

ISPEC 8TH INTERNATIONAL CONFERENCE ON
AGRICULTURE, ANIMAL SCIENCES AND RURAL DEVELOPMENT

December 24-25, 2021

Bingöl / TURKEY

CONFERENCE PROCEEDINGS
BOOK

Editors

Prof. Dr. Kagan KOKTEN

Assoc. Prof. Dr. Hakan INCI

Assoc. Prof. Dr. Seyithan SEYDOSOGLU

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**8th INTERNATIONAL CONFERENCE ON AGRICULTURE, ANIMAL
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Authors	Affiliation	Presentation title
Hadjira Naoui Mohamed Yousfi Mohamed Benalia	Université Amar Telidji Laghouat	Fatty acid composition , quantification of total tocopherols and antioxidant activity of lipid extrats from Algerian Ficus Carica fruit
Dijana Blazhekovikj - Dimovska Stojmir Stojanovski	University “St. Kliment Ohridski	Bighead Carp (Hypophthalmichthys Nobilis, Richardson, 1845) (Pisces: Cyprinidae) As Host Of New Parasite Species Dactylogyrus Aristichthys (Long & Yu, 1958) In Macedonian Waters
A. U. Arun Usha K. Aravind Aneesh V. Pillai	Cochin University of Science and Technology	Climate Change And Indian Legal Framework: An Anlytical View
Batoul Essalimi Siham Esserti Lalla Aicha Rifai Tayeb Koussa Nimine Ezzouine Kacem Makroum Malika Belfaiza Lydia Faize Mohamed Faize	University Chouaib Doukkali	Enhancement Of Plant Growth, Using Plant Growth-Promoting Rhizobacteria (Pgpr) Associated With Plum Trees (Prunus domestica)
Nasiru Adamu Aminu Adamu Ahmed	Abubakar Tafawa Balewa University Bauchi	Influence Of Feed Type And Period On Egg Quality Traits
Ogunlesi Oluwagbenga Olaoluwa Tiyati Humwapwa Mujong Aderemi Timothy Adeleye Ogunlesi Opeyemi Elizabeth Oyeleke Peter Olaoye Akinfoyeku Aanuoluwapo Fejisayo Igwe Chigbo Okereke	Landmark University Omu Aran Kwara State	Efficient Utilization Of Eco-Friendly Biochar-Derived Materials For Sustainable Environmental Remediation
Hamdaoui Nora Mouncif Mohamed Mennane Zakariae Omari Abdeloudoude Meziane Mustapha	University Mohammed I	Biochemical and technological characteristics of lactic acid bacteria genus Lactococcus lactis isolated from raw cow's milk
Youssef Khachtib Lalla Hasna Zinelabidine Said Bouda Abdelmajid Haddioui	Sultan Moulay Slimane University	Genetic Diversity In Moroccan Apple Cultivars Revealed With Ssr Markers
Nasiru Adamu Aminu Adamu Ahmed	Abubakar Tafawa Balewa University	Influence Of Feed Type And Period On Egg Quality Traits
Bhupendra Singh Manoj Kumar Riyal	Uttarakhnad University of Horticulture and Forestry	Traditional agroforestry system of Grahwal Himalaya and their management through the study of intercropping

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**BIGHEAD CARP (*HYPOPHTHALMICHTHYS NOBILIS*, RICHARDSON, 1845)
(PISCES: CYPRINIDAE) AS HOST OF NEW PARASITE SPECIES
DACTYLOGYRUS ARISTICHTHYS (LONG & YU, 1958) IN MACEDONIAN
WATERS**

Prof. Dr. Dijana Blazhekovikj - Dimovska

University "St. Kliment Ohridski", Faculty of Biotechnical Sciences, Bitola, N. Macedonia
dijanablazekovic@yahoo.com, 0038978273134
ORCID NO: <https://orcid.org/0000-0001-5912-9093>

Prof. Dr. Stojmir Stojanovski

Hidrobiological Institute, Ohrid, N. Macedonia
stojstoi@gmail.com, 0038978348124
ORCID NO: <https://orcid.org/0000-0003-4704-4820>

