First Occurrence of Three Species of the Genus Dactylogyrus Diesing, 1850 (Monogenea: Dactylogyridae) in Iraq from Some Diyala River Fishes, Diyala Province

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Abstract

Three monogeneans: Dactylogyrus folkmanovae from gills of Chondrostoma regium, D. reinii from gills of Mesopotamichthys sharpeyi and D. robustus from gills of Leuciscus vorax were collected from Diyala River in Diyala Province. The description, measurements and illustrations of these parasites were given.

Keywords: Monogenea, *Dactylogyrus folkmanovae*, *Dactylogyrus reinii*, *Dactylogyrus robustus*, Diyala River, Iraq

Introduction

The fishes as a group from biodiversity view point, has the highest species variety among all vertebrate taxa. Froese and Pauly [1] have documented 32,500 fish species in the world. Fishes are of great implication in the life of mankind as a source of food, profits and employment. They are known for nutritionally wealthy source of protein, minerals and fewer saturated fats. Parasites and diseases however are known to affect the delectableness and availability of fish provisions [2], ultimately affecting the national wealth [3].

Among the fish parasites, monogeneans are the most numerous ectoparasites of fish, constituting the main class of phylum Platyhelminthes. Monogeneans mainly contaminate the gills of fishes [4], typically infecting the gills and/ or external surfaces of freshwater and marine fishes [5] and feeds on mucus, epithelial cells, tissues and blood causing different signs and symptom [6].

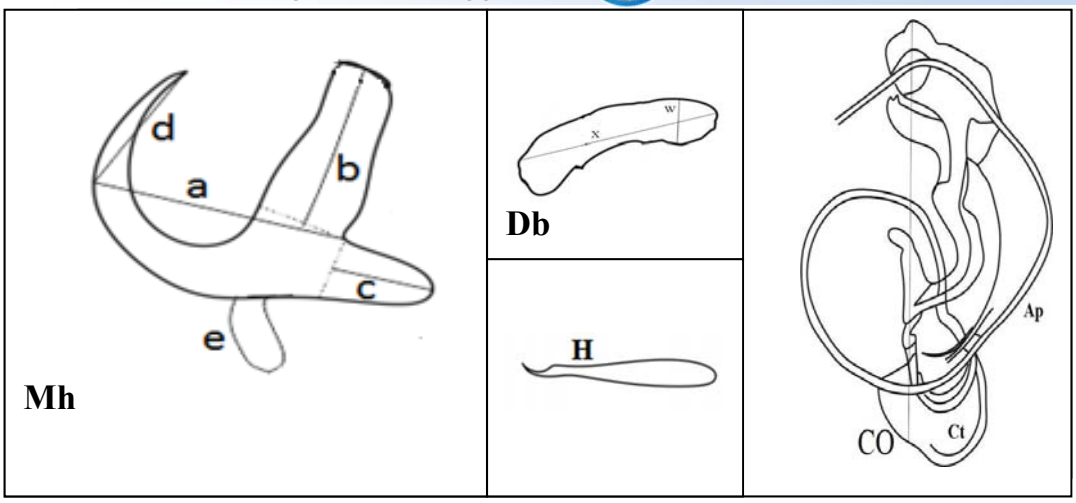
The most significant monogenean parasites in fishes are the dactylogyrids and gyrodactylids [7], mainly infecting cyprinid fishes [8]. *Dactylogyrus* parasites are the cause of serious infections in gill filaments which affect respiration, their pathogenicity consequences in high mortalities [9, 10] and cause important economic losses in aquaculture [11, 12].

In Iraq, the first record of *Dactylogyrus* species from Diyala river was *D. cornu* on five freshwater fish species [13]. So, more surveys on fish parasites are needed to recognize more species in this river. The present investigation deals with the record of three monogenean species belonging to the genus *Dactylogyrus* for the first time in Iraq infecting gills of some freshwater fishes from Diyala river.

