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# Research Article
# Morphological Study of *Cichlidogyrus mbirizei* (Ancyrocephalidae) Monogenean Gill Parasite on Red Tilapia (*Oreochromis* sp.) from Como River Kenyir Lake, Terengganu Malaysia

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## Abstract

**Background and Objective:** There were many cage-cultures at Como River, Kenyir lake and reported have fish diseases problem. Investigation was done and found that the fishes infected by monogenean parasite. Therefore, a study was conducted to identify the monogenean species infected the cage-culture fish, *Oreochromis* sp., from Como river, Kenyir lake. **Methodology:** The fishes were collected from floating net cage cultures. Monogenea were removed from the gills and mounted on a slide by using a drop of ammonium picrate-glycerin for the sclerotized structures and 10% of Sodium Dodecyl Sulfate (SDS) for the internal anatomy. They were observed under microscope (NIKON Eclipse 80i) and drawing was made with the aid of a lucida camera attached to compound microscope (Leica DM 750). **Results:** *Cichlidogyrus mbirizei* was found from the fish. The genus are based on their shape and size of the sclerotised parts of the copulatory organs. **Conclusion:** This is the first report about *Cichlidogyrus mbirizei* from cage culture of *Oreochromis* sp., from Kenyir lake.

Key words: *Cichlidogyrus mbirizei*, monogenean, *Oreochromis* sp., Kenyir lake, morphological characteristics

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Data Availability: All relevant data are within the paper and its supporting information files.

## INTRODUCTION

Kenyir lake is the largest tropical man-made lake in Southeast Asia in the district of Hulu Terengganu of Malaysia. The main function of Kenyir lake was to produce electricity (Hydroelectric) and to boost fish production in the area. The maximum depth of the lake is 145 m with mean depth of 37 m. A cage culture project for farming economically important freshwater fishes has been launched at Como river, Kenyir lake by Department of Fisheries, Government Malaysia. There were reported of high mortality and slow growth in fishes at the area. *Oreochromis* sp., is one of the fish species cultured at the area. This study was done based on the report from farmer and mortality case occurred. During the time, a case of mortality on *Oreochromis* sp., was increased and it observed that the dead and weak fishes for the causes. The monogenean parasites were observed with highly numbers on the gills of the fish. Monogenean is of great interest to the ecologist because of their simple life cycle and is considered as one of the important and sensitive parasites to any changes in water quality. Monogenean that showed low infection rates and minor pathological effects on their host under natural conditions can easily spread in the population and can cause serious outbreaks and resulting in economic losses[1,2]. The infestation of monogeneans also related to the water temperature which is the affect their life cycle[3]. It is important because monogeneans activities can provoke skin and gill lesions which are cause secondary infections[4]. The monogeneans can damage the gills systems and effect the respiratory. The overloading of the parasites infestation on fish become lethargic or die. These conditions required taxonomic and biological knowledge of the pathogenic monogeneans. These infections is important to prevent in cultured fishes because it will cause economic loses. Although, some work has been done in Malaysia on monogenean, there has been no report about this monogenean from Kenyir lake. Thus, it decided to describe the morphology and identify the parasitic monogenean from the *Oreochromis* sp., at the cage-cultures at Como river, Kenyir lake.

## MATERIALS AND METHODS

Host cichlid fish, *Oreochromis* sp., were collected from floating net cage cultures and were kept alive in a tank containing aerated water and were examined within an hour of landing. The gills of the fish were removed and place in the 70% alcohol and brought back to the laboratory for further examination. Monogenea were removed with a dissection needle. They were mounted on a slide under a cover-slip directly in a drop of ammonium picrate-glycerin[5] for the sclerotized structures[6], while for the internal anatomy, others were flattened by putting 10% of Sodium Dodecyl Sulfate (SDS) on the slide. Put the cover slip and place a small piece of tissue on the opposite side of the cover slip. Seal every edge of the slide by nail varnish and observe the specimen under 10X, 40X and 100X magnification by using compound microscope (Leica DM 750). Drawing was made with the aid of a lucida camera attached to Leica DM 750 compound microscope. For identification, the morphological part of sclerotised parts of the haptoral and copulatory organ were measured and image captures were done by using Advanced Research Microscope, (NIKON Eclipse 80i). The numbering of haptoral parts was adopted from ICOPA IV[7], the terminology follows Pariselle and Euzet[8] and from Pariselle *et al.*[9], the metrics has been taken. Average measurements (all in micrometers) are followed by the range parentheses.

