



The first record of *Gyrodactylus decorus* Malmberg, 1957 (Monogenea: Gyrodactylidae) on *Alburnus mossulensis* in Iraq

Younis S. Abdullah

Medical Laboratory Dept., Technical College of Health, Sulaimani Polytechnic University, Iraq,

Corresponding author E-mail: younis.abdullah@spu.edu.iq

Article info

Original: 18 June 2021
Revised: 20 July 2021
Accepted: 27 July 2021
Published online
20 December 2021

Key Words:

Gyrodactylidea,
Gyrodactylus decorus,
Alburnus mossulensis,
Aw-e Shiler, Sulaimani
Province

Abstract

The monogeneans *Gyrodactylus decorus* Malmberg, 1957 (Monogenea: Gyrodactylidae) is recorded and described in the current study for the first time in Iraq on the skin, fins, and gill filaments of five Leuciscidae fish *Alburnus mossulensis* Heckel, 1843. Out of 56 fish samples randomly collected from the Aw-e Shiler in Sharbazher Region, north of Sulaimani Province in Kurdistan Region-Iraq. Overall, 59 gyrodactylid species are to be recorded from Iraqi fishes. Description and detailed measurements of the parasite mentioned above and photomicrograph of them are studies.

Introduction

Gyrodactylus von Nordmann, 1832 is one of the genera of the family Gyrodactylidae [1]. They are monogenetic flatworms living on the body of many crustaceans, cephalopodan, amphibians, and many freshwaters and marine water teleost fishes [2; 3]. They are small, elongate viviparous (very rarely oviparous) helminths, the front part is bilobed, and each lobed piece has encompassed ahead organ. They have a well-developed haptor that bears anchors, dorsal bar, ventral bar, and 16 hooklets [3].

They have a direct life cycle and possess a high degree of host-specificity [4]. Few species of *Gyrodactylus* were likely to be significant pathogens, such as *G. salaris*, which has been responsible for the devastation in *Salmo salar* population in some rivers in Norway [5, 6].

In Iraq, the first gyrodactylid species (*G. elegans*) was recorded on the gills of two fish species (*Cyprinus carpio* and *Planiliza abu*) by Ali & Shaaban [7]. Later several studies were carried out and recorded many new species of *Gyrodactylus* in Iraq, and some of them were reported in the previous decade [8, 9,10,11,12, 13, 14; ,15,16].

The present investigation deals with *Gyrodactylus decorus* Malmberg, 1957 on the skin, fins, and gills of Leuciscidae fish *Alburnus mossulensis* Heckel, 1843, which was collected from Aw-e Shiler in Sharbazher Region, north of Sulaimani for the first time in Iraq.

Materials and Methods

A. Study Area

Aw-e Shiler is a river located in Sharbazher Region; it is a part of Sulaimani Province, which lies to the north of Sulaimani City between Azmir (one of the parallel NW-SE ridges of the Zagros system) and the Iran frontier. Many rivers pass through Sharbazher Region, such as Gogasur River, Aw-e Shiler River, Qalachwalan River, and Lesser Zab River.

B. Collection and Examination of Fish

A total of 56 Semnan (*Alburnus mossulensis*) fish belonging to the family Leuciscidae were collected from Aw-e Shiler near Wazha Village (N 35.750105⁰, E 45.496155⁰) (Fig. 1) in Sulaimani Province, north of Iraq by electro-shock machine. The fish specimens with some local river water were put in a container then immediately transported to the parasitological lab. The fishes were recognized according to their morphometric and meristic characters based on Coad [17]. The scientific names of fishes were distinguished according to Froese & Pauly [18].