Materials and Methods

A total of 84 fishes belonging to four species were collected from Diyala river, at Khan Bani Saad (situated between 33°-35° N and 36°-44° E). Sampling was done weekly twice during the period from July 2016 to February 2017. The fishes were placed in a cool box containing local river water, transferred right away to the laboratory and were examined within 24 hours after their capture. The fishes were identified according to Coad [14]. In the laboratory, the gill arches were isolated from both sides, kept moist in Petri dishes and examined under dissecting microscope for the presence of dactylogyrids on each gill lamella. Parasites were isolated and then stained with aqueous neutral red and permanent slides were prepared with glycerol-gelatin [15].

Drawings of the sclerotized pieces of the haptor were made by using a camera Lucida. The measurements of parasites were achieved by ocular micrometer. The morphological terminology and the parasites identification were done on basis of Pugachev *et al.* [16], as shown in figure (1). The information on the previous account records of parasites were checked by using the index-catalog of parasites and disease agents of fishes of Iraq [17]. The mean values of all measurements (in mm) employed in this study are used in the description as in the following order: minimum-maximum (mean) values.



Figer (1): The morphological terminology and measurements used in the description of *Dactylogyrus* species according to Pugachev *et al.* (16).

Mh- Median hook: a- Main part length, b- Inner root length, c- Outer root length, d- Point length, e- Wing. **Db- dorsal bar:** w- Length, x- Width. **H- Marginal hook**. **CO-Copulatory organ**: Ct- Copulatory tube, Ap- Accessory piece length.

Results and Discussion

The present investigation showed the existence of three species of monogeneans belonging to the genus *Dactylogyrus*. The following is an account of their measurements (in mm) which were based on five specimens of each species.

***Dactylogyrus folkmanovae* Ergens, 1956 (Figure (2)):**

Three out of 29 *Chondrostoma regium* were infected with this parasite with a prevalence of 10.4% and a mean intensity of 3. This parasite was not reported before from any fish species in Iraq [17], therefore, the present parasite is considered as the first record in Iraq.

Body length was 0.5-0.7 (0.6) and width was 0.09-0.13 (0.11). Total length of marginal hooks was 0.023-0.027 (0.025). Overall length of median hook was 0.031-0.033 (0.032), main part was 0.032-0.034 (0.033), inner root was 0.012-0.014 (0.013), outer root was 0.004-0.006 (0.005), point 0.006-0.008 (0.007). Size of dorsal bar was 0.003-0.005 (0.004) x 0.020-0.022 (0.021), size of ventral bar was 0.006-0.008 (0.007) x 0.019-0.021 (0.020). Total length of copulatory organ was 0.029-0.035 (0.032).

The description and measurements of the present specimens are similar to those reported by Pugachev *et al.* [16].

***Dactylogyrus reinii* El-Gharbi, Birgi & Lambert, 1994 (Figure (3)).**

This species was reported on gills of *Mesopotamichthys sharpeyi* of the present study with prevalence of 8.3% and the mean intensity of 8. This parasite was not reported before from any fish species in Iraq [17], therefore, the present parasite is considered as the first record in Iraq.

Small worms, body length was 0.42-0.40 (0.41) and width was 0.074-0.76 (0.075). Total length of marginal hooks was 0.024-0.028 (0.026). Overall length of median hook was 0.047-0.051 (0.049), main part was 0.031-0.033 (0.032), inner root was 0.020-0.022 (0.021), outer root was 0.005-0.007 (0.006), point was 0.013-0.017 (0.015). Size of dorsal bar was 0.007-0.009 (0.008) x 0.027-0.031 (0.029). Size of ventral bar was 0.003-0.005 (0.004) x 0.021-0.025 (0.023). Total length of copulatory organ was 0.033-0.035 (0.034).

The description and measurements of the present specimen are similar to those reported by Pugachev *et al.* [16].