## RESULTS

**Genus *Cichlidogyrus*[10]:** Following Paperna[10] and Pariselle *et al.*[9], the monogenean species described below belong to *Cichlidogyrus*. Genus *Cichlidogyrus* sp., belong to Family Ancyrocephalidae. They have three pairs of cephalic glands, two posterior ocellae with crystalline lenses. Their intestinal caeca unbranched and joined posteriorly. They have two pairs of anchors which are one dorsal and one ventral and two transverse bars which are dorsal bar with two auricles and ventral bar with V-shaped and fourteen uncinuli/marginal hooks. Median posterior testis with vas deferens on the right side but not encircling intestinal caecum. Seminal vesicle present. One prostatic reservoir. Male Copulatory Organ (MCO) with penis and accessory piece. Median pre-testicular ovary. Sub-median vaginal dextral opening. Vagina sclerotised or not. Seminal receptacle present.

***Cichlidogyrus mbirizei*[11]:**

- Host type: *Oreochromis* sp. (Red tilapia)
- Site of infection: Gills
- Locality: Como river, Kenyir lake (N 05°01'57.7", E 102°50'36.4")

**Description:** Descriptions morphology of structures of the monogenea parasite was illustrated in Fig. 1 and 2. Only adult monogenea was described. Adult: 410 (345-476) long, Dorsal Anchor (DA): a = 44 (40-49) long, DA blade length: b = 36 (32-41), DA shaft length: c = 4 (2-6), DA guard length:

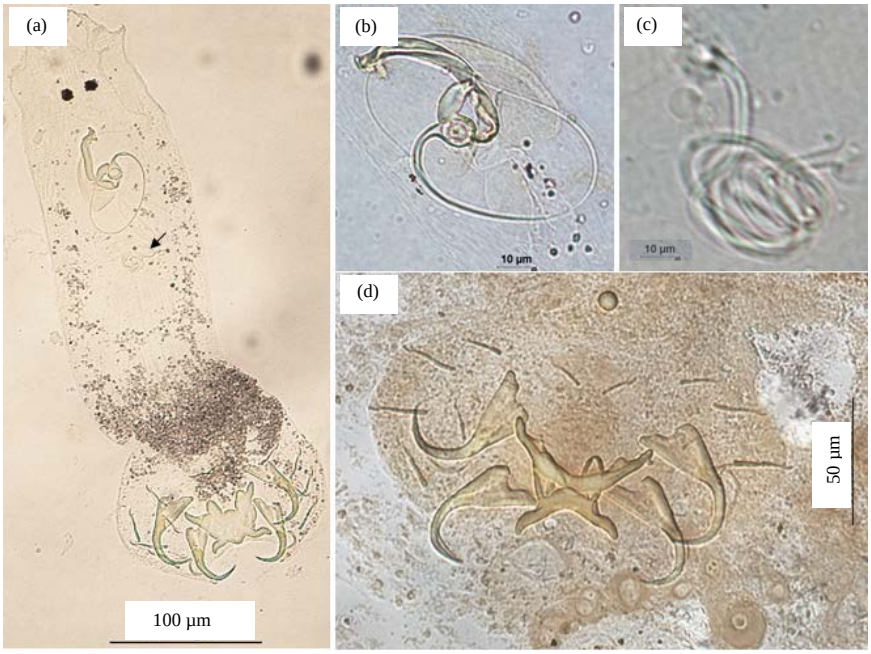


Fig. 1(a-d): (a) *Cichlidogyrus mbirizei* of red tilapia (200X total magnification), (b) Copulatory organ, (c) Coiled vagina and (d) Opisthaptoral hooks (400X total magnification)

