Poland (Ergens, 1981). The slight differences concerning the hard parts of the haptor can be attributed to changes in environmental temperatures (Prost, 1991). This is the first report for the presence of D.ersinensis from freshwater fishes of Iraq.

The family dactylogyridae includes a large number of parasitic species mainly in the gills of freshwater fishes. The genus Dactylogyrus is oviparous and very specious, more than 900 described species. In Iraq, more than 30species of the *Dactylogyrus* were collected and identified before, 7 species were recorded from *Cyprinus carpio*. These are:

D.charbinensis, recorded from Dokan lake, north of Iraq (Abdullah, 1990); *D.anchoratus,* from Tigris river and Al-Zaafaraniya fish farm (Mhaisen *et al*., 1997); *D.propinquus; D.ergensi; D.sahuensis* and *D.navicularis* from Al-Furat fish farm (Al-Zubaidy, 1998) and *D.baueri* from Al-Zaafaraniya fish farm (Al-Aubaidy, 1999).

Species of *Dactylogyrids* showed different rates of tolerance to water salinity (Paperna, 1964), and development to maturity is usually fast 4-5 days and their life span is short (5–40 days) (Shaharom-Harrison, 1986). Because the life span is short and the spatial distribution of the host makes chance contact unlikely, these parasites having evolved variety of mechanisms to increase chance of host location, these include: the production of eggs when fish are shoaling and so potential hosts are close together, hatching of the oncomiracidia during daytime when the fish are resting on the bottom and response to chemical and physical stimuli, the larvae are able to locate their hosts over short distances (Cable *et al*., 1998).

Gyrodactylus menschikowi Gvosdev, 1950

This parasite (Fig. 2) was found on the gills and skin of 37 specimens of the common carp and skin, fins and gills of 87 specimens of mugilid fish from Hilla river. The measurements are based on 25 specimens.

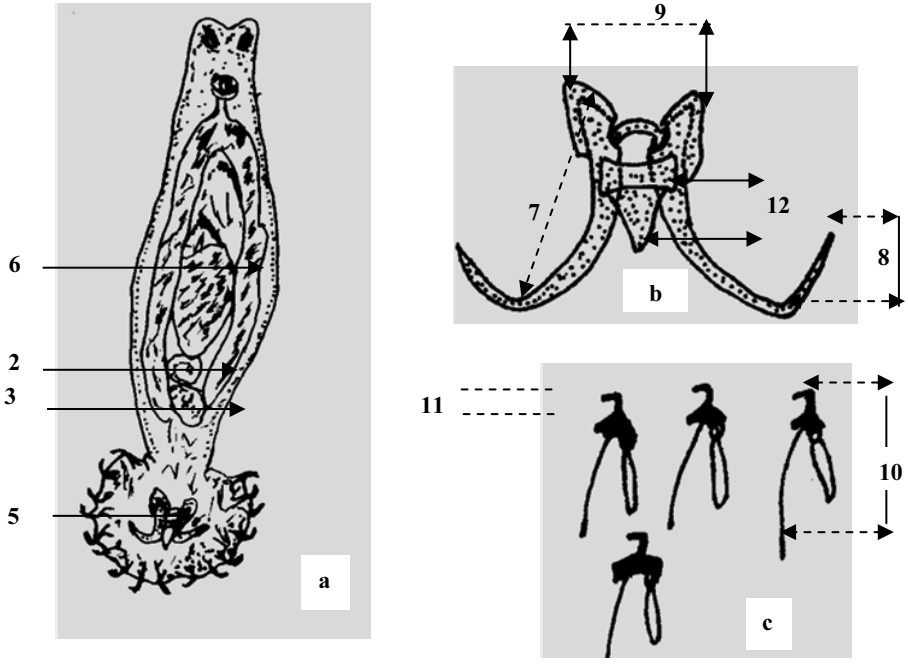

Fig. 2. ***G.menschikowi*** **whole (a) X150, anchor with bar (b) X640, marginal hooks (c) X640.**

Description: Parasite length was 0.225-0.695, width 0.030-0.097 (Fig.2a). Haptor length was 0.040-0.079, width 0.050-0.094. Total anchor (Fig.2b) length was 0.042-0.044. Marginal hook (Fig.2c) length 0.013-0.016, Dorsal bar length was 0.011-0.015, width0.001-0.002, ventral bar length0.014-0.017, width 0.010-0.017. Cirrus pouch length was 0.009-0.015, width 0.008 - 0.014.