***Dactylogyrus robustus* Malewitzkaja, 1941 (Figure (4)).**

The specimens of *D. robustus* were collected from gills of *Leuciscus vorax* with a prevalence of 6.3% and a mean intensity of 3. This parasite was not reported before from any fish species in Iraq [17], therefore, the present parasite is considered as the first record in Iraq.

Body length was 1.2-1.4 (1.3) and width was 0.2-0.4 (0.3). Total length of marginal hooks was 0.037-0.039 (0.038). Overall length of median hook was 0.048-0.050 (0.049), main part was 0.040-0.042 (0.041), inner root was 0.023-0.025 (0.024), outer root was 0.018-0.020 (0.019), point was 0.033-0.035 (0.034). Size of bar was 0.018-0.020 (0.019) x 0.083-0.085 (0.084). Total length of copulatory organ was 0.087-0.091 (0.089).

The description and measurements of the present specimen are similar to those reported by Pugachev *et al.* [16].

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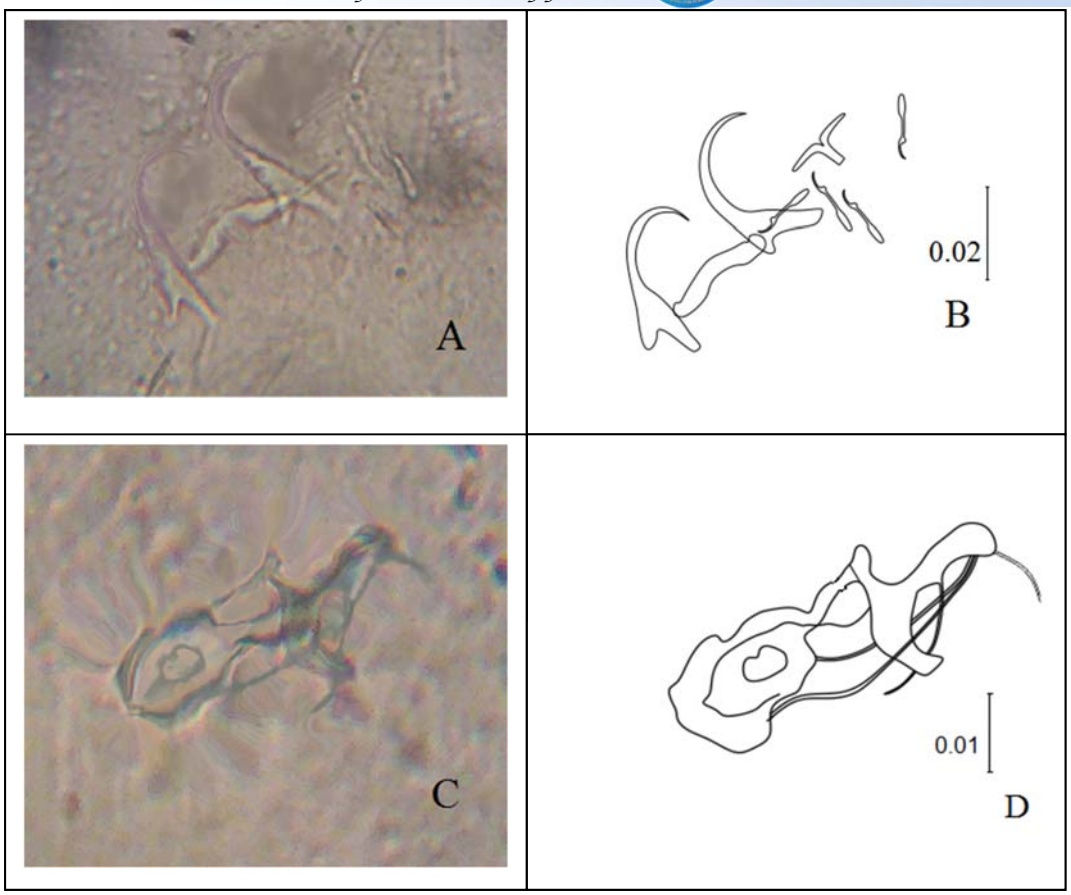