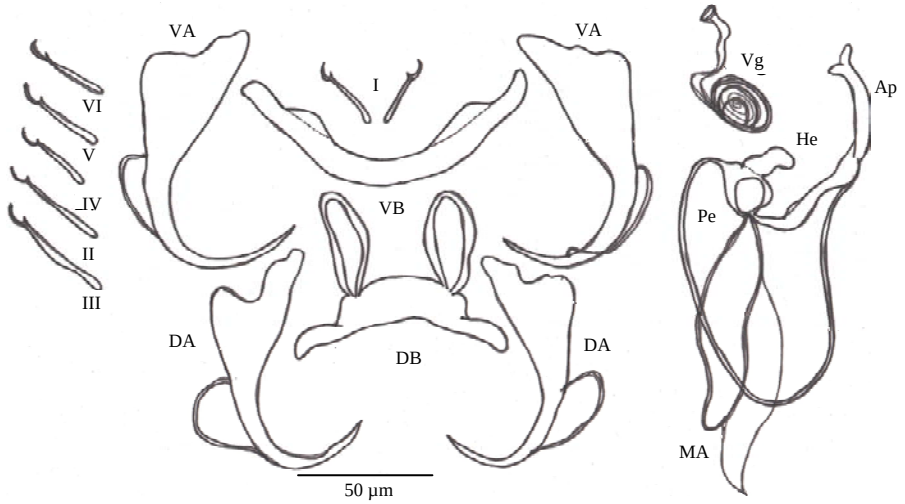


Fig. 2: Sclerotised part of *Cichlidogyrus mbirizei*, DB: Dorsal transverse bar, DA: Dorsal anchor, VB: Ventral transverse bar, VA: Ventral anchor, I-VI: Uncinuli, MA: Male apparatus, Ap: Accessory piece, He: Heel, Vg: Vagina scale bar: 50 µm

d = 9 (6-13), DA point length: e = 17 (13-20). Dorsal transverse bar (DB) arched with 2 auricles: x = 38 (34-43), DB length of auricles: h = 16 (14-21), DB greatest width: w = 9 (6-14), DB distance between auricles: y = 12 (7-13). Ventral Anchor (VA) similar to dorsal but slightly larger: a = 45 (38-49) long, VA blade length: b = 38 (35-43), VA shaft length: c = 3 (2-4), VA guard length: d = 8 (6-11), VA point length: e = 16 (15-18). Ventral transverse bar (VB); length of branch x = 38 (34-40) length, VB maximum width: w = 5 (3-7). Uncinuli (marginal hooklets) I: Short, 14 (13-15) long, II: 14 (12-17), III-VII: 21 (20-23). Male Copulatory Organ (MCO) with very long and thin penis: Pe = 138 (110-154) and distinct heel length: He = 9 (6-14), rather straight accessory piece: Ap = 54 (52-59) long, attached to the basal bulb of the penis, ending in

rounded outgrowths. Very long, thin and spirally coiled vagina (double pitch), no valuable length measurement could be taken.

**Remarks:** *Cichlidogyrus mbirizei* found in the present study was the first reported in Kenyir lake, Malaysia. *Cichlidogyrus mbirizei* has a long, thin, non-spirally coiled penis, such as *Cichlidogyrus arthracanthus*, *Cichlidogyrus bychowskii*, *Cichlidogyrus cirratus*, *Cichlidogyrus inconsultans* and *Cichlidogyrus nandidae.* It can be distinguished from all these species (except *Cichlidogyrus cirratus*) by having short uncinuli I (which are long in the other species). *Cichlidogyrus mbirizei* was easily distinguished from *C. cirratus* by the shape of the accessory piece of the Male Copulatory Organ (MCO), absence of a long expansion at mid-length (versus presence in *C. cirratus*) and of a hook at the distal extremity (versus rounded outgrowths in *C. cirratus*). The shape of the vagina (spirally coiled (double pitch) in *C. mbirizei* sp., versus sinuous in *C. cirratus*) is also distinctive. Bukinga *et al.*[11] found *Cichlidogyrus mbirizei* from *Oreochromis tanganicae* at Democratic Republic of the Congo. The description of adults: 729 (429-1160) long, dorsal anchor: 44 (37-50) long, guard of length: 14 (9-17), hence longer than shaft of length: 3 (2-5), blade: 36 (32-42) long, regularly curved point: 12 (7-14) long. Clearly arched Dorsal transverse bar (DB) of length: 32 (26-44) and greatest width: 7 (6-11), large auricles: 15 (12-19) long and attached to ventral surface of the bar, distance between auricles: 13 (9-18). Ventral anchor: 46 (40-52) long, guard of length: 13 (9-16), hence longer than shaft of length: 3 (2-5), blade: 41 (36-47) long, point length: 13 (11-18). Ventral transverse bar with branches more or less straight and 32 (24-40) long, greatest width: 6 (4-9). First and third to seventh uncinuli short: pair I: 13 (12-15) long, pair II: 11 (10-12), pair III: 16 (11-19), pair IV: 19 (15-23), pair V: 22 (19-26), pair VI: 20 (18-25), pair VII: 16 (14-21). Male Copulatory organ with very long (180 (149-204)) and thin penis and distinct heel of length 10 (7-21), rather straight accessory piece 28 (24-32) long, attached to the basal bulb of the penis, ending in rounded outgrowths. Long, thin and spirally coiled vagina (double pitch), no valuable length measurement was taken.

