Rafidain Journal of Science
https://rsci.mosuljournals.com
Vol. 33, No.3, pp. 20- 32, 2024

Study of the Ectoparasites of the Common Carp *Cyprinus carpio* Fish from Mosul Dam Lake in Nineveh Governorate, Iraq

Mohammed A. Al-Badrani
Department of Biology/ College of Science/ University of Duhok/ Kurdistan Region/ Iraq

p-ISSN: 1608-9391
e -ISSN: 2664-2786

Article information

Received: 27/ 8/ 2023
Revised: 20/10/ 2023
Accepted: 28/ 10/ 2023

DOI: 10.33899/rjs.2024.184532

corresponding author:
Mohammed A. Al-Badrani
mohammed.ibrahim@uod.ac

ABSTRACT

Nowadays, carp, which is common in Iraq's inland rivers, is the main species raised in most fish farms. Being aware that parasites can harm carp populations, or significantly contribute to their extinction or a growth limitation causing aquacultures to suffer financial losses. This study examines the parasites of certain carp fish in Mosul Dam Lake in the Iraqi province of Nineveh.

In the Nineveh governorate's Mosul Dam Lake, 70 common carp, *Cyprinus carpio*, were gathered situated northwest Mosul city one of the most important strategic projects in Iraq, by sellers and local fishermen, six try monthly during the period from April to August, 2023. Then following capture, carp fish were checked. Samples for parasite examination were taken from various areas of the host body surface, such as scales, fins, skin, gills, and eyes, and were then probed for ectoparasites. The infection rate was 40% (28/70), in the examination, eight parasite species were found, including: Four different protozoan species in the class Ciliata, *Chilodonella cyprinid* (21%), *Ichthyophthirius multifiliis* (7%), *Tetrahymena pyriformis* (8.5%), and *Trichodina mutabilis* (5.7%), two species of Monogenea trematode *Dactylogyrus minutus* (4%), and *Paradiplozoon cyprini* (2.9%) and two species of Crustacea *Ergasilus mosulensis* (4%), Copepodal stage of *Lernae cyprinacea* (4%). Among the cases parasites can hurt their hosts and damage parasite infestation, gill invasion, and harm internal organs and tissues.

Keywords: Parasites, Protozoa, Monogenea, Crustacea, Nineveh governorate of Iraq.

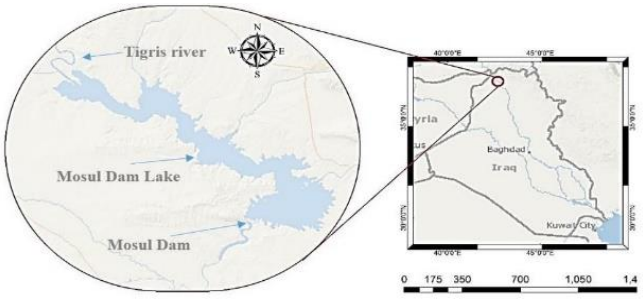
INTRODUCTION

As the population of our globe rises, all foods, including fish, become more expensive. The fishing industry is crucial in supplying the population with animal protein to offset their low saturated fat intake. A fish population suffers greatly when parasites are present, which results in significant fish losses. Fish infestation by parasites may result in significant mortality, weight loss and decreased fertility. Serious illnesses were brought on by parasites including protozoa, nematodes, cestodes, trematodes, and crustaceans in fish species. These parasite groups stop fish from growing and feeding. Poor water quality and malnutrition, particularly in waters polluted by industrial and urban pollution, lead to outbreaks of parasitic diseases (Cengizler *et al.,* 2001). The world's largest family of freshwater fish, the Cyprinidae, or carps (Mama and Abdullah, 2012). The value of the fish that parasites may affect directly relates to their importance (Kumar *et al.,* 2021). In intensive fish rearing, ectoparasitic protozoa frequently cause serious issues since they may grow quickly and transfer themselves directly (Mhaisen *et al.,* 2019). The Trichodinids are among these parasites and are likely the most often observed ciliophoran protozoan parasites in cultivated fish in both marine and freshwater habitats (Vilizzi *et al.,* 2015). Young fish are also at risk of contracting monogenean infections, which can infect and kill larger fish as well as culture in hatcheries (Bashe and Abdullah, 2010). Abnormal behavior, epithelial lesions, distorted gills, disruption of reproduction, blindness, and parasites are other symptoms that ultimately create a financial loss for the fish industry. Impotence is one of the primary reasons of weight loss (Nematollahi *et al.,* 2013). Because of this, surveys are carried to learn the basics about the fish parasite flora including some bacteria (AL-Nasiri and Mhaisen, 2009). Additionally, parasite organisms have caused carp infections in various regions of Iraq, encompassing Najaf al-Ashraf, Kurdistan, Al-Diwaniyah, Babylon, and Salah Al-Deen. Health control is important because parasites can negatively affect carp populations or significantly contribute to their mortality or growth retardation, which results in financial losses for aquacultures. It is important to strengthen aquaculture systems and the nutritional value of these fishes. Research on fish parasites and parasitic diseases that could impede their survival and growth is essential (Obaid *et al.,* 2021). The aim of this study is to survey and investigate the Ectoparasites that infect of the Carp fish *C. carpio* of Mosul dam lake in Nineveh governorate, Iraq.

MATERIALS AND METHODS

Study area

The Mosul Dam Lake, one of Iraq's most significant strategic initiatives for the management of its water resources is a dam. It is the largest dam in Iraq. It is located on the Tigris River 60 kilometers north-west of Mosul in the western governorate of Nineveh, upstream of the city of Mosul. The dam serves to generate hydroelectricity and provide water for downstream irrigation. At full capacity. The project was constructed on the banks of the Tigris River in northern Iraq, at latitude 36°37'44"N and longitude 42°49'23"E.



(A) **(B)**

Fig. A: Mosul dam lake location. **Fig. B: The map of Iraq.**

(Iraqi Ministry of Water Resources 2012.)