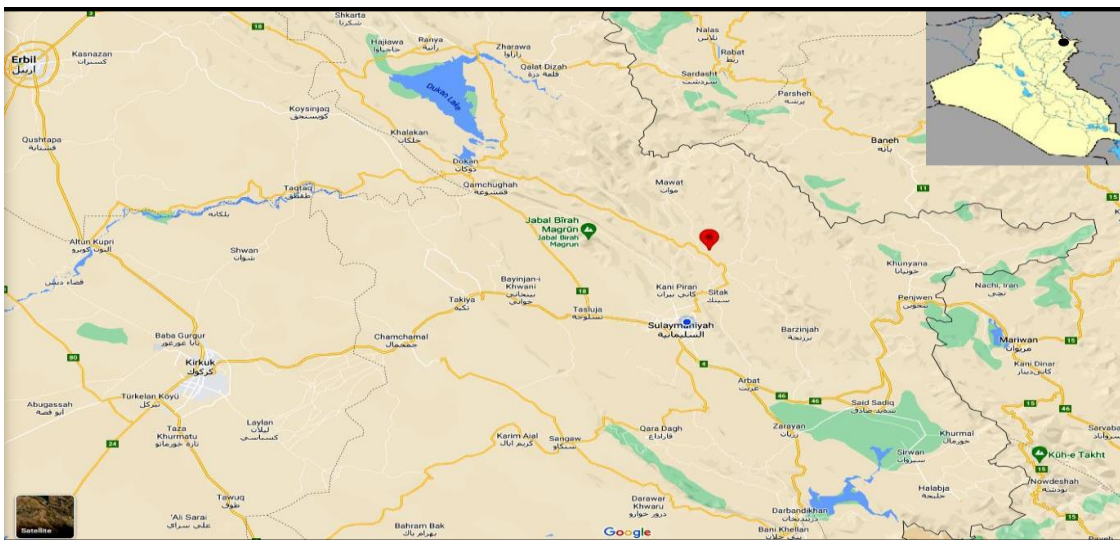


Fig. (1): Location of the study area (marked with red location icon) in Sulaimani Province, Kurdistan Region-Iraq.

C. Specimen preparation

The fish gills, skin, and fins were inspected under dissecting microscope. The gills were examined and put in a separate petri dish with a small amount of normal saline (0.9%). The gills are tied by two needles. The monogenean *Gyrodactylus* was removed from the petri dish by a plastic dropper after leaving the gills and placed on a clean slide with a few drops of normal saline. After that, a small amount of glycerin-gelatin was added then covered by a cover slide. The worm inside the glycerin-gelatin was continuously thickened [19]. On the other hand, the smear from the skin and fins is prepared for microscopical examination. The measurements of the specimens (worms) were done with the aid of an ocular and stage micrometer. The parasite was identified according to Pugachev *et al.* [3]. The photomicrographs were taken with a camera (Sony, 16.1 megapixels).

Results and discussion

In the current study, only gyrodactylid monogeneans were recovered from one freshwater leuciscid fish *Alburnus mossulensis*, from Aw-e Shiler River in Sulaimani Province, Kurdistan Region-Iraq. The study revealed that only five of examined *Alburnus mossulensis* were infected with *Gyrodactylus decorus*, which is found on the skin, fins, and gills of the infected fishes. The following is represented a brief account and estimations (in millimeter) based on the five recorded specimens (*G. decorus*).

A. Classification

Class: Monogenea Carus, 1863

Order: Gyrodactylidea Bychowsky, 1937

Family: Gyrodactylidae Cobbold, 1864

Gyrodactylus decorus Malmberg, 1957

Host: *Alburnus mossulensis*

Site of infection: Gill, skin, and fins

Locality: Aw-e Shiler River, Sulaimani Province, Kurdistan Region-Iraq

B. Description

The morphometric measurements of the worm are represented that the gyrodactylid monogeneans are elongated. The greatest width at the uterus level when pregnant; peduncle is short and becomes narrow toward the haptor. Cephalic lobes are well-developed and cephalic glands composed of bilateral groups of unicellular glands located anterolateral of the pharynx. The haptor is semicircular (Fig. 2A and B).