## DISCUSSION

The morphology and measurements of these specimens from the gill of tilapia from Como River, Kenyir lake, Terengganu, correspond to some extent, to those of *C. mbirizei*[11], *Cichlidogyrus halli*[12], *Cichlidogyrus sclerosus*[13], *Cichlidogyrus tilapiae*[10], *Cichlidogyrus thurstonae*[14] and *Scutogyrus longicornis*[13]. *Cichlidogyrus sclerosus*, *C. halli* and *C. tilapiae* were redescribed by Douellou[15] while *C. thurstonae* was redescribed by Pariselle and Euzet[16]. *Scutogyrus longicornis* corresponded to *Cichlidogyrus longicornis* described also on *O. niloticus* by Paperna and Thurston[13] and to *C. longicornis* described by Douellou[15] on *O. mortimeri.* Wu *et al.*[17] proposed to treat *Scutogyrus* sp., as a junior synonym of *Cichlidogyrus* sp., Pouyaud *et al.*[18] suggested that *Cichlidogyrus* sp., should be split into different genera. Thailand were observed six pathogenic gill monogenean species such as *Cichlidogyrus sclerosus*, *C. thurstonae*, *C. halli*, *C. mbriri*zei, *C. tilapiae* and *Scutogyrus longicomis* infected cultured tilapias[19]. Therefore, a taxonomic revision of the species recently considered within *Scutogyrus* sp., and *Cichlidogyrus* sp., genera is needed. According to Pariselle and Euzet[12], the length of each examined sclerite, will be standardized by dividing its total length by the total length of uncinuli pair II, which retain its size from larval to adult stages of development in ancyrocephalid monogenean. The new species resembles more to *C. mbirizei* than to *C. cirratus*. *Cichlidogyrus mbirizei* is easily distinguished from *C. cirratus* by the shape of the accessory piece of the male copulatory organ which is the absence of a long expansion at mid-length (versus presence) and of a hook at the distal extremity (versus rounded outgrowths). The vagina is spirally coiled (double pitch). This species had been sampled in Tanganyika lake on an endemic *Oreochromis tanganicae*. Also found this species infected cultured tilapias in Thailand and it could be translocate with the host during fish trading[19]. However, this is the first report of *C. mbirizei* infected cultures tilapias in Malaysia.

## CONCLUSION

The monogeneans of *Cichlidogyrus* sp., reported in this study are specific to cichlid fishes and reasonable to consider that these monogeneans are alien parasites that were introduced to Kenyir Lake along with their cichlid hosts. Similarly, even though Cichlidogyriasis outbreaks are not dramatic tilapia killers, it is necessary to seriously consider the parasite's potential effect upon farmed tilapia in terms of growth, the amount of food supplied to infected and non-infected fish and the effect of treatment with the chemical of the fish immune system. Knowledge of seasonal influence over monogenea communities is an important tool for applying adequate prophylactic measures especially in the cage culture.