Sampling collection

70 common carp *C. carpio* were collected in the Nineveh governorate's Mosul dam lake by sellers and local fishermen, six try monthly during the period from different areas of the lake from April to August 2023. to the laboratories of the University of Duhok's College of Science, Department of Biology, Fish were then identified after being captured according to (Coad, 2010). Immediately following capture, carp fish were checked. Samples for parasite examination were taken including scales, fins, skin, gills, eyes, and other areas of the host body surface, and then they were checked for ectoparasites according to (Prasad *et al.*, 2018). Then, wet mount and temporary slides were made from the collected samples, and were examined to look for parasites (Abdullah and Mhaisen, 2006). The gills were examined by cutting the gill sheet directly from both sides. In a petri dish filled with physiological saline solution (0.9%NaCl), the gills were isolated and kept moist (Li *et al.,* 2014).

Post-collection samples (samples examination)

Gills that had been dissected and had their filaments bonded with glycerin were placed on petri dishes. The protozoan parasites were identified by studying smears without the use of any procedures after adding one drop of buffer solution (Omeji *et al*., 2011).

Additionally, smears were created for Trichodinid detection, and 100% methyl alcohol was used to fix the slides for roughly 1-2 minutes, stained for 30–40 minutes with Giemsa's stain (1:10), cleaned and dried once more, then mounted with Canada balsam (Mansoor and AL-Shaikh, 2010).

To prepare the slide for Monogenia, all smears were exposed to 100% methanol for around 15 minutes. The specimens were then fixed in hot 70% alcohol after being cleaned for several minutes with alcohol that also contained a drop of extra iodine solution and air dried (Shwani *et al.* 2010).

To create permanent slides, samples of crustaceans were fixed in 70% ethanol, cleaned in lactophenol, and mounted with glycerin-gelatine (Abdullah and Abdulkarim, 2010).

Dino-Eye Microscope Eye-piece camera model AM7023 series: 5 Mega pixels, (made in Taiwan) was used to take the pictures. Olympus ocular micrometer was used to examine for parasites (Jori, 2006). The found parasites were morphologically recognized using the keys parasite identification (Jithendran, 2014).

RESULTS AND DISCUSSION

In the current study survey investigations on a collection of 70 carp fish species from the Mosul Dam Lake in Iraq's Nineveh Governorate that were included carp, and which there are eight types of parasites, including four species of protozoans in the class Ciliata: *Chilodonella cyprinid*, *Ichthyophthirius multifiliis*, *Tetrahymena pyriformis*, *Trichodina mutabilis*, two species of the trematode Monogenea *Dactylogyrus minutus* and *Paradiplozoon cyprini*, and two species of the Crustacea *Ergasilus mosulensis*, *Lernae cyprinacea's* copepod stage in (Table 1).

Table 1: The infection of ectoparasites on *C. carpio* from Mosul dam lake fish of Nineveh governorate

Groups	Parasites	No. of infected fish	Prevalence (%) for 70 fish	Site of infection
Protozoa	*Chilodonella cyprinid*	15	21	Skin
	Ichthyophthirius multifiliis	5	7	Gills
	Tetrahymena pyriformis	6	8.5	Gills
	Trichodina mutabilis	4	5.7	Gills
Monogenea	*Dactylogyrus minutus*	3	4	Gills
	Paradiplozoon cyprini	2	2.9	Gills
Crustacea	*Ergasilus mosulensis*	3	4	Gills
	Copepodal stage of Lernae cyprinacea	3	4	Gills
	Total genus = 8			

Protozoa

In the current investigation, four species of protozoa were identified:

1- *Chilodonella cyprini* (Moroff, 1902)

This parasite, had an infection rate of (21%) was found on the skin of a *C. carpio* from the Mosul Dam Lake in the Nineveh governorate (Table 1). It had a large pear-like form. The body is described as having a dorsoventral section, a ventral concave and a dorsal side convex. The body is 40–70µm long and 20–35µm wide. Only a broad band of cilia, including several bigger cilia situated anterior to the cytostome and several lateral parallel arching rows, are visible ventrally. There are no cilia dorsal side. A round macronucleus is in close proximity to the back end. The micronucleus, which has two contractile vacuoles, is located next to the macronucleus (Mama and Abdullah, 2012) Fig. (1).

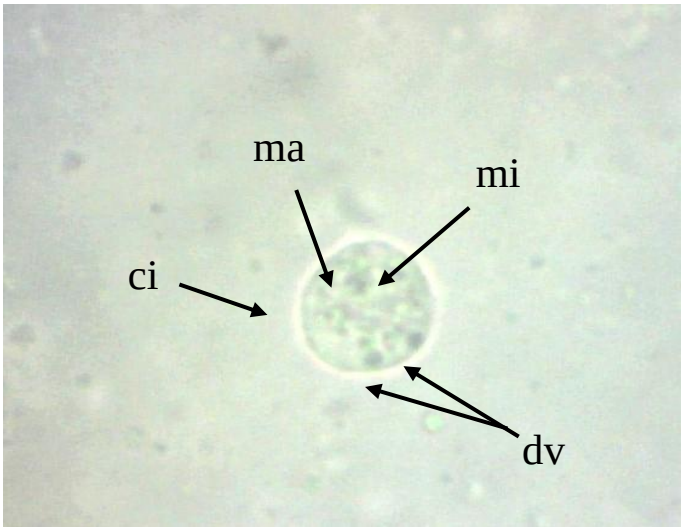


Fig. 1: *Chilodonella cyprini* (40X).

*ma= macronucleus; mi= micronucleus; dv= digestive vacuole; ci= cilia.

2- *Ichthyophthirius multifiliis* (Fauquet, 1876)

This ciliated protozoan was found with an infection rate of (7%) in of the *C. carpio* gill filaments (Table 1). This massive, spherical particle has a macronucleus that is obviously shaped like a horseshoe and has a diameter between 0.5-1.0µm. The macronucleus is located behind the micronucleus (Abdullah, 2005) Fig. (2).