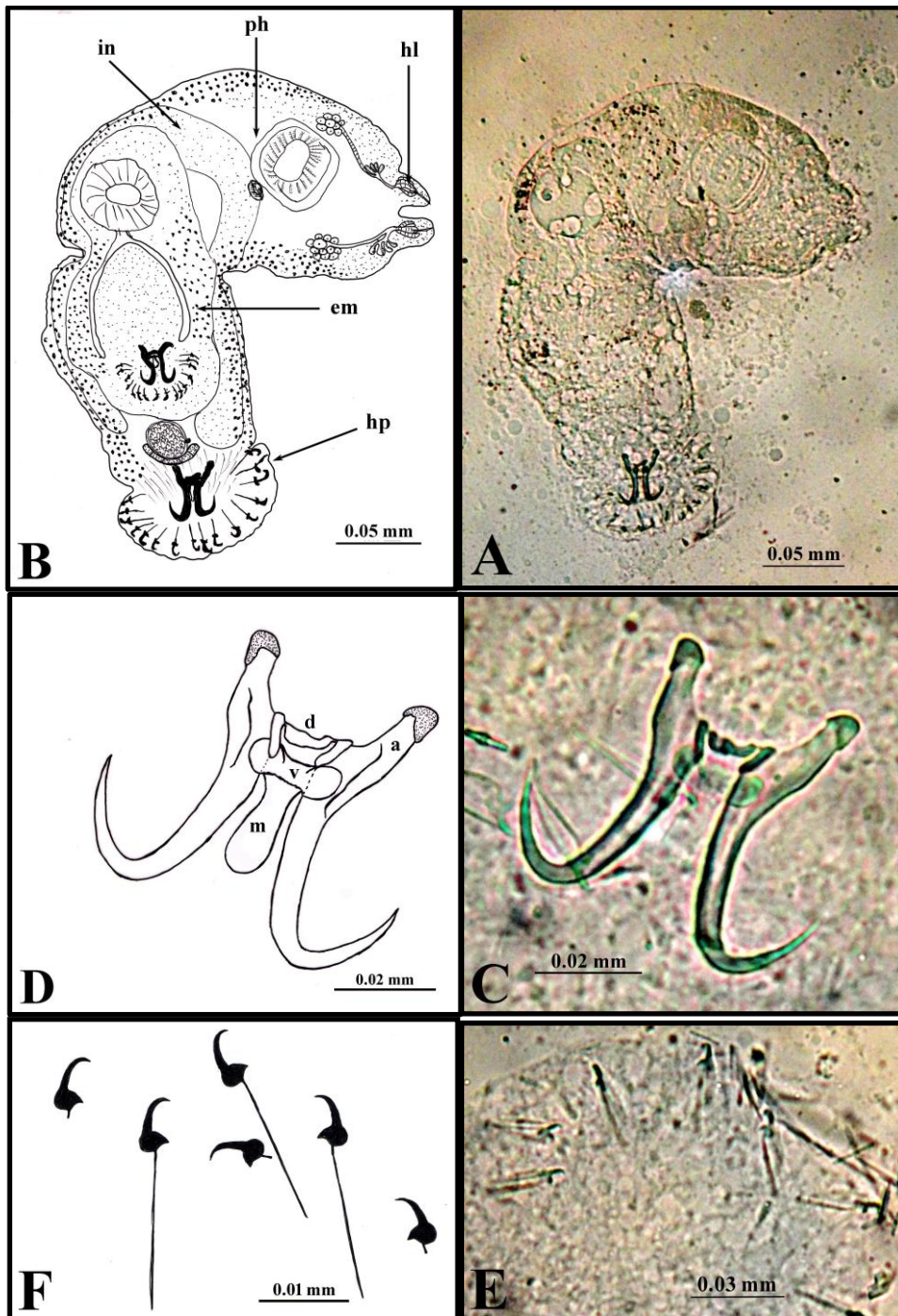


Fig. (2): A: Photomicrograph of *Gyrodactylus decorus* ventral view

B: Camera lucida of *Gyrodactylus decorus* ventral view

C: Photomicrograph of attachment apparatus

D: Camera lucida of attachment apparatus

E: Photomicrograph of marginal hooks (hooklets)

F: Camera lucida of marginal hooks (hooklets)

a= anchor; d= dorsal bar; em= embryo; hl= head lob; hp= haptor;

in= intestine; m= membrane; ph= pharynx; v= ventral bar

The anchor's total length is 0.055-0.072 mm, the length of the main parts is 0.037-0.053 mm, and the point part is 0.022-0.030 mm, inner root length is 0.020-0.030 mm. The ventral bar size is 0.006-0.009 x 0.013-0.020 mm. The membrane length is 0.019-0.023 mm. The dorsal bar size is 0.002-0.003 x 0.006-0.011 mm. The total length of the marginal hooks is 0.02-0.027 mm (Fig. 2C; D).

The description of the reported *Gyrodactylus* in the current study and their measurements is indistinguishable to those described by Pugachev *et al.* [3] for *G. decorus* found on gill, fins, skin, and nasal cavities of *Scardinius erythrophthalmus*, *Alburnus alburnus*, and *Rutilus rutilus*, and accidentally on *Gobio gobio*, *Leucaspis delineates*, *Leuciscus leuciscus* and *Squalius cephalus* from Czechia, Slovakia, Hungary, former Yugoslavia, and the European part of Russia.