Figure (2): ***Dactylogyrus folkmanovae,*** A- Photomicrograph of the haptor (400x), B- Camera Lucida drawing of the haptor, C- Photomicrograph of the copulatory organ (400x) and D- Camera Lucida drawing of the copulatory organ

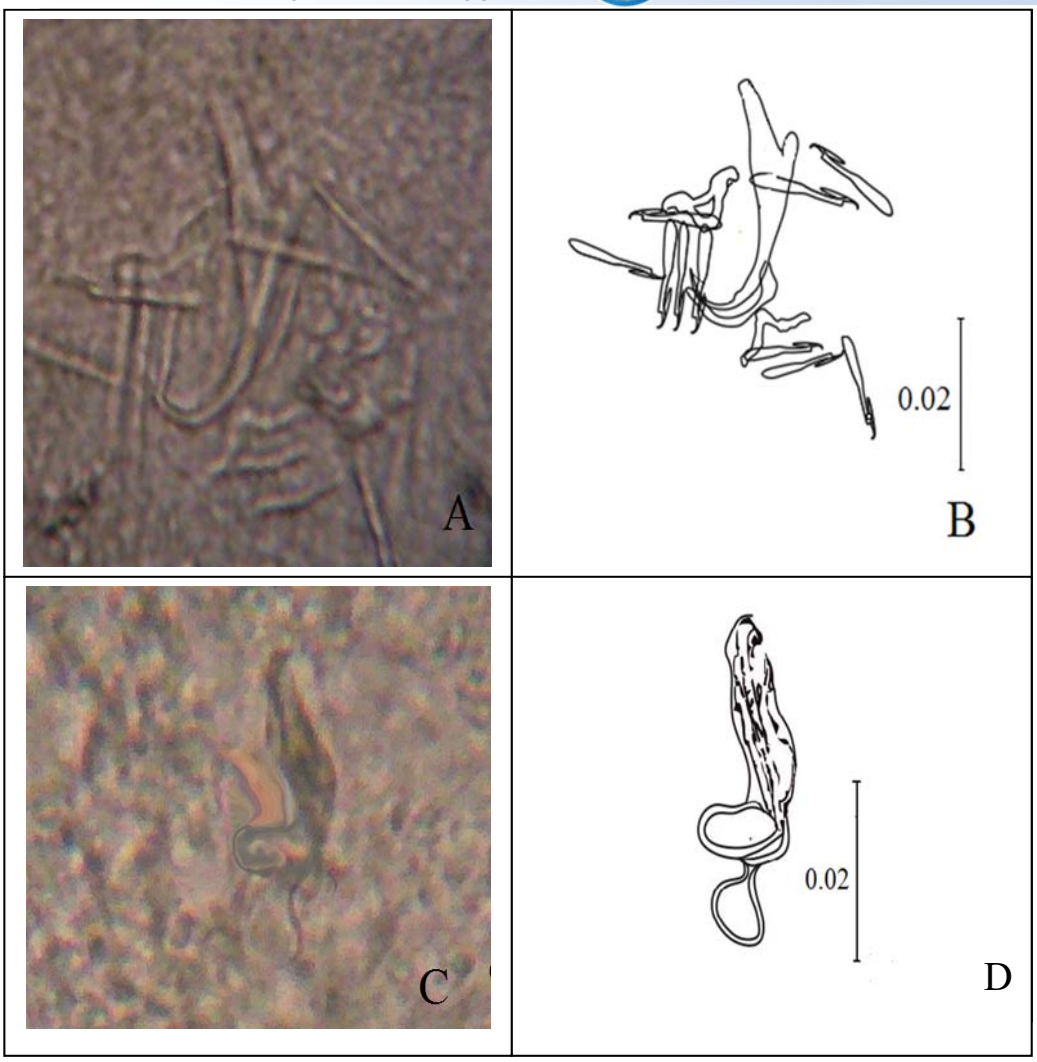

Figure (3): ***Dactylogyrus reinii,*** A- Photomicrograph of the haptor (400x), B- Camera Lucida drawing of the haptor, C- Photomicrograph of the copulatory organ (400x) and D- Camera Lucida drawing of the copulatory organ