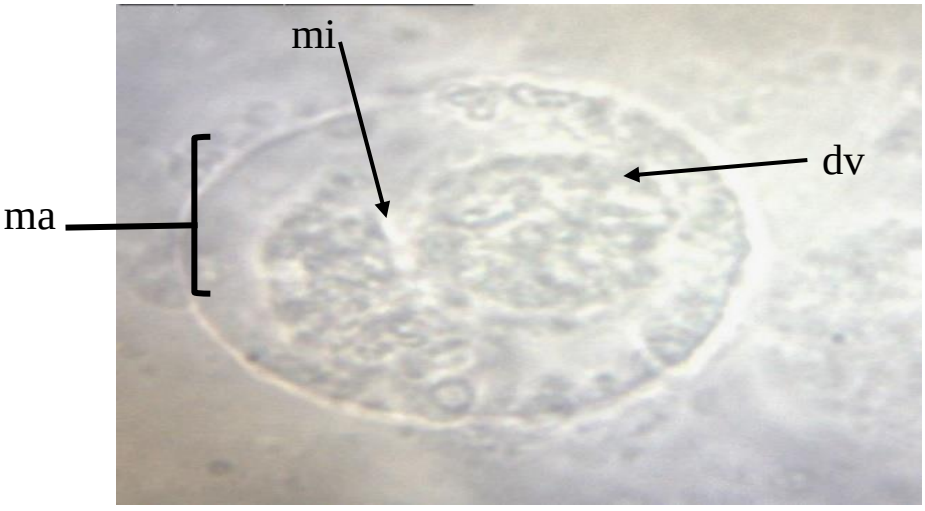


Fig. 2: *Ichthyophthirius multifiliis* (100X).

*ma= macronucleus; mi= micronucleus; dv= digestive vacuole.

3- *Tetrahymena pyriformis*

This parasite was found on the gills of *C. carpio*, and its infection rate was (8.5%) (Table 1). It is pyriform in shape and 25–50µm long by 15–30µm wide. Vestibulum, is situated along the body's ventral axis. The central or posterior region of the body contains the spherical macronucleus. The micronucleus has a 1.5 mm diameter, whereas its measurements are 4-7 x 5-10 mm (Abdullah and Abdullah, 2013) Fig. (3).

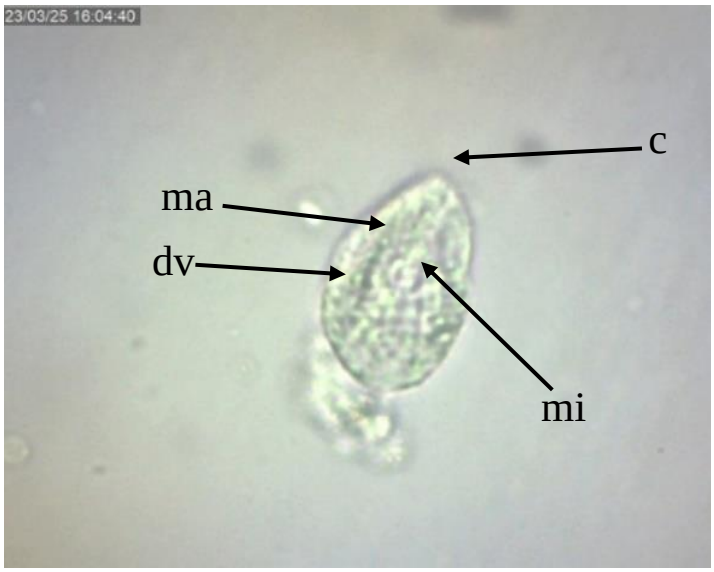


Fig. 3: *Tetrahymena pyriformis* (40X).

*ma= macronucleus; mi= micronucleus; dv= digestive vacuole; c= cytopharynx.

Genus: *Trichodina*

One Protozoa Trichodina species was identified:

4- *Trichodina mutabilis*

This protozoan has cilia was discovered in *C. carpio* gills from the Mosul dam lake fish with infection rate of (5.7%) (Table 1). The same parasitic infection was recorded at the Lesser Zab River fishes in Iraq for the first time ever. Trichodinid with a medium size and broad blade. Blade's distal surface is flat, straight, and parallel to the adhesive disc's border membrane. Blunt tangent point that is at the same level as or just below the distal border. Roughly parallel to the posterior boundary is the anterior margin (AL-Jawda and Asmar, 2013) Blade's posterior margin thickened. The shallow posterior blade border that forms a semilunar curve with its lowest point at the same level as the apex. Blade attachment is thick. Moderately sized central portion. Very thin posterior segment of the middle part. Denticles are firmly closed. Same ray thickness along its length Fig. (4). In (Kumar, 2005) study the parasites in Catfish and Carp. *Trichodina sp*. has denticles or hooks teeth on the body's surface; it is round like a disc. The incidence of trichodiniasis in Carp is higher than in Catfish.

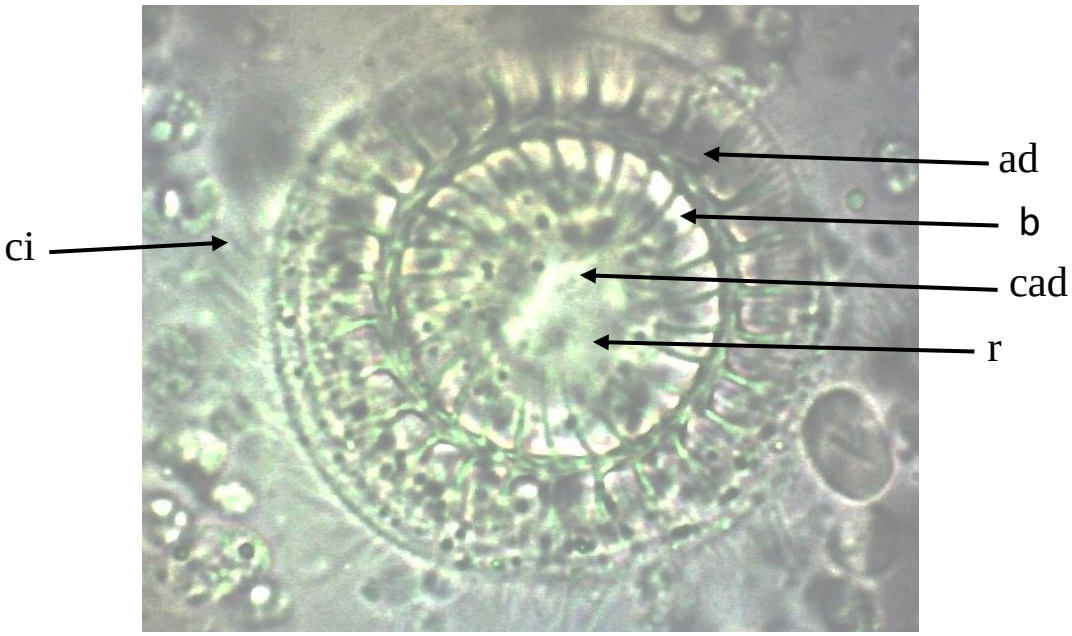


Fig. 4: *Trichodina mutabilis* (40X).
*cad= central of adhesive disc; ad= adhesive disc; b= blade; r= ray; ci= cilia.