Type host: *Cyprinus carpio* L. 1758 and *Liza abu* (Heckle, 1843)
Type locality: Hilla river.
Site of infection: Gills, skin and fins.
Prevalence: 32 % (Cyprinus *carpio)* and 44.8 % (Liza *abu).*
Mean intensity: 0.66 (*Cyprinus carpio*) and 1.4 (*Liza abu).*

Gyrodactylus derjavini Mikailov, 1975.

This species (Fig. 3) was found on the gills, skin, and fins of 12 specimens of *A. vorax*. The body measurements of this ectoparasite were taken from 6 specimens.

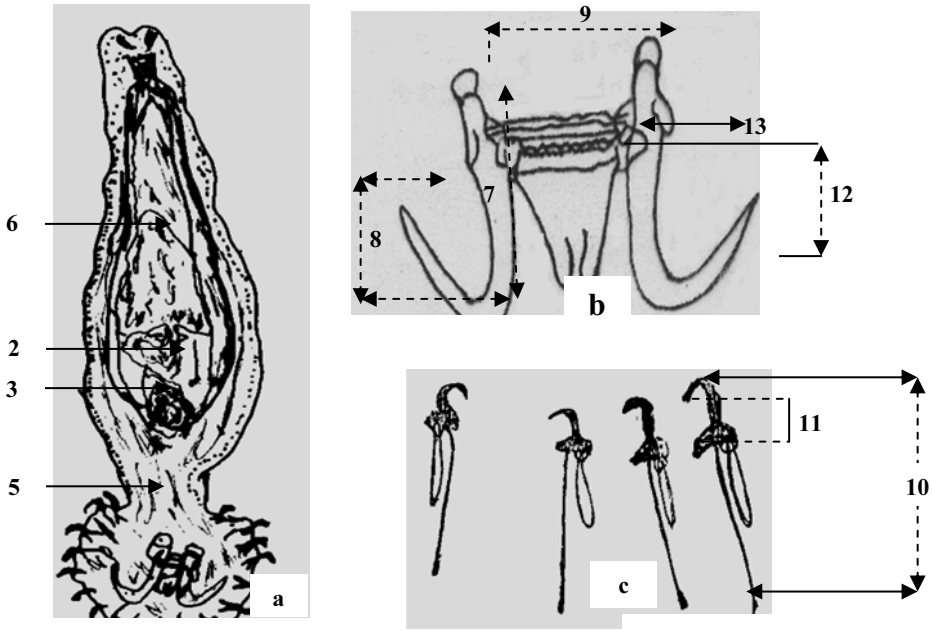

Fig. 3. ***G.derjavini*** **whole (a) X150, anchor with bar (b) X640, marginal hooks (c) X640.**

1- eye spots **2-** testes **3-** ovary **4-** smoll hooks **5-**Anchor **6-** Uterus

Characters analysed on the hard parts of haptor of monogeneans.

7- Anchor shaft length **8-** Anchor point length
9-Width of ventral bar **10-** Total length of marginal hooks
11- Length of marginal hook sickle **12-** Length ventral bar membrane
13- Length of ventral bar **14-** Width of dorsal bar

Description: Parasite length was 0.510-0.612, width 0.068-0.078 (Fig.3a). Total anchor (Fig.3b) length was 0.053-0.064, length of basal portion (shaft) 0.037-0.047 of point 0.025-0.033, ventral bar 0.022-0.029 long, basal width 0.007-0.010, length of ventral bar membrance 0.012-0.017. Dorsal bar 0.020-0.030 long, median width 0.002-0.003, lateral width 0.002-0.004. Over all length of marginal hooks (Fig.3c), 0.028-0.034.
Type host: *Aspius vorax* (Heckle, 1843).
Type locality: Hilla river.
Site of infection: Gills, skin and fins.
Prevalence: 12.6%.
Mean intensity: 0.13.