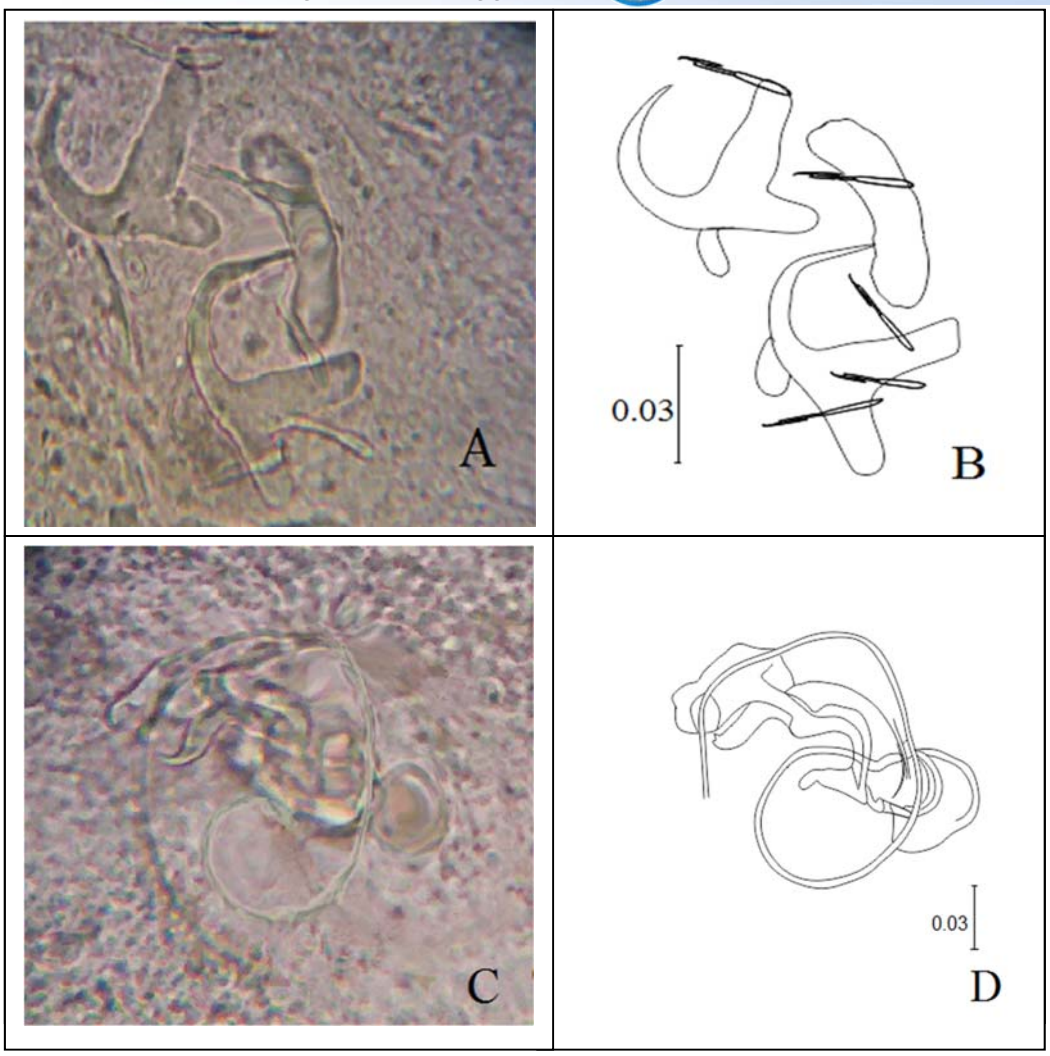

Figure (4): ***Dactylogyrus robustus,*** A- Photomicrograph of the haptor (400x), B- Camera Lucida drawing of the haptor, C- Photomicrograph of the copulatory organ (400x) and D- Camera Lucida drawing of the copulatory organ

References

[1] R. Froese, and D. Pauly, Fish Base.org. http://www.fishbase.org, 2017.