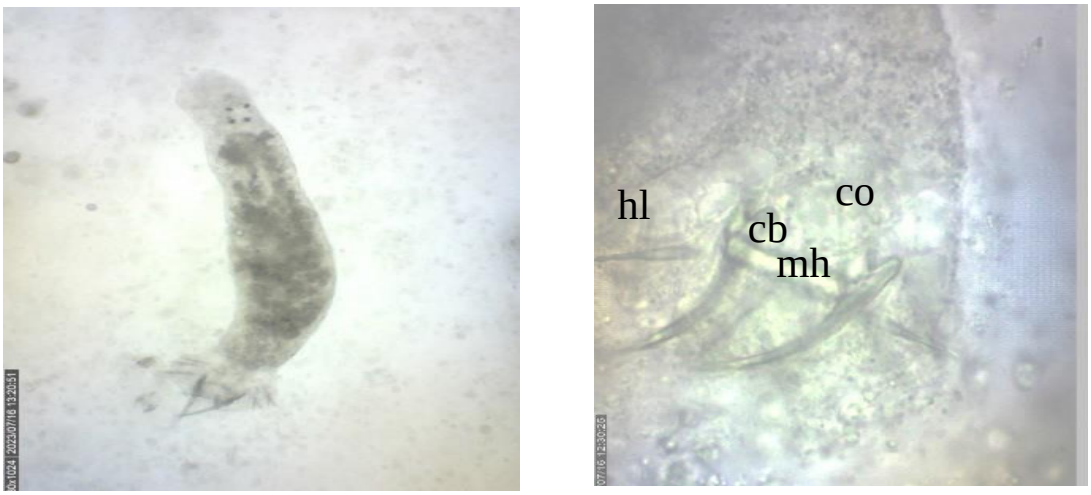
Monogenea

In the current investigation, two species of Monogenea were identified:

Family: Dactylogyridae

5- *Dactylogyrus minutus* (Kulwiec, 1927)

This parasite was found on the gills of *C. carpio* in Mosul dam lake with an infection rate of (4%) (Table 1). Small worms body width 0.010mm and 0.48mm for body length. The lengths of hooklets vary from 0.018 to 0.026 mm. Short median hooks that repeat from the base and have a powerful outer root. The lengths of the median hooks are 0.039-0.052 mm overall, 0.035-0.038 mm for the major section, 0.013-0.017 mm for the inner root, 0.004-0.006 mm for the outer root, and 0.012-0.015 mm for the tip in Fig. (5). There is one huge connecting bar, which is nearly straight and has rounded and expanded ends that measure around 0.003-0.006 X 0.026-0.030 mm. The tube's initial expanded section of the copulatory organ has a lateral thickening; the copulatory organ's overall length ranges from 0.031 to 0.043 mm (Özer *et al.*, 2016).



A **B**

Fig. 5: A- *Dactylogyrus minutus* (10X). B- The haptor (40X).
*cb= connective bar; co= copulatory organ; mh= median hook; hl= hooklet

Family: Diplozooidae

6- *Paradiplozoon cyprini*

This species was obtained from the gills of *C. carpio* Mosul dam lake with an infection rate of (2.9%) (Table 1). The body is divided into two parts: An anterior section and a posterior part. One short sclerite connects the connivant clamp jaws to the anterior margin of the median sclerite. There are tiny creases in the body's rear region (Al-Sarraj *et al.*, 2018). Anterior part with genital glands, the middle segment with intestine trunk terminations, and posterior region (attaching disc) with attachment clamps on the ventral side make up the posterior region. Body length is between 1.5 and 2.5mm, with the front portion measuring between 1 and 1.5 mm and the posterior portion measuring between 0.5 and 0.9mm. The hooks' length is 0.022 to 0.024 mm. 0.05 mm for the pharynx and 0.08 to 0.10 mm for the suckers Fig. (6). The testis is lobbed or rounded (Adday and Ali, 2011).

.

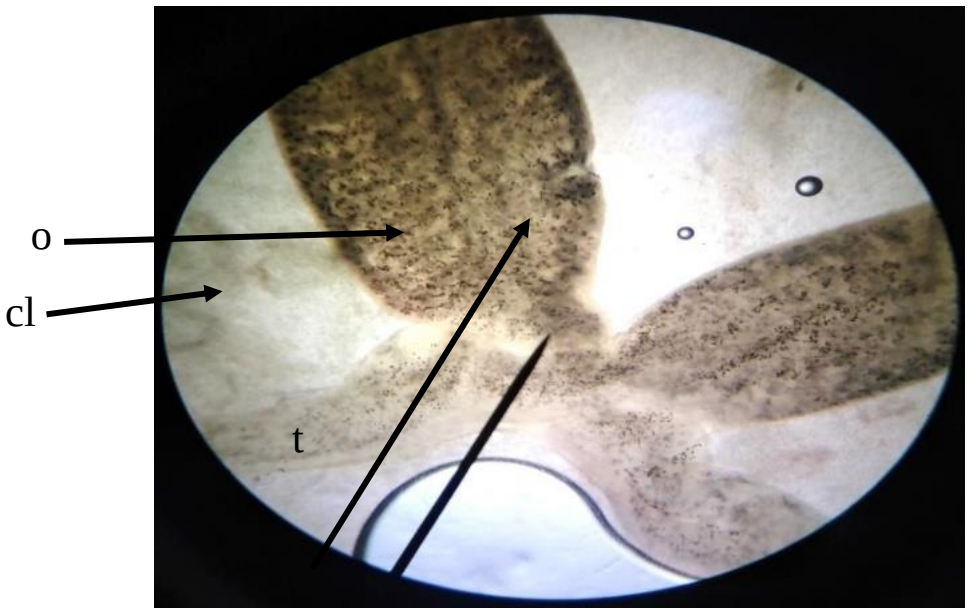


Fig. 6: *Paradiplozoon cyprini* (4X).
*t= testis; o= ovary; cl= clamp.