The genus *Gyrodactylus* is the most diverse parasite among viviparous gyrodactylids, in the world, with more than 500 nominal species [20]. According to Mhaisen [21], the monogenean *G. decorus* Malmberg, 1957 is not recorded from fishes of Iraq before; hence, this is the first record in Iraq. Therefore, *Alburnus mossulensis* is considered here as the first fish host for *G. decorus* in Iraq. So far, 58 *Gyrodactylus* species (*G. angorae*, *G. baicalensis*, *G. barbi*, *G. brachymystacis*, *G. branchicus*, *G. bychowskianus*, *G. capoetai*, *G. cernuae*, *G. comephori*, *G. cotti*, *G. ctenopharngodontis*, *G. cyprinid*, *G. derjavini*, *G. dzhililovi*, *G. elegans*, *G. gobioninum*, *G. gussevi*, *G. hrabei*, *G. ibragimovi*, *G. jalalii*, *G. katharineri*, *G. kearnii*, *G. kherulensis*, *G. kobayashii*, *G. latus*, *G. lavareti*, *G. longihamus*, *G. longiradix*, *G. longoacuminatus*, *G. lotae*, *G. macracanthus*, *G. macronychus*, *G. magnus*, *G. malmbergi*, *G. markevitschi*, *G. masu*, *G. matovi*, *G. medius*, *G. menschikowi*, *G. mikailovi*, *G. molnari*, *G. monstruosus*, *G. mugili*, *G. ophiocephali*, *G. pewzowi*, *G. prostate*, *G. rarus*, *G. salaris*, *G. seravschani*, *G. shulmani*, *G. slovacicus*, *G. sprostonae*, *G. taimeni*, *G. tincae*, *G. umbrae*, *G. varicorhini*, *G. vicinus*, *G. vimbi*) excluding *G. decorus* are known from fishes of Iraq.

In Kurdistan Region-Iraq, there were 16 species of *Gyrodactylus* (*G. angorae*, *G. baicalensis*, *G. barbi*, *G. cyprinid*, *G. elegans*, *G. gobioninum*, *G. gussevi*, *G. katharineri*, *G. kherulensis*, *G. longoacuminatus*, *G. macracanthus*, *G. medius*, *G. molnari*, *G. shulmani*, *G. sprostonae* and *G. vicinus*) reported from different fish species [22, 23].

Acknowledgments

I am satisfied to thank Prof. Dr. Furhan T. Mhaisen for his suggestions and authorization to utilize his index-catalog of parasites and infection specialists of angles of Iraq to supply the data about the records of diverse species *Gyrodactylus* on different fish species of Iraq.

References

- [1] Bakke, T.A.; Cable, J. & Harris, P.D. (2007). The biology of gyrodactylid monogeneans: The "Russian-doll killers". *Adv. Parasitol.*, 64: 161-376.
- [2] Woo, P.T.K. 2006. *Fish diseases and disorders, volume 1: Protozoan and metazoan infections*. Second Ed. CAB Int., Wallingford: 791pp.
- [3] Pugachev, O. N., Gerasev, P. I., Gussev, A. V., Ergens, R. and Khotenowsky, I. (2010). *Guide to monogenoidea of freshwater fish of Palaearctic and Amur regions*, Ledizioni Led publishing, Milano.
- [4] Buchmann, K. 2012. *Gyrodactylus salaris* and *Gyrodactylus derjavinoides*. In: Woo, P. T. K. and Buchmann, K. (Eds.). *Fish parasites: Pathobiology and protection*. CAB Int., Wallingford: Chapter 11 (193-208).
- [6] Brooker, A., Grano-Maldonado, M. I., Irving, S., Bron, J. E., Longshaw, M., and Shinn, A. P. (2011). The effect of octopaminergic compounds on the behavior and transmission of *Gyrodactylus*. *Parasite Vector*, 4(1): 207-216.
- [5] Bakke, T.A. and Harris, P.D. (1998). Diseases and parasites in wild Atlantic salmon (*Salmo salar*) populations. *Canadian J. Fish. Aquat. Sci.*, 55 (Suppl. 1): 247-266.