G. menschikowi and G. derjavini are common ectoparasites in Europe. It was noted in U.S.S.R, Sweden, Norway, Denmark, Italy, Poland and Scotland (Ergens,1983; Malmberg, 1987a,b).Variability of the length of the anchors and marginal hooks of the haptor of *G.derjavini* is dependent on fish species and the kind of the environment of the fish (Prost,1991).

A wide range in shape of haptors is observed between *Gyrodactylus* species and the differences in haptoral morphology may be one reason for the different site specificity (Cone and Cusack, 1988). The haptoral morphology of each *Gyrodactylus* species is probably an adaptation to the site at which it is attached to the host (Jensen and Johnsen, 1992). Mo (1993) mentioned that the marginal hooks, anchors and ventral bars showed considerable seasonal variation in size, but varied very little in shape. The size increased when the water temperature decreased and vice versa. The large number of species and intraspecific morphological variations cause problems in identifying single Gyrodactylus specimens, especially when collected on unexpected hosts, or from previously unstudied localities (Zietara and Lumme, 2003).

In Iraq, there are 11 species belong to the family Gyrodactylidae that were recorded, these include: *G.elegans* (Ali, 1985); *G.kherulensis* (Ali *et al*., 1988); *G.baicalensis* (Salih *et al.,* 1988); *G.markewitschi* (Abdul-Ameer, 1989); *G.ctenopharyn- godontis* (Mhaisen *et al*.1990); *G.vicinus; G.paralatus; G.sprostonae; G.medius; G.salaris* and *G.malmbergi* (Al-Zubaidy, 1998). All these species were recorded from rivers, lake and fish farms. *G. menschikowi* occurs on gills of fish host and very rare on the external body surface of the host. Pnkrylova *et al*. (2005) mentioned

that about 98% of specimens infected skin and fins, while 2% infected the gills of the host.

G. derjavini, in this study was only detected on the *Aspius vorax* which, may indicate that the host fish is more susceptible to this viviparous parasite. Many species within the monogenean genus GyrodactylusVonNordmann, 1832 are host specific (Bakke *et al.,* 2002), but the basis for this specificity is still insufficiently known (Buchmann and Lindenstrom, 2002).Chemical, mechanical, and behavioural mechanisms have been suggested to explain this host specificity (Whittington *et al.,* 2000). Although chemical host substances are considered to offer a good explanation both among Gyrodactylids (Jorndrup and Buchmann, 2005) and among other monogeneans (Hirazawa *et al.,* 2003). Buchmann *et al.,* (2004) mentioned that the fish species with highest contact with *G.derjavini* on the substrate (the carp) showed the lowest infection, which suggests that chemical substance, mucus, pH, water currents factors could influence such host choices by monogeneans. Monogeneans, in general, are known to possess sensory organs (Watson and Rohde, 1994) and have been suggested to involve lectin-carbohydrate recognition (Jorndrup and Buchmann, 2005), pH-related interactions (Hirazawa *et al.,* 2003) and other compounds (Whittington *et al.,* 2000) in their communication with their microhabitat in the fish. Host movements are probably necessary to secure parasite host contacts whereby these short range chemoattractants can play a role.

Harris *et al*., (2004) mentioned that the majority of *Gyrodactylus* species (59%) were recorded from single hosts, some have a much broader broad range. *Gyrodactylus spp*. have a wide host range and ubiquitous parasites on the host skin , fins and gills, and characterized by the absence of larvae, the adults being viviparous, parasites give birth to fully developed adults. Intra-uterine embryos already contain second and often third generation of embryos, and this leads to rapid increase in parasite numbers (Bakke *et al*., 2002). When fish come close together, the adult parasites can easily move from one fish to another, spreading the infection. In addition, the parasites can also survive for short periods in the absence of the host (Kearn, 1999).

