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**Filling the knowledge gap of Middle American freshwater fish parasite biodiversity: Metazoan parasite fauna of Nicaragua**

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| **Supplementary Table S1.** List for freshwater fish parasites of Nicaragua. Some parasite names are in accordance with the current acceptance in the literature, not as they were presented in the original reference. S, stage, adult A or larvae L.In bold the species reported in this study. | | | | | |
| **Parasite Family** | **Parasite taxa** | **S** | **Host species** | **Locality** | **Reference** |
| **Trematoda** |  |  |  |  |  |
| Acanthostomatidae Poche, 1926 | *Acanthostomum astorquii* | A | *Rhamdia nicaraguensis* | Lake Nicaragua | Watson, 1976 |
|  | *Acanthostomum gnerii* | A | *Rhamdia managuensis* | Lake Nicaragua | Watson, 1976 |
|  |  |  | *Rhamdia nicaraguensis* | Lake Nicaragua | Watson, 1976 |
|  | *Acanthostomum minimum (=Stunkardiella minima)* | A | *Vieja maculicauda* | Caño Marañon | Aguirre-Macedo *et al*., 2001a |
| Allocreadiidae Losos, 1902 | *Auriculostoma astyanace* | A | *Astyanax fasciatus* | Torsuani River | Aguirre-Macedo *et al*., 2001b |
|  |  |  | *Astyanax fasciatus* | Loonku Creek, Bluefields | Aguirre-Macedo *et al*., 2001b |
|  |  |  | *Astyanax fasciatus* | Loonku Creek, Bluefields | Scholz et al., 2004 |
|  |  |  | *Astyanax fasciatus* | Torsuani River | Scholz et al., 2004 |
| Alloglossidiidae Hernández-Mena, Mendoza-Garfías, Ornelas-García & Pérez-Ponce de León, 2016 | *Magnivitellum simplex* | A | *Astyanax fasciatus* | Loonku Creek, Bluefields | Aguirre-Macedo *et al*., 2001b |
|  |  |  | *Astyanax fasciatus* | Torsuani River | Aguirre-Macedo *et al*., 2001b |
| Callodistomidae Poche, 1926 | *Prosthenhystera obesa* | A | *Astyanax fasciatus* | Loonku Creek, Bluefields | Aguirre-Macedo *et al*., 2001b |
|  | *Prosthenhystera caballeroi* | A | *Astyanax aeneus* | Quezalguaque River near Telica | Tkach et al., 2015 |
| Clinostomidae Lühe, 1901 | ***Ithyoclinostomum yamaguti*** *(= Clinostomum* sp*.)* | L | *Parachromis managuensis* | Mahogany River | Aguirre-Macedo et al., 2001a |
|  |  |  | *Parachromis managuensis* | Caño Negro | Aguirre-Macedo et al., 2001a |
|  |  |  | *Hypsophrys nematopus* | Lake Nicaragua | Santacruz *et al*., 2021 |
|  |  |  | *Hypsophrys nicaraguensis* | Lake Nicaragua | Santacruz *et al*., 2021 |
|  |  |  | *Parachromis managuensis* | Mahogany River | Aguirre-Macedo et al., 2001a |
|  |  |  | *Parachromis managuensis* | Caño Negro | Aguirre-Macedo et al., 2001a |
|  |  |  | *Parachromis* sp. | Lake Nicaragua | Santacruz *et al*., 2021 |
|  | *Clinostomum* sp. | L | *Rhamdia* sp. | Lake Nicaragua | **This study** |
| Crytogonimidae Ward, 1917 | Cryptogonimidae gen. sp. | A | *Parachromis* sp. | Lake Managua | Santacruz *et al*., 2021 |
|  |  |  | *Poecilia velifera* | Caño Marañon | Aguirre-Macedo et al., 2001a |
|  | ***Neochasmus ackerti*** | A | *Pomadasys croco* | Lake Nicaragua | Watson, 1976; **this study** |
|  | *Oligogonotylus manteri* | A | *Amphilophus amarillo* | Crater lake Xiloá | Santacruz *et al*., 2021 |
|  |  |  | *Amphilophus astorquii* | Crater lake Apoyo | Santacruz *et al*., 2021 |
|  |  |  | *Amphilophus chancho* | Crater lake Apoyo | Santacruz *et al*., 2021 |
|  |  |  | *Amphilophus citrinellus* | Lake Managua | Santacruz *et al*., 2021 |
|  |  |  | *Amphilophus citrinellus* | Crater lake Asosca León | Santacruz *et al*., 2021 |
|  |  |  | *Amphilophus citrinellus* | Crater lake Apoyeque | Santacruz *et al*., 2021 |
|  |  |  | *Amphilophus citrinellus* | Crater lake Masaya | Santacruz *et al*., 2021 |
|  |  |  | *Amphilophus citrinellus* | Lake Nicaragua | Watson, 1976; Santacruz *et al*., 2021 |