ABSTRACT

This study aimed to determine the presence of parasite fauna, prevalence, mean intensity, as well as, the seasonal dynamic of parasite species in bighead carp (*Hypophthalmichthys nobilis* Richardson, 1845) from one of the largest cyprinid aquaculture facilities in Macedonia. A total of 53 specimens of bighead carp from one of the most significant and larger cyprinid aquaculture facilities in Macedonia were subjected to parasitological investigation, by seasons. Monogenea *Dactylogyrus aristichthys* (Long & Yu, 1958) was found on gills in bighead carp, in spring and autumn. Parasite identification was performed morphologically, based on the character of significant organs, using referent keys for determination. In total, the prevalence with *Dactylogyrus aristichthys* in bighead carp was 18.87%, while the mean intensity was 70.00. Our findings of *Dactylogyrus aristichthys* in bighead carp are first recorded in Macedonia. At the same time, the bighead carp represent a new host for *Dactylogyrus aristichthys* in Macedonian waters.

Keywords: Monogenea, Parasites, Mean intensity, Prevalence, Aquaculture



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INTRODUCTION

Bighead carp (*Hypophthalmichthys nobilis*, Richardson, 1845) is one of the most important farm-cultured fish species inhabiting the largest cyprinid aquaculture facilities in Macedonia. It is breeding in polyculture together with the common carp, the silver carp, and the grass carp. Bighead carp have not been found yet in open waters in our country. There aren't artificial hatcheries as well. The population of bighead carp in cyprinid aquaculture facilities in Macedonia is maintained by stocking that is carried out by import of fish fry.

The origin of bighead carp is from the Far East, so probably by introducing it in our fish farms, the parasite species that are characteristic of bighead carp have been transferred. Therefore, special care should be taken when buying stocking fish material from other countries. Uncontrolled imports of live fish into the country can contribute to the transmission of various parasites to autochthonous fish species, causing great economic and environmental damage to the fish population. Hoffman and Schubert (1984) believe that some of the imported fish species are carriers of parasites that disseminate widely in new geographical areas and infect indigenous fish species.

According to FAO (2018), the bighead carp is an important species in aquaculture, having the fifth-highest production (7.5%) of all cultured freshwater fish worldwide.

Potential pathogens including parasites constantly attack fish that can cause diseases generally associated with stressful conditions. In natural conditions, parasites may be of minimal importance, but they can contribute to significant problems in aquaculture, especially in inadequate environmental conditions and high density (Parker, 2012).

According to Gibson et al. (1996) and Woo (2006), *Dactylogyrus* spp. represents the most dominant genus within the class Monogenea. These ectoparasites are usually attached to the gills of freshwater fish of the family Cyprinidae. Jiang et al. (2013) and Tu et al. (2015) considered that infestation with monogenean parasites may lead to serious hyperplasia of the gill filaments epithelium, impairs respiratory function, and even associates with high mortalities, especially in young carps.

This study aimed to determine the presence of parasite fauna, prevalence, mean intensity, as well as, the seasonal dynamic of parasite species in bighead carp (*Hypophthalmichthys nobilis* Richardson, 1845) from one of the largest cyprinid aquaculture facilities in Macedonia.



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MATERIAL AND METHODS

Specimens of bighead carp (*Hypophthalmichthys nobilis*) were obtained from one of the largest cyprinid aquaculture facilities in Macedonia. The parasitological investigations were carried out by seasons, and a total of 53 specimens of bighead carp were examined. Fish were caught by net and fish species were determined according to the key of Kottelat and Freyhof (2007). The fish were placed in plastic tanks with water obtained from the collection sites and transferred to the Department of fish diseases at Hydrobiological Institute - Ohrid (Macedonia). Only fresh fishes were subjected to routine identification, dissection, and observation methods. Cleaned parasites were separated and put in certain fixatives, prepared for determination with determined techniques of staining and clearing (Vasiljkov, 1983; Gussev, 1983). Parasite identification was performed by morphometric analysis, using the keys of Bauer (1985) and Gussev (1983), based on the character of the copulatory organ, the haptor sclerites like anchors, bars, and hooks.