In this study the prevalence by these monogeneans (Dactylogyrus and Gyrodactylus) were shown negatively correlated with host length/age, thus small fish appear as more susceptible to the infection rather than the larger one. This trend was previously observed in the case

of other monogeneans (Grutte *et al*., 2002; Mattiucci *et al*., 2005). In the present study, the fins of some infected fish (especially *Liza abu*) with *G. menschikowi* were erosions and red spots were also shown in the baseses of these fins. Kearn (1999) mentioned that the heavy infection with *Gyrodactylus spp*. can cause overall darkening in color, erosion of fins, obvious secretions of mucus which sometimes is described as blue-grey slime, emaciation especially in young fishes and loss of scales. Obiekezie and Taege (1991) reported severe mortalities (up to 90%) of *Clarias gariepinus* fry (two week old) in a hatchery in Nigeria, due to a severe infestation by *Gyrodactylus groschafti*.

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References

Abdul-Ameer, K.N. (1989) Study on parasites of freshwater fishes from Tigris River, Salah -Al-ddin Provence, Iraq, *Msc.Sci.*Unvi. Baghdad: 98 P.

Abdullah, Sh.M.A. (1990) Survey on parasites of Dokan lake fishes, *Msc.Sci.,* Unvi. Salah-Alddin: 115 P.

Al-Aubaidy, I.K. (1999) External parasites of the common carp (*Cyprinus carpio*) in Al-Zaafaraniya fish farm, Baghdad and treatment of yheir infection with the monogenetic trematodes, *Msc. Thesis,* Coll. Educ (Ibn.Al-Haitham), Unvi. Baghdad: 80 P.

Ali, N. M. (1985) Observation on lernaeosis and gyrodactylosis in carp fingerlings raised in ponds, *J. Biol. Sci. Res*., **16** (1): 125-132.

Ali, N.M., Mhaisen, F.T., Abul-Eis, E.S. and **Kadim, L.S.** (1988) First occurrence of the monogenetic trematode *Gyrodactylus kherulensis* Ergens, 1974 in Iraq on the gills of the common carp *(Cyprinus carpio), J. Biol. Sci. Res*., **19** (3): 659-664.

Al-Zubaidy, A.B. (1998) Studies on the parasitic fauna of carps in Al-Furat fish farm, Babylon provence, Iraq, *Ph.D.Thesis, Coll. Sci.* Unvi. Babylon: 141 P.

Bakke, T.A., Harris, P.D. and **Cable, J.** (2002) Host specificity dynamic: Observations on gyrodactylid monogeneans, *Int J. Parasitol*., **32** (3): 281-308.

Buchmann, K. and **Lindenstrom, T.** (2002) Interactions between monogenean parasite and their fish host, *Int. J. Parasitol*., **32**: 309-319.

Buchmann, K., Kenneth, K.M. and **Michael, B.D.** (2004) Homing of *G.salaris* and *G.derjavini* (monogenea) on different hosts and response post-attachment, *Folia. Parasitol*., **51**:263-267.

Bush, J.O., Lafferty, K.D., Lotz, J.M. and **Shostak, A.W.** (1997) Parasitology meets ecology on its own terms: Margolis *et al*. revisited, *J. Parasitol*. **83**: 575-583.

Bykovskaya-Ravlovskay, I.E., Gussev, A.V., Dubinina M.N., Lzyumova, N.A., Smirnova, T.S., Sokolovskaya, L.L., Shtein, G.A., Shulman, S.S. and **Epshtein, V.M.** (1962) Key to parasites of fresh water fish of the U.S.S.R., *Akademii Nauk SSSR, Moscow*: 727 P (in Russian).

Cable, J., Harris, P.D. and **Tinsley, R.C.** (1998) Life history specializations of monogenean flatworms: a review of experimental and microscopical studies, *Microsc. Res. Tech. 1*, **42** (3): 186-199.

Cone, D.K. and **Gusack, R.** (1988) A study of *Gyrodactylus colemanensis* Mizelle and kritsky, 1967 and *Gyrodactylus salmonis* (Yin. and Sproston, 1948) (Monogenea) parasitizing captive salmonids in Novascotia, *Can. J. Zool*., **66**: 409-415.

Cribb, T.H., Chisholm, L.A. and **Bray, R.A.** (2000) Diversity in the monogenea and digenea: does lifestyle matter, *Int. J. Parasitol*., **32**: 321-328.

Eregns, R. (1981) Nine species of the genus cichlidogyrus paperna, 1960 (Monogenea: Ancyrocephalinae) from Egyption fishes, *Folia Parasitologica*, **28**: 205 -214.