Crustacea

Family: Ergasilidae

7- *Ergasilus mosulensis* (Rahemo, 1982)

This crustacean was obtained from *C. carpio* gills of Mosul Dam Lake fish, where it was found to be (4%) prevalent (Table 1). Long body, complete cephalic union with the first thoracic segment, and a cephalothorax with a guitar-shaped that is noticeably longer than wide. Between the first thoracic pediger and the anterior cephalosome, there is a deep indentation. Four parts of a free thorax regularly shrink in size. Fifth section is condensed. 0.3-0.4 mm in width and 0.7-1 mm in total length. 0.7-0.9 mm is the length of the egg sac. The cephalothorax, which has an anterior lobe and a guitar-shaped appearance, is the current species' most recognizable feature. The primary antenna has six segments Fig. (7). Three-segmented abdomen with second antenna on large cephalic projection. Legs 1–4 have setae and spines and are biramous (Öktener *et al*., 2008).

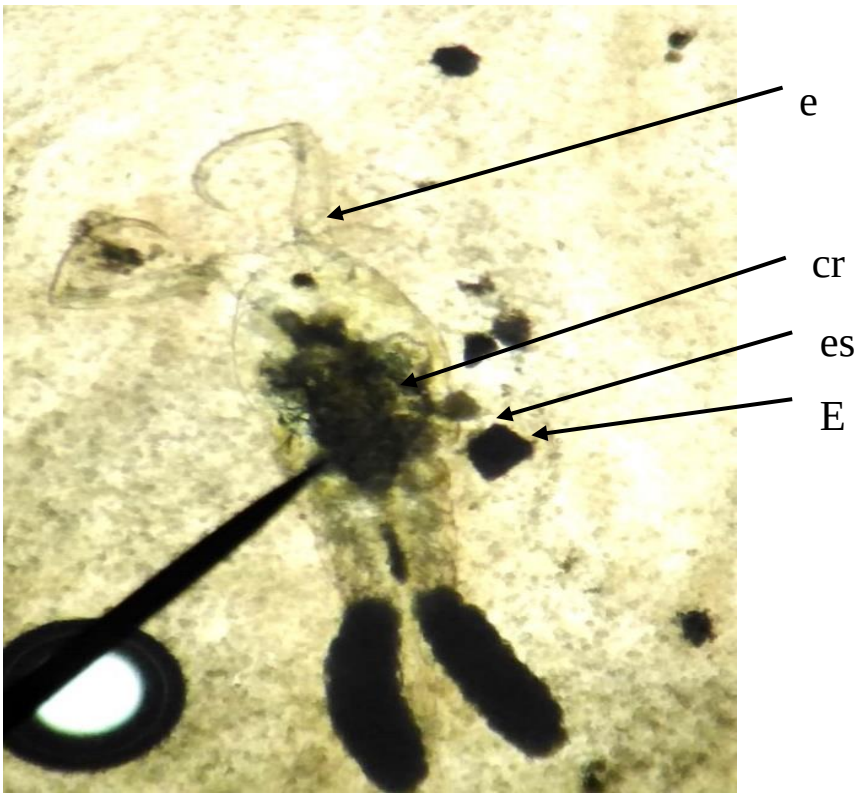


Fig. 7: *Ergasilus mosulensis* (4X).
*e= Eye; cr= caudal ramus; es= Egg sac; E= Egg

Family: Lernaeidae

8- Copepodal stage of *Lernaea cyprinacea*

The parasite's fifth copepodal stage is found on the gills of *C. carpio* in the Mosul dam lake with infection of (4%) (Table 1). At this stage, the parasite's total body length ranges between 0.80 and 1.25 mm. The body is made up of the cephalothorax, eight free segments, and the furca. Endopodites and exopodites are present in four pairs of biramous swimming limbs, whereas sixth pair is vestigial, fifth pair is uniramous in Fig. (8). At this period, male and female sexual differentiation takes place (Maduenyane *et al.*, 2023).