- [7] Ali, M. D. and Shaaban, F. (1984). Some species of parasites of freshwater fish are raised in the pond and Tigris-Al-Tharthar canal region. Seventh Scientific Conference Iraqi Veterinary Medicine Association, Mosul: 23-25, Oct. 1984: 44-46.
- [8] Mama K. S. and Abdullah S. M. A. (2013). Parasitic infections of the common carp *Cyprinus carpio* from Lesser Zab River in Kurdistan Region, Iraq. 1st Annual International Interdisciplinary Conference, AIIC 2013, 24-26 April, Azores, Portugal, 895-900.
- [9] Abdullah Y. S. and Abdullah S. M. A. (2013). Monogenean Infections on Fishes from Darbandikhan Lake in Kurdistan Region, Iraq. Basrah J. Agric. Sci., 26 (Special Issue 1): 117-131.
- [10] Abdullah S. M. A. and Nasraddin M. O. (2015). Monogenean Infections on Some Fishes from Lesser Zab River, Kurdistan Region, Iraq. Amer. J. Biol. Life Sci., 3(5): 161-167.
- [11] Al-Saadi A. A. J. J. and Rasheed R. A. (2016). The occurrence of three monogenean parasite species for the first time in Iraq on gills of the common carp *Cyprinus carpio* Linnaeus, 1758 (Cypriniformes, Cyprinidae). Bull. Iraq Nat. Hist. Mus., 14(2): 99-108.
- [12] Abdul-Ameer K. N. and Atwan F. K. (2017). First record of four species of the genus *Gyrodactylus* Nordmann, 1832 (Monogenea: Gyrodactylidae) from some Iraqi freshwater fishes. Journal of Kerbala for Agricultural Sciences (Proceedings of the Third Scientific Conference of the Faculty of Veterinary Medicine / the University of Kerbala on 10th April 2017), 4(5): 289-297.
- [13] Rasheed R. A. and Al-Saadi A. A. J. J. (2018). The first record of four species of *Gyrodactylus* (Monogenea) from gills of four freshwater fish species in Iraq. Biol. Appl. Environ. Res., 2(1): 1-11.
- [14] Sheyaa F. A.-R. and Abdul-Ameer K. N. (2019). Record of *Gyrodactylus bychowskianus* Bogolepova, 1950 (Monogenea, Gyrodactylidae) for the first time in Iraq from gills of the cyprinid fish *Arabibarbus grypus*. Bull. Iraq Nat. Hist. Mus., 15(3): 287-291.
- [15] Hameed R. S. and Abdul-Ameer K. N. (2020). *Gyrodactylus capoetai* Ergens and Ibragimov, 1976 (Monogenea: Gyrodactylidae) from gills of cyprinid fish, *Arabibarbus grypus*: new recording in Iraq. Biochem.Cell.Arch., 20(2): 4363-4365.
- [16] Abdul-Ameer K. N. and Sheyaa F. A.-R. (2020). First record of *Gyrodactylus longiradix* Malmberg, 1957 (Monogenea: Gyrodactylidae) from three Iraqi freshwater fish species. Biological and Applied Environmental Research, 4(1): 48-52.
- [17] Coad, B. W. (2010). Freshwater fishes of Iraq. Pensoft Publisher, Sofia-Moscow, 275pp.
- [18] Froese, R. and Pauly D. (2021). FishBase. World web electronic publication. www.fishbase.org, version (15/5/2021).
- [19] Kritsky, D. C., Panndey, K. C., Agrawal, N. and Abdullah, S. M. A. (2004). Monogenoids from the gills of spiny eels (Teleostei: Mastacembelidae) in India and Iraq, the proposal of *Mastacembelocleidus* gen. n., and status of the Indian species of *Actinocleidus*, *Urocleidus* and *Haplocleidus* (Monogenoidea: Dactylogyridae). Folia Parasitol. 51(3): 291-298.
- [20] Kritsky, D. C., Boeger, W. A., Mendonza-Franco, E. F. and Vianna, R. T. (2013). Neotropical Monogenoidea. 57. Revision and phylogenetic position of *Scleroductus Jara & Cone*, 1989 (Gyrodactylidae), with descriptions of new species from the *Guatemalan chulin Rhamdia guatemalensis* (Günther) (Siluriformes: Heptapteridae) in Mexico and the barred sorubim *Pseudoplatystoma fasciatum* (Linnaeus) (Siluriformes: Pimelodidae) in Brazil. Syst. Parasitol., 84(1): 1-15.
- [21] Mhaisen, F. T. (2021). Index-catalogue of parasites and disease agents of fishes of Iraq. (Unpublished: mhaisenft@yahoo.co.uk).
- [22] Abdullah, S. M. A. and Mhaisen, F. T. (2017). Parasites of fishes of Kurdistan Region, Iraq: checklists. Biol. Appl. Environ. Res., 1(2): 131-218.
- [23] Abdullah Y. S. (2021). *Gyrodactylus angorae* (Monogenea: Gyrodactylidae): First Occurrence on the Body of Two Nemachilid Fishes from Iraq., JZPAS ., JZPAS , 33(5):51-56.