Classical epidemiological variables (prevalence and mean intensity) were calculated according to Bush et al. (1997) using the following formulas:

$$\text{Prevalence} = \text{Number of infected fish} / \text{Number of examined fish} \times 100$$

$$\text{Mean intensity} = \text{Total number of parasites} / \text{Number of infected hosts}$$

During the examinations, stereomicroscopes „Zeiss”- Stemi DV4 and „MBS 10”, as well as light microscope „Reichert” with magnifications of 40 - 100 x were used.

RESULTS AND DISCUSSION

A total of 53 specimens of bighead carp (*Hypophthalmichthys nobilis*) from one of the largest cyprinid aquaculture facilities in Macedonia were examined for parasitological investigation by season, in which parasite infestation with *Dactylogyrus aristichthys* was found on gills in 10 specimens of bighead carp, of which 5 specimens in spring and 5 in autumn. This parasite species were found on all sizes of host fish. In total, the prevalence with *Dactylogyrus aristichthys* in bighead carp was 18.87%, while the mean intensity was 70.00. The prevalence with *Dactylogyrus aristichthys* by seasons was as following: spring – 33.0% and autumn - 25.0%, while the mean intensity: spring - 49,60 and autumn - 90,40.

Data on fish examined, fish infected, as well as the prevalence and mean intensity with *Dactylogyrus aristichthys*, total and by season, are given in Tables 1 & 2.



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Table 1. Total prevalence and mean intensity with *Dactylogyrus aristichthys* in bighead carp (*Hypophthalmichthys nobilis*) from Macedonian waters

Fish species	Number of examined fish	Number of infected fish	Mean intensity	Prevalence (%)
Bighead carp (<i>Hypophthalmichthys nobilis</i>)	53	10	70.00	18.87

Table 2. Prevalence (P) and mean intensity (I) with *Dactylogyrus aristichthys* in bighead carp (*Hypophthalmichthys nobilis*) from Macedonian waters, by season

Parasite species	Spring		Summer		Autumn		Winter	
	I	P (%)	I	P (%)	I	P (%)	I	P (%)
<i>Dactylogyrus aristichthys</i>	49.60	33.00	/	/	90.40	25.00	/	/