Eregens, R. (1983) Gyrodactylus from Eurasian freshwater salmonidae and Thymallidae, *Folia Parasitologica* (praha), **30**: 15-26.

Ergens, R. and **Dulmaa, A.** (1969) Monogenoidea from *Cyprinus carpio haematopterus* and *carassius auratus* gibelia (cyprinidae) from Mongolia, *Folia parasit* (praha), **16**: 201-206.

Grutter, A.S., Deveney, M.R., Whittington, I.D. and **Lester, R.J.G.** (2002) The effect of the cleaner fish *Labroides dimidiatus* on the capsalid monogenean *Benedenia lol* parasite of labrid fish *Hemigymnus melapterus*, *J. Fish Biol*., **61**: 1098-1108.

Gussev, A.V. (1985) *Guide to the Parasites of Freshwater Fish of the fauna of U.S.S.R*. 2, (Ed .O. N.Bauer) lzd. Nauka, Leningrad (in Russian).

Harris, P.D. (1988) Changes in the site specificity of *G.turnbulli* Harris, 1986 (Monogenea) during infection of individual guppies (*Poecilia reticulate* Peters, 1859), *Canadian J. Zool*., **66**: 2854-2857.

Harris, P.D., Shinn, A.P., Cable, J. and **Bakke, T.A.** (2004) Nominal species of the genus *Gyrodactylus* Von Nordman 1832 (monogenea: Gyrodactylidae) with a list of host species principal. *J. Syst. Parasitol*., **59** (1): 1-27.

Hirazawa, N., Oshima, S., Mitsuboshi, T. and **Yamashita, S.** (2003) Mucus PH of the tiger puffer *Takifugu rubripes* is an important factor for host identification by the monogenea *Heterobothrium okamotoi*, *Parasitol.,* **127**: 225-230.

Jensen, A.J. and **Johnsen, B.O.** (1992) Site specificity of *Gyrodactylus salaries*, Malmberg, 1957 (Monogenea) on Atlantic salmon (salmo salar L.) in the River lakselva, northern Norway, *Can J. Zool.,* **70** (2): 264-267.

Jorndrup, S. and **Buchmann, K.** (2005) Carbohydrate localization on *G.salaris* and *G.derjavini* and corresponding carbohydrate binding capacity of their hosts *Salmo salar* and *S. Trutta. J. Helminthol*., **79**: 1-6.

Kearn, G.C. (1999) The survival of monogenean (platyhelminth) parasites on fish skin, *Parasitol*., **119**: 57-88.

Malmberg, G. (1970) The excretory systems and the marginal hooks as a basis for systematic of the Gyrodactylus (Trematoda, Monogenea), *Arkiv for Zool*., **23**: 1-235.

Malmberg, G. (1987 a) lncreased in traspecific divergence in *Gyrodactylus salaries* resulting from genetic drift in fish farm populations, *Proceeding of the Xlll symposium of the Scandinavian society for parasitology 12-14 June, 1998*, Helsinki. Institute of parasitology, Abo Akademi, Finland, information, 19-33.

Malmberg, G. (1987 b) Gyrodactylus salaries, Malmberg, 1957 and *G. truttae* Glaser, 1974 - two problematic species.*2 nd International Symposium of Ichthyoparasitology Actual Problems in Fish Prasitology, September 27 October 3, 1987*, Tihany Hungary, 56.

Mattiucci, S., Farina, V., Garcia, A. and **Santos, M.N.** (2005) Metazoan parasitic infection of sword fish (Xiphias *gladius* L. 1758) from the mediterranean sea and Atlantic gibraltar waters: Imlications for stock assessment, *Col. Sci. Pap. Iccat*., **58** (4): 1470-1482.

McHugh, E.S., Shinn, A.P. and **Kay, T.W.** (2000) Discrimination of the notifiable pathogen *G.salaris* from *G.thymalli* (Monogenea) using statistical classifiers applied to morphometric data, *Parasitol.*

Mhaisen, F.T., Ali, N.M., Abul-Eis, E.S. and **Kadim, L.S.** (1990) Parasitological investegation on the grass carp (*Ctenopharyngo donidella*) of Babylon fish farm, Hilla,Iraq. *Iraqi J. Biol. Sci.***10**: 89-96.