[2] K.A. Hadfield,The biodiversity, systematic and ecology of fish parasitic gnathid isopods from the east coast of South Africa. M. Sc. Thesis, Fac. Sci., Univ. Johannesburg, 228,2007.

[3] H.R. Chiary;U. Kapinder;U.C. Goswami, and H.S. Singh,Abundance of diseases in food fishes of north east region of India with reference to economic loss. IOSR J. Agric. Vet. Sci., 7(1): 23-33, 2014.

[4] B.E.Bychowsky, Monogenetic trematodes, their systematic and phylogeny. Akad. Nauk S.S.S.R., Moscow, 509, 1957, (In Russian).

[5] D.I. Gibson; T.A.Timofeeva, and P.I. Gerasev,A catalogue of the nominal species of the monogenean genus *Dactylogyrus* Diesing, 1850 and their host genera. Syst. Parasitol., 35: 3-48, 1996.

[6] Van C. Jnr. Duijn, Diseases of fishes, 3rd edn., Iliffe Books, London: 372, 1973.
[7] E. Amlacher. Textbook of fish diseases. (Engl. transl.) T.F.H. Publ., Jersey City: 302, 1970.
[8] A. Šimková; O .Verneau; M. Gelnar, and S. Morand, Specificity and specialization of congeneric monogeneans parasitizing cyprinid fish. Evolution, 60: 1023-1037,2006.
[9] B. Jiang; C. Chi; Y.W. Fu; Q.Z, Zhang, and G.X. Wang, In vivo anthelmintic effect of flavonol rhamnosides from *Dryopteris crassirhizoma* against *Dactylogyrus intermedius* in goldfish (*Carassius auratus*). Parasitol. Res., 112: 4097-4104,2013.
[10] X. Tu; F. Ling; A. Huang, and G. Wang, The first report of *Dactylogyrus formosus* Kulwiec, 1927 (Monogenea: Dactylogyridae) from goldfish (*Carassius auratus*) in central China. Parasitol. Res., 114: 2689-2696, 2015.
[11] P.A. Reed; R. Francis-Floydand, and R.C. Klinger, FA28/FA033: Monogenean parasites of fish. EDIS- Electronic Data Information Source-UF/IFAS Extension, Univ. Florida, 2009.
[12] P.T.K. Woo; D.W. Bruno, and L.H.S. Lim, Diseases and disorders of finfish in cage culture. CAB Int., Wallingford: 354, 2002
[13] N.M. Ali; A.R. Al-Jafery, and K.N. Abdul-Ameer, New records of three monogenetic trematodes on some freshwater fishes from Diyala river, Iraq. J. Biol. Sci. Res., 17(2): 253-266, 1986.
[14] B.W. Coad, Freshwater fishes of Iraq. Pensoft Publisher, Sofia: 274 pp. + 16 pls,2010.
[15] A.V. Gussev; N.M. Ali; K.N. Abdul-Ameer; S.M .Amin, and K. Molnár, New and known species of *Dactylogyrus* Diesing, 1850 (Monogenea, Dactylogyridae) from cyprinid fishes of the river Tigris, Iraq. Syst. Parasitol., 25: 229-237, 1993.
[16] O.N. Pugachev; P.I. Gerasev; A.V. Gussev; R. Ergens, and I. Khotenowsky, (eds.) Guide to Monogenoidea of freshwater fish of Palaeartic and Amur regions. Ledizioni Ledi Publ, Milano: 567, 2009
[17] F.T. Mhaisen, Index- catalogue of parasites and disease agents of fishes of Iraq. (Unpublished: mhaisenft@yahoo.co.uk) 2017.