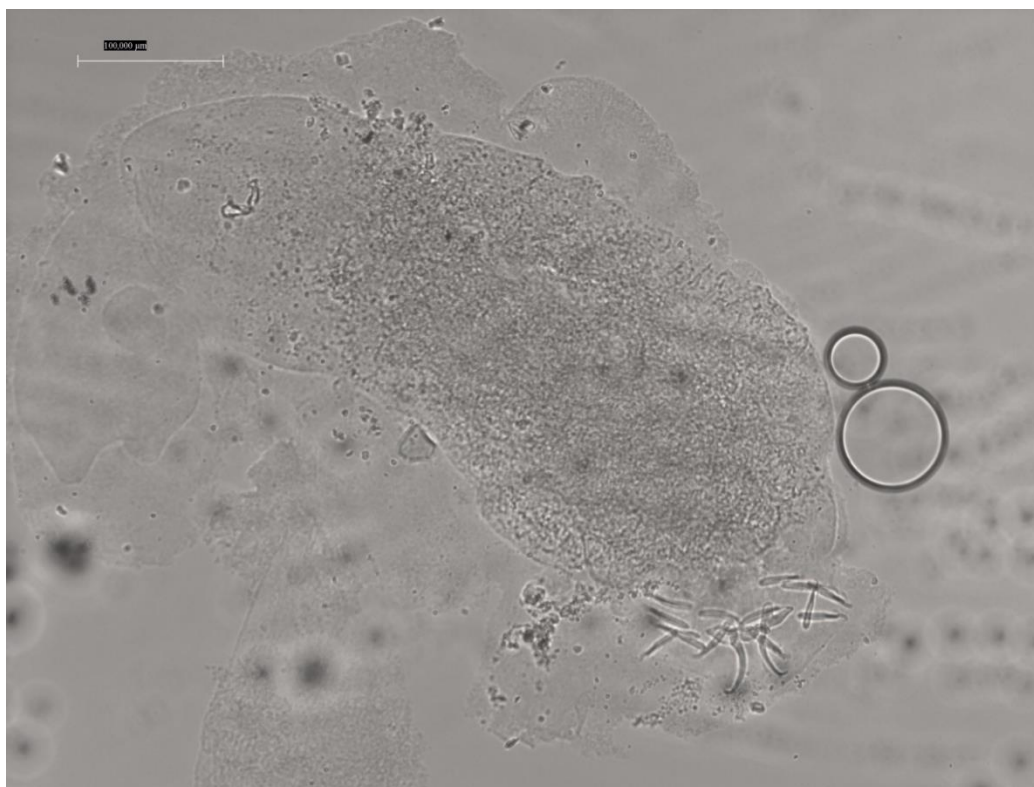


Fig. 1. *Dactylogyrus aristichthys* on gills in bighead carp – whole parasite (original)



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Fig. 2. *Dactylogyrus aristichthys* on gills in bighead carp – hooks (original)

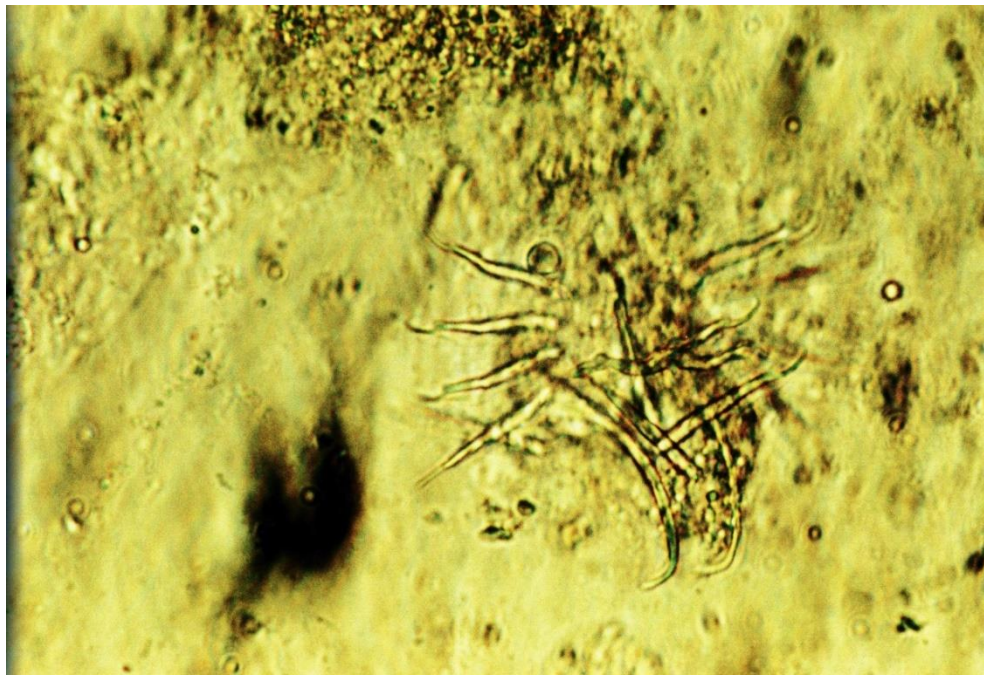


Fig. 3. *Dactylogyrus aristichthys* on gills in bighead carp – hooks (original)



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Fig. 4. *Dactylogyrus aristichthys* on gills in bighead carp – copulatory organ (original)