Mhaisen, F.T., Balasem, A.N., Al-Khateeb, G.H. and **Asmar, K.R.** (1997) Recording of five monogenetic trematodes for the first time from fishes of Iraq, *14th Sci. Conf. Iraqi Biol. Soc., Kufa*: (11-13 March) (Abst.).

Mo, T.A. (1993) Seasonal variations of the opisthaptoral hard parts of *Gyrodactylus derjavini* Mikailov, 1975 (Monogenean:Gyrodactylidae) on the brown trout *Salmo trutta* L.parr and Atlantic salmon *S.salar*L.parr in the river Sandvikselva, Norway, *Syst. Parasitol.,* **26** (3): 225-231.

Obiakezie, A.I. and **Taege, M.** (1991) Mortality in hatchery reared fry of the African catfish *Clarias gariepinus* (Burchell) caused by *Gyrodactylus groschafti* Ergens, 1973. *Bull. Eur. Ass.Fish Pathol*., **11**: 82-85.

Paperna, I. (1964) Host reaction to infestation of carp with *Dactylogyrus vastator* Nybelin, 1924 (Monogenea), Bamidgeh, *Bull. Fish Cult. Israel*, **16:** 129-141.

Pnkrylova, I., Matejusova, I., Jarkovsky, J., Koubkova, B. and **Gelnar, M.** (2005) Seasonal occurrence of *Gyrodactylus species* (Platyhelminthes: Monogenea) on the Stone *loach* (Barbatula *barbatula*) in the Hana river, Czech Republic, *Guangzhou. Sun Yat-Sen Unvi: 36-*36 P.

Prost, M. (1991) Fish monogenea of Poland. Ix. two species of *Gytodactylus* from salmonidae. *Acta. Parasit. Polonica*, **36** (3): 109-114.

Salih, N.E., Ali, N.M. and **Abdul-Ameer, K.N.** (1988) Helminthic fauna of three species of carp raised in ponds in Iraq, *J. Biol. Sci. Res.,* **19** (2): 369-386.

Shaharom-Harrison, F. (1986) The Reproductive Biology of Dactylogyrus Nobilis (Monogenea: Dactylogyridae) from the Gills of Big Head Carp (Aristichthys nobilis), In: Maclean, J.L., Dizon, L. B. and Hosillos, L. V. (eds), *The First Asian Fisheries Forum,* Asian Fisheries Society, Manila, Philippines., 265-268.

Watson, N.A. and **Rohde, K.** (1994) Two new sensory receptors in Gyrodactylus species (Platyhelminthes, Monogenea, Monopisthocotylea), *Parasitol. Res.,* **80:** 442-445.

Whittington, I.D., Cribb, B.W., Hamwood, T. E. and **Halliday, J.A.** (2000) Host specificity of monogenean (Platyhelminth) parasite:arole for anterior adhesive areas, *Int. J. Parasitol.,* **30:** 305-320.

Zietara, M.S. and **Lumme, J.** (2003) The crossroads of molecular, typological and biological species concepts: Two new species of Gyrodactylus Nordmann, 1832 (Monogenea: Gyrodactylidae), *Syst. Parasitol.,* **55**: 39-52.

التسجيل الأول لثلاثة أنواع من الطفيليات أحادية المنشأ من أسماك المياه العذبة العراقية

علي بناوي الزبيدي

كلية علوم البحار والبيئة – قسم الأحياء البحرية والمصائد – جامعة الحديدة اليمن

المستخلص. سُجلت ثلاثة أنواع من الطفيليات أحادية المنشأ، من ٤٠٥ نموذج من الأسماك العائدة إلى ثلاثة أنواع، وهي: الكارب الاعتيادي والشلك والخشني المأخوذة من نهر الحلة في محافظة بابل. والطفيليات المسجلة هي: دكتلوجيريس إيرسينسس وجيرودكتيلس مينشكووي وجيرودكتلس ديرجافيني. وتمت دراسة نسب ظهور وكثافة الطفيليات في مضائفها. إن الطفيليات المسجلة في الدراسة الحالية تم إعادة وصفها وتسجيلها لأول مرة في أسماك المياه العذبة العراقية.