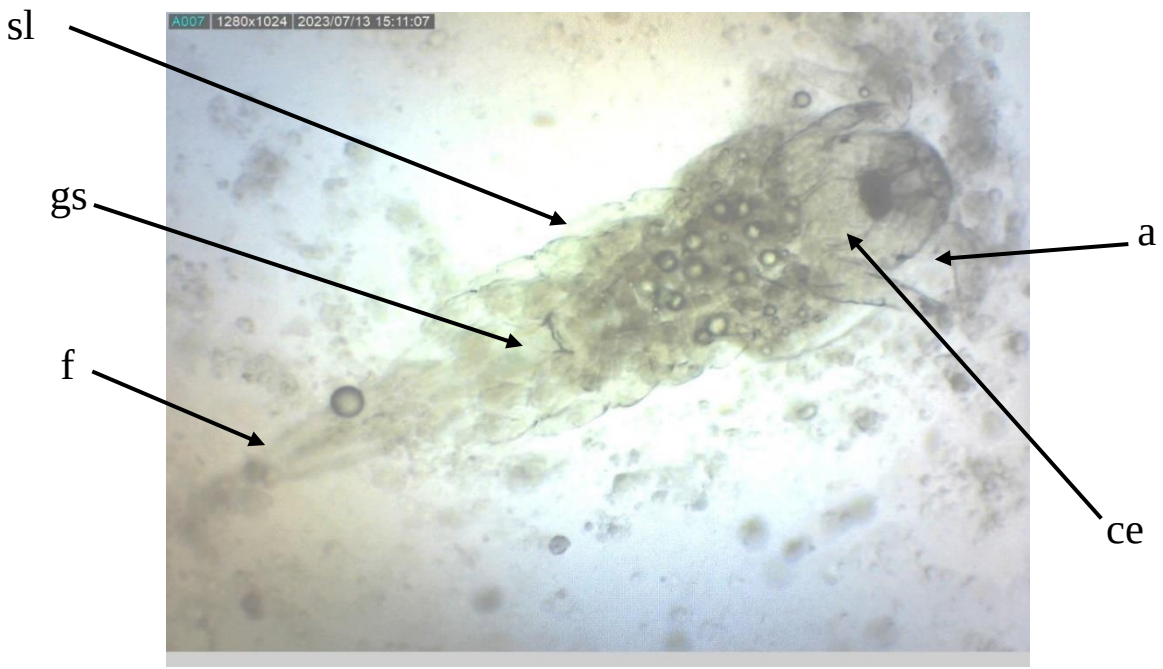


Fig. 8: Copepodal stage of *Lernae cyprinacea* (4X).
*a= antenna; ce= cephalothorax; sl= swmming legs; gs= genital segment; f= furca.

The percentage of infection in the current study was 40% (28/70). Eight parasite species were found in the fish (4 Protozoa, 2 Monogenea, and 2 Crustacea). According to the study's findings, protozoa were the most prevalent parasite in common carp (*Cyprinus carpio*), where protozoa infection rates were at their highest. And anther parasite is a monogenea that can infect the skin and gills. The parasite infection results in gill and skin bleeding and deterioration. This parasite has a history of being found in several freshwater fish species, including those from Iraq and other parts of the world. This study agree with (Abd AL-Khenifsawy and AL-Mayli, 2022) where the infection was in *C. carpio* (37.5%). While it disagree with (Prasad *et al.*, 2018) where the highest infection (63.33%) (Kumar *et al.*, 2021). The parasites were found in skin and gills organs (100%) from Carp, for the first time in Iraq, at Al-Zaafaraniya, *D. minutus* was found in *C. carpio* from the Tigris River. After that, There were 12 different fish hosts. *D. minutus* was discovered on the gills of *C. carpio* from the Lesser Zab River and the Ainkawa fish hatchery in the Kurdistan region (Abdullah and Abdullah, 2013) *L. cyprinacea's* on the *C. carpio's* gills at the Al-Zaafaranya fish farm in Baghdad, a copepod stage was found. It was stated that Dokan Lake in the Kurdistan area has seven distinct species their are *Cyprinus carpio, Ctenopharyngodon idellus, Hypophthalmichthys molitrix, Lisa abu* (Ali *et al*., 1988) Previously, this parasite was found on *C. carpio* at the Baghdad fish farm Al- Zaafaranya in Iraq, Mugil Dussmien was the first to mention this parasite in Iraq (AL-Saadi and Rasheed, 2016). The entire body surface is covered in parasite cilia. *Carasobarbus luteus*, *Garra rufa*, *Leuciscus vorax*, *Mesopotamichthys sharpeyi*, and Planiliza abu are among the species that include *Ichthyophthirius multifiliis* (Daghigh Roohi *et al.*, 2015) Albu-Ajeel village in Tikrit city is where *Barbus grypus*, a species from the Tigris River (Salah Al-Deen provine), originates. there are no more records for it in Iraq. The five genera that make up the subfamily Diplozoinae are as follows: Diplozoon, Inustiatus, Paradiplozoon, Eudiplozoon, and Sindiplozoon based on the morphology of the posterior section of the body. Primarily, host specificity, clamp sclerite shape, and median hook length are used to identify species. Ten Paradiplozoon species, two Diplozoon species, and one Eudiplozoon species are included in the index-catalogue of fish parasites from Iraq (AL-Nasiri and Mhaisen, 2009). In the Kurdistan region, Dokan Lake, Lesser Zab River, and Greater Zab River were the only places where *D. barbi*, *D. kasimi*, and *P. pavloskii* were found (Mama and Abdullah, 2012). There are many factors that caused the study to be similar and

different from previous studies at the same time, including the unity of the source and the mouth of the river, the geographical distance and proximity between the studied environments, and the abundance of fish. Age and maturity of lake fish are influenced by seasonal variations, water temperature, and water oxygenation (Mahir *et al.*, 2020).

CONCLUSIONS

This study examines the ectoparasitic fauna of a few carp fishes in Mosul Dam Lake in Iraqi the province of Nineveh. When these fish were examined for parasites, a 40% (28/70) infection rate was discovered. Eight parasite species are identified, including four species of protozoans (Ciliata), Monogenea, and Crustacea. These parasitic infections lead to significant economic losses in fish stocks in countries. These ectoparasitic infections have a high risk of mortality and morbidity. Damage to the eyes (blindness), gill invasion, and injuries to the tissues and internal organs. Parasitic infection increases if fish are confined to one tank or a specific area and lack of awareness and hygiene among farmers and fish breeders increases the infection.

ACKNOWLEDGMENT

I thank the Department of Biology in the College of Science, University of Duhok for providing assistance in the completion of this research.

Conflict of interest

There is no conflict of interest.

REFERENCES

Abd AL-Khenifsawy, R.H.; AL-Mayli, H.M.H. (2022). Detection of internal and external parasites of some common fish species from Al-Dalmaj Marsh/Iraq. *Int.l J. En. Res.*, **7**, 37-47. https://doi.org/10.53730/ijhs.v6nS8.13417

Abdullah, S.M.; Abdulkarim, A.S. (2010). Ectoparasites of the Asian catfish *Silurus triostegus* (Heckel, 1843) from greater zab river-Kurdistan Region-Iraq. *J. Duhok Univ.*, **13**(1), 164-171. https://www.researchgate.net/publication/305494704

Abdullah, S. (2005). Parasitic fauna of some freshwater fishes from Darbandikhan lake, north of Iraq. *J. Dohuk Univ.*, **8**(1), 29-35. https://www.researchgate.net/publication/305377906