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## REFERENCES

1. Boungou, M., G.B. Kabre, A. Marques and L. Sawadogo, 2008. Dynamics of population of five parasitic monogeneans of *Oreochromis niloticus* Linne, 1757 in the dam of loumbila and possible interest in intensive pisciculture. Pak. J. Biol. Sci., 11: 1317-1323.
2. Velloso, A.L. and J. Pereira Jr., 2010. Influence of ectoparasitism on the welfare of *Micropogonias furnieri*. Aquaculture, 310: 43-46.
3. Buchmann, K. and J. Bresciani, 2006. Monogenea (Phylum Platyhelminthes). In: Fish Diseases and Disorders, Protozoan and Metazoan Infections, Woo, P.T.K. (Ed). CAB International, Wallingford, pp: 294-341.
4. Ogawa, K., 2002. Impacts of diclidophorid monogenean infections on fisheries in Japan. Int. J. Parasitol., 32: 373-380.
5. Malmberg, G., 1957. On the occurrence of *Gyrodactylus* on Swedish fishes. Skkrifterutgivna av Sodra Sveriges Fiskeriforening (1956), pp: 19-76.
6. Ergens, R., 1969. The suitability of ammonium picrate-glycerin in preparing slides of lower Monogenoidea. Folia Parasitologica, 16: 320-320.
7. Euzet, L. and M. Prost, 1981. Report of the Meeting on Monogenea: Problems of Systematics, Biology and Ecology. In: Review of Advances in Parasitology, Slusarski, W. (Ed.). P.W.N. Polish Scientific Publishers, Warsaw, Poland, pp: 1003-1004.
8. Pariselle, A. and L. Euzet, 1995. Gill parasites of the genus *Cichlidogyrus* Paperna, 1960 (Monogenea, Ancyrocephalidae) from *Tilapia guineensis* (Bleeker, 1862), with descriptions of six new species. Syst. Parasitol., 30: 187-198.
9. Pariselle, A., C.F.B. Bilong and L. Euzet, 2003. Four new species of *Cichlidogyrus* Paperna, 1960 (Monogenea, Ancyrocephalidae), all gill parasites from African mouthbreeder tilapias of the genera *Sarotherodon* and *Oreochromis* (Pisces, Cichlidae), with a redescription of *C. thurstonae* Ergens, 1981. Syst. Parasitol., 56: 201-210.
10. Paperna, I., 1960. Studies on monogenetic trematodes in Israel. 2. Monogenetic trematodes of cichlids. Bamidgeh, 12: 20-33.
11. Bukinga, F.M., M.P.M. Vanhove, M. van Steenberge and A. Pariselle, 2012. Ancyrocephalidae (Monogenea) of Lake Tanganyika: III: *Cichlidogyrus* infecting the world's biggest cichlid and the non-endemic tribes Haplochromini, Oreochromini and Tylochromini (Teleostei, Cichlidae). Parasitol. Res., 111: 2049-2061.
12. Price, C.E. and R.G. Kirk, 1967. First description of a monogenetic trematode from Malawi. Revue Zoologie Botanique Africaines, 76: 137-144.
13. Paperna, I. and J.P. Thurston, 1969. Monogenetic trematodes collected from cichlid fish in Uganda: Including the description of five new species of *Cichlidogyrus*. Revue Zoologie Botanique Africaines, 19: 15-33.
14. Ergens, R., 1981. Nine species of the genus *Cichlidogyrus Paperna*, 1960 (Monogenea: Ancyrocephalinae) from Egyptian fishes. Folia Parasitologica, 28: 205-214.
15. Douellou, L., 1993. Monogeneans of the genus *Cichlidogyrus* Paperna, 1960 (Dactylogyridae: Ancyrocephalinae) from cichlid fishes of Lake Kariba (Zimbabwe) with descriptions of five new species. Syst. Parasitol., 25: 159-186.
16. Pariselle, A. and L. Euzet, 2003. Four new species of *Cichlidogyrus* (Monogenea: Ancyrocephalidae), gill parasites of *Tilapia cabrae* (Teleostei: Cichlidae), with discussion on relative length of haptoral sclerites. Folia Parasitologica, 50: 195-201.
17. Wu, X.Y., X.Q. Zhu, M.Q. Xie and A.X. Li, 2007. The evaluation for generic-level monophyly of Ancyrocephalinae (Monogenea, Dactylogyridae) using ribosomal DNA sequence data. Mol. Phylogenet. Evol., 44: 530-544.
18. Pouyaud, L., E. Desmarais, M. Deveney and A. Pariselle, 2006. Phylogenetic relationships among monogenean gill parasites (Dactylogyridea, Ancyrocephalidae) infesting tilapiine hosts (Cichlidae): Systematic and evolutionary implications. Mol. Phylogenet. Evol., 38: 241-249.
19. Lerssutthichawal, T., W. Maneepitaksanti and W. Purivirojkul, 2015. Gill monogeneans of potentially cultured tilapias and first record of *Cichlidogyrus mbirizei* Bukinga *et al*., 2012, in Thailand. Walailak J. Sci. Technol., 13: 543-553.