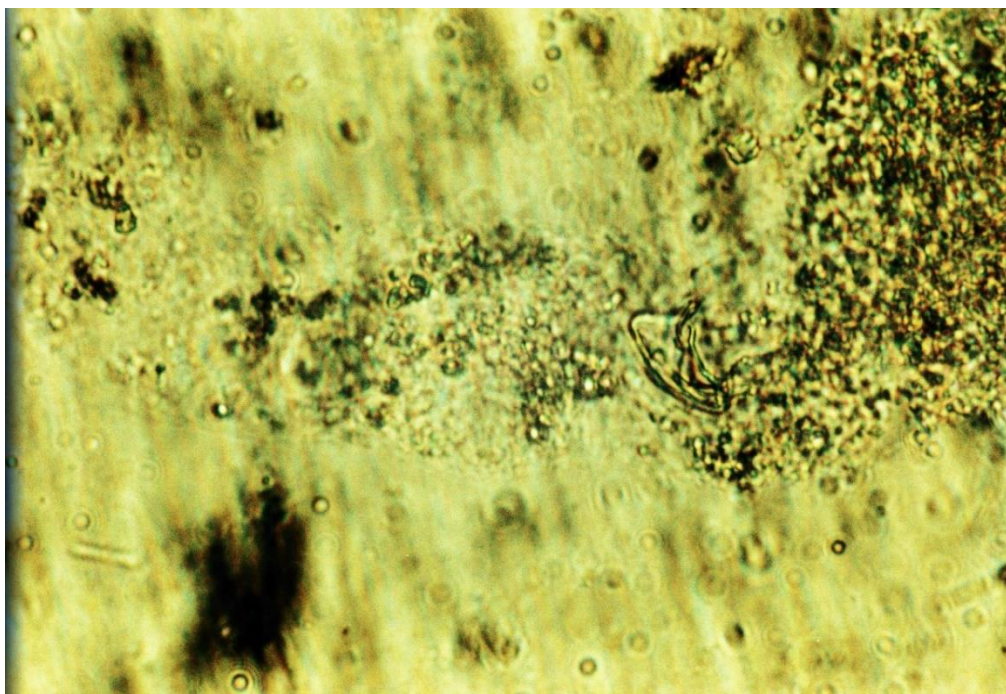


Fig. 5. *Dactylogyrus aristichthys* on gills in bighead carp – copulatory organ (original)



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Our findings of *Dactylogyrus aristichthys* in bighead carp (*Hypophthalmichthys nobilis*) are first recorded in Macedonia. At the same time, the bighead carp represent a new host for *Dactylogyrus aristichthys* in Macedonian waters.

Dactylogyrus aristichthys parasites on the gill filaments of the bighead carp. It is a parasite of small or medium size, up to 0.5 mm long and up to 0.15 mm wide. The length of the peripheral hooks ranges from 0.026 - 0.037 mm; the middle hooks of 0.042 - 0.044 mm; the basic part of 0.038 - 0.039 mm, the inner growth of 0.010 - 0.012 mm; the outer growth of 0.006 - 0.008 mm, and the sharp part of 0.007 - 0.009 mm. The dimensions of the connecting plate are 0.005 - 0.007 × 0.028 - 0.030 mm, and the additional plate 0.002 - 0.004 × 0.032 - 0.038 mm. The length of the copulatory organ is 0.025 - 0.035 mm.

According to world literary reviews, *Dactylogyrus aristichthys* has been identified in bighead carp from fish farms in Guilan and Mazandaran provinces in Iran by Shamsi et al. (2009) and Bozorgnia et al. (2012).

Bauer (1985) concludes that this parasite is widespread in cyprinid fishponds, sometimes with infestations of very high intensity, but pathological changes are rarely observed.

CONCLUSIONS

Our findings of monogenean *Dactylogyrus aristichthys* in bighead carp are first recorded for our country. At the same time, the bighead carp represent a new host for *Dactylogyrus aristichthys* in Macedonian waters. Total, the prevalence with *Dactylogyrus aristichthys* in bighead carp was 18.87%, while the mean intensity, 70.00.

Dactylogyrus aristichthys is found in spring and autumn, in relatively high mean intensity. Maximum prevalence and intensity of parasites occur in the course of a vernal period. Alongside that, there are three factors because of which the fish are physiologically less resistant to parasites during the spawning period: weaker condition, stress, and disruption in the production of estrogen. Also, after the winter period, which is a latent period, the vernal period provides better conditions for the development and reproduction of the parasites, which is mainly why they increase in number.

The population of bighead carp in cyprinid aquaculture facilities in Macedonia is maintained by stocking that is carried out by import of fish fry. For this reason, the introduction of exotic pathogens by fish imports into the country should be strictly controlled and evaluated from the outset, to protect not only autochthonous fish species but also the aquatic ecosystem itself.



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