Abdullah, S.M.; Mhaisen, F. (2006). Effects of sex and length of *Cyprinus carpio* from Lesser Zab River in northern Iraq, and seasonal variations on the infection with some parasites. *Raf. J. Sci.*, **17**(9), 1-9. Doi: 10.33899/rjs.2006.44056

Abdullah, Y.S.; Abdullah, S.M. (2013). Monogenean infections on fishes from Darbandikhan lake in Kurdistan region, Iraq. *Basrah J. Agric. Sci.*, **26**, 117-131. Doi:10.33762/bagrs.2013.111649

Adday, T.; Ali, A. (2011). *Ergasilus boleophthalmi* sp. n. (Copepoda: Ergasilidae) parasitic on gobiid fishes from Shatt Al-Basrah Canal, South of Iraq. *Wiad. Par.*, **57**(3), 137–142. https://pubmed.ncbi.nlm.nih.gov/22165733/

AL-Jawda, J.M.; Asmar, K.R. (2013). Myxosporeans (Phylum Myxozoa) Parasitic on Some Fishes from Tigris River at North, Mid and South of Baghdad Province, Iraq. *Basrah J. Agric. Sci.*, **26**, 106-109. DOI:10.33762/bagrs.2013.111648

AL-Nasiri, F.; Mhaisen, F. (2009). Parasites of fishes collected from Tigris river, Salah Al-Deen province, Iraq. *Ibn Al-Haitham J. Pure Appl. Sci.*, **22**(2), 1-8. https://www.researchgate.net/publication/349723725

AL-Saadi, A.A.J.; 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. https://jnhm.uobaghdad.edu.iq/index.php/BINHM/article/view/46/34

Al-Sarraj, E.S.; Jankeer, M.H.; Al-Rawi, S.M. (2018). Bioaccumulation of Zinc in four tissues of local fishes collected from Tigris River in Mosul City. *Raf. J. Sci.,* **27**(3), 15-22. DOI: 10.33899/RJS.2018.159379

Ali, N.; Mhaisen, F.; Abul-eis, E.; Kadim, L. (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 https://www.researchgate.net/publication/273446610

Bashe, S.; Abdullah, S. (2010). Parasitic fauna of spiny eel Mastacembelus mastacembelus from Greater Zab river in Iraq. *Iranian J. Vet. Res.,* **11**(1), 30. DOI: 10.22099/IJVR.2010.170.

Cengizler, I.; Aytac, N.; Sahan, A.; Ozak, A.A.; Ercüment, G. (2001). Ecto-endo parasite investigation on mirror carp (*Cyprinus carpio* L., 1758) captured from the river Seyhan, Turkey. E.U. *J. Fish. Aq. Sci*., **18**(1/2), 87-90. http://jfas.ege.edu.tr

Coad, B. W. (2010). "Freshwater Fishes of Iraq". Printed in Bulgaria. Pensoft Series Faunistica No 93. ISBN: 9546425303, 9789546425300

Daghigh Roohi, J.; Sattari, M.; MirhashemI Nasab, F. (2015). Occurrence and intensity of parasites in Common Carp, *Cyprinus carpio*, from Anzali Wetland, southwest of the Caspian Sea, Iran. *J. Per. Gu.,* (Marine Science). **6**(21), 25-30. https://www.researchgate.net/publication/334625112

Jithendran, K.P. (2014). "Parasites and Parasitic Diseases in Fish Culture System". Indian Council of Agricultural Research. Research institute in New Delhi, India. pp. 333-337. Corpus ID: 229717852

Jori, M. (2006). Parasitic study on the asian catfish *Silurus triostegus* (Heckel, 1843) from Al-Hammar marshes, Basrah, Iraq. *Ph. D. Thesis, Coll. Educ*., Univ. Basrah. 192 p. https://www.researchgate.net/publication/311627453

Kumar, M.A. (2005). First records of *Trichodina japonica* Imai, Miyazaki et Nomura 1991 and *Trichodina mutabilis* (Kazubski et Migala 1968) (Ciliophora, Trichodinidae) from Indian fishes. *Prot.*, **4**, 121-127. Corpus ID: 73615188

Kumar, V.; Nugraha, A.B.; Cahyaningsih, U.; Rahmani, T.P.D. (2021). Parasitic Protozoa found in the skin, gills, and intestines of Patin Catfish (*Pangasius hypophthalmus*) and Common Carp (*Cyprinus carpio*). *J. Nat. Sci. Math. Res.,* **7**(2), 86-91. DOI:10.21580/jnsmr.2021.7.2.11493

Li, M.; Ponce-Gordo, F.; Grim, J. N.; Wang, C.; Nilsen, F. (2014). New insights into the molecular phylogeny of Balantidium (Ciliophora, Vetibuliferida) based on the analysis of new sequences of species from fish hosts. *Parasitol. R.,* **113**, 4327-4333. DOI:10.1007/s00436-014-4195-z

Maduenyane, M.; Dos Santos, Q.; Avenant-Oldewage, A. (2023). *Gyrodactylus sprostonae* (Ling, 1962) infects an indigenous cyprinid in southern Africa: An expanded description. *J. Hel.,* **97**(40), 1–10. DOI:10.1017/S0022149X23000202

Mahir Mahmod, H.; Abbood, I. S.; Hanoon, A.N. (2020). Surface area evaluation of Mosul dam lake using satellite imagery technique. *In. J. Sci. Tech.,* **6**(1), 85-100. DOI:10.1017/S0022149X23000202

Mama, K.S.; Abdullah, S.M. (2012). A comparative study on the parasitic fauna of the common carp Cyprinus carpio from Ainkawa fish hatchery (Erbil) and Lesser Zab river in Kurdistan region, Iraq. *Mes. J. Agric.,* **40**(2), 19-26. https://www.researchgate.net/publication/318637249

Mansoor, N.T.; AL-Shaikh, S.M.J. (2010). Protozoans infection of *Cyprinus carpio* L. from Bab Al-Muatham fish markets, Baghdad city. *Iraqi J. Vet. Med.,* **34**, 1. DOI: 10.30539/ijvm.

Mhaisen, F.T.; AL-Mayali, H. M.; AL-Abodi, H.R. (2019). Checklists of parasites of fishes of Al-Diwaniyah province, Iraq. *Bull. Iraq Nat. Hist. Mus*., **15**(3), 293-318. DOI: https://doi.org/10.26842/binhm.7.2019.15.3.0293

Nematollahi, A.; Ahmadi, A.; Mohammadpour, H.; Ebrahimi, M. (2013). External parasite infection of common carp (*Cyprinus carpio*) and big head (*Hypophthalmichthys nobilis*) in fish farms of Mashhad, northeast of Iran. *J. Paras. Dise.*, **37**, 131-133. DOI:10.1007/s12639-012-0146-8.

Obaid, H. M.; Hussein, N.F.; Obed, T.M.; Boundenga, L. (2021). Common Carp (*Cyprinus carpio*) parasites diversity and prevalence in Erbil aquacultures: gills, skin and intestinal infections. *Iranian J. Vet. Sci. Tech.*, **13**, 34-41. DOI:10.22067/IJVST.2021.64304.0

Öktener, A.; Ali, A. H.; Alas, A. (2008). New host record, *Chalcalburnus mossulensis* (Heckel, 1843) (Teleostei; Cyprinidae) for *Ergasilus mosulensis* (Rahemo, 1982) (Copepoda; Ergasilidae). *Bulletin-European Assoc. Fish Path.*, **28**, 194-197. DOI: 10.13140/RG.2.1.4940.8886

Omeji, S.; Solomon, S.; Idoga, E. (2011). A comparative study of the common protozoan parasites of *Clarias gariepinus* from the wild and cultured environments in Benue State, Nigeria. *J. of Parasitol. R.*, **2011**, Article ID 916489. 8. DOI: 10.1155/2011/916489

Özer, A.; Gürkanl, C.; Özkan, H.; Acar, G.; Çiftçi, Y.; Yurakhno, V. (2016). Molecular characterization and morphological aspects of *Myxobolus parvus* (Myxozoa) from *Liza saliens* (Mugilidae) off the Turkish Black Sea coasts. *Par. Res.*, **115**, 3513-3518. DOI:10.1007/s00436-016-5115-1

Prasad, A.; Yadav, S.; Limbu, J.H. (2018). Identification of Ecto-parasites in silver carp (*Hypophthalmichthys molitrix*) and common carp (*Cyprinus carpio*) at fishery development Center Bhairahawa, Rupandehi, Nepal. *Int. J. Fish. Aq. Stu.,* **6**(5), 116-120. https://www.researchgate.net/publication/344163157

Rahemo, Z. I. F. (1982). Two new species of *Ergasilus* (Copepoda: Cyclopoida) from the gills of two Iraqi freshwater fishes. *Bull. Basrah Nat. Hist. Mus.*, **5**, 39-59.

Shwani, A.A.A.; Abdullah, S.M.A.; Asmat, G. (2010). Two new species of *Trichodina ehrenberg*, 1830 (Ciliophora: Trichodinidae) from *Silurus triostigus* in Iraq. *Eur. J. Sci. Res.*, **40**(4), 598-604. https://www.researchgate.net/publication/287910003

Vilizzi, L.; Tarkan, A.S.; Ekmekci, F.G. (2015). Parasites of the common carp *Cyprinus carpio* L., 1758 (Teleostei: Cyprinidae) from water bodies of Turkey: updated checklist and review for the 1964-2014 period. *Turkish J. Zoo.*, **39**, 545-554. DOI:10.3906/zoo-1401-42

(Iraqi Ministry of Water Resources 2012. https:// en.wikipedia.org/wiki/Mosul. Dam).

دراسة الطفيليات الخارجية لأسماك الكارب الشائع في بحيرة سد الموصل في محافظة نينوى، العراق

محمد عدنان البدراني

قسم علوم الحياة/ كلية العلوم/ جامعة دهوك/ اقليم كردستان/ العراق

الملخص

سمك الكارب شائع في أنهار العراق الداخلية، هو النوع الرئيسي الذي يتم تربيته في معظم المزارع السمكية. أن الطفيليات يمكن أن تضر بتجمعات الكارب، أو تساهم بشكل كبير في انقراضها أو تقييد نموها، مما يؤدي إلى خسائر مالية للاستزراع المائي. تم جمع 70 كارب شائع من أسماك بحيرة سد الموصل بمحافظة نينوى الواقعة شمال غرب مدينة الموصل أحد أهم المشاريع الإستراتيجية في العراق، من قبل البائعين والصيادين المحليين باستخدام الشباك الخيشومية والصنارة، ست محاولات شهريا خلال الفترة من نيسان إلى اب 2023. ثم بعد الصيد، تم فحص أسماك الكارب. تم أخذ عينات لفحص الطفيليات من سطح جسم المضيف، بما في ذلك القشور والزعانف والجلد والخياشيم والعينين. ثم تم عزل وفحص الطفيل الخارجي باستخدام المجهر الضوئي والتشريحي. وكانت نسبة الإصابة عند فحص هذه الأسماك 40٪ (70/28). تم اكتشاف ثمانية أنواع من الطفيليات في هذه الدراسة، بما في ذلك: أربعة أنواع من البروتوزا تنتمي إلى فئة Ciliata *Chilodonella cyprinid* (21%)، *Ichthyophthirius multifiliis* (7%)، *Tetrahymena pyriformis* (8.5%)، و*Trichodina mutabilis* (5.7%) ونوعان من المخرمات احادية المنشأ trematode *Dactylogyrus minutus* (4%) و *Paradiplozoon cyprini* (2.9%) ونوعان من القشريات *Ergasilus mosulensis* (4%) و Copepodal stage of *Lernae cyprinacea* (4%).

تؤدي الطفيليات الى تلف الأنسجة والأعضاء الداخلية وغزو الخياشيم وانتشار الميكروبات في مضائفها. هذه الدراسة تمثل مسح والعثور على الطفيليات في بعض اسماك الكارب الشائع في بحيرة سد الموصل في محافظة نينوى، العراق.

الكلمات الدالة: سمك الكارب، المخرمات احادية المنشأ، محافظة نينوى في العراق، الطفيليات، الهدبيات.