|  |  |  | *Amphilophus globosus* | Crater lake Apoyo | Santacruz *et al*., 2021 |
|  |  |  | *Amphilophus labiatus* | Lake Managua | Santacruz *et al*., 2021 |
|  |  |  | *Amphilophus labiatus* | Lake Nicaragua | Watson, 1976; Santacruz *et al*., 2021 |
|  |  |  | *Amphilophus sagittae* | Crater lake Xiloá | Santacruz *et al*., 2021 |
|  |  |  | *Amphilophus xiloaensis* | Crater lake Xiloá | Santacruz *et al*., 2021 |
|  |  |  | *Amphilophus zaliosus* | Crater lake Apoyo | Santacruz *et al*., 2021 |
|  |  |  | *Cribroheros longimanus* | Crater lake Xiloá | Santacruz *et al*., 2021 |
|  |  |  | *Cribroheros rostratus* | Lake Managua | Santacruz *et al*., 2021 |
|  |  |  | *Cribroheros rostratus* | Crater lake Xiloá | Santacruz *et al*., 2021 |
|  |  |  | *Cribroheros rostratus* | Lake Nicaragua | Watson, 1976; Santacruz *et al*., 2021 |
|  |  |  | *Hypsophrys nematopus* | Crater lake Xiloá | Santacruz *et al*., 2021 |
|  |  |  | *Hypsophrys nematopus* | Crater lake Masaya | Santacruz *et al*., 2021 |
|  |  |  | *Hypsophrys nematopus* | Lake Nicaragua | Santacruz *et al*., 2021 |
|  |  |  | *Hypsophrys nematopus* | Lake Managua | Santacruz *et al*., 2021 |
|  |  |  | *Hypsophrys nicaraguensis* | Crater lake Xiloá | Santacruz *et al*., 2021 |
|  |  |  | *Hypsophrys nicaraguensis* | Lake Nicaragua | Watson, 1976; Santacruz *et al*., 2021 |
|  |  |  | *Parachromis managuensis* | Lake Nicaragua | Watson, 1976; Santacruz *et al*., 2021 |
|  |  |  | *Parachromis managuensis* | Puente Chino | Aguirre-Macedo *et al*., 2001b |
|  |  |  | *Parachromis* sp. | Lake Managua | Santacruz *et al*., 2021 |
|  |  |  | *Parachromis* sp. | Crater lake Asosca León | Santacruz *et al*., 2021 |
|  |  |  | *Parachromis* sp. | Crater lake Apoyeque | Santacruz *et al*., 2021 |
|  |  |  | *Parachromis* sp. | Crater lake Xiloá | Santacruz *et al*., 2021 |
|  |  |  | *Parachromis* sp. | Crater lake Apoyo | Santacruz *et al*., 2021 |
|  |  |  | *Vieja maculicauda* | Lake Nicaragua | Watson, 1976; |
|  |  |  | *Vieja maculicauda* | Caño Marañon | Aguirre-Macedo *et al*., 2001a; Aguirre-Macedo *et al*., 2001b |
|  |  |  | *Vieja maculicauda* | Torsuani River | Aguirre-Macedo *et al*., 2001a; Aguirre-Macedo *et al*., 2001b |
| Derogenidae Nicoll, 1910 | ***Genarchella astyanactys (=Paravitellotrema astyanactis)*** | A | *Astyanax fasciatus* | Lake Nicaragua at Tepetate^ | Watson, 1976 |
|  |  |  | *Astyanax* sp. | Lake Managua | **This study** |
|  | *Genarchella thorsoni (=Paravitellotrema thorsoni)* | A | *Rhamdia managuensis* | Lake Nicaragua | Watson, 1976 |
| Diplostomatidae Poirier, 1886 | ***Austrodiplostomum compactum (=Diplostomum compactum)*** | L | *Amphilophus citrinellus* | Lake Managua | Santacruz *et al*., 2021 |
|  |  |  | *Astyanax* sp. | Lake Managua | **This study** |
|  |  |  | *Cribroheros alfari* | Loonku Creek, Bluefields | Aguirre-Macedo *et al*., 2001a |
|  |  |  | *Cribroheros rostratus* | Lake Managua | Santacruz *et al*., 2021 |
|  |  |  | *Parachromis* sp. | Lake Managua | Santacruz *et al*., 2021 |
|  | *Posthodiplostomum minimum* | L | *Amatitlania nigrofasciata* | Loonku Creek, Bluefields | Aguirre-Macedo *et al*., 2001a |
|  |  |  | *Herotilapia multispinosa* | Puente Chino | Aguirre-Macedo *et al*., 2001a |
|  |  |  | *Parachromis managuensis* | Caño Negro | Aguirre-Macedo *et al*., 2001a |
|  |  |  | *Parachromis managuensis* | Mahogany River | Aguirre-Macedo *et al*., 2001a |
|  |  |  | *Poecilia velifera* | Caño Marañon | Aguirre-Macedo *et al*., 2001a |
|  |  |  | *Vieja maculicauda* | Torsuani River | Aguirre-Macedo *et al*., 2001a |
|  | ***Posthodiplostomum* sp. 1** | L | *Hypsophrys nematopus* | Lake Nicaragua | Santacruz *et al*., 2021 |
|  |  |  | *Hypsophrys nematopus* | Crater lake Masaya | Santacruz *et al*., 2021 |
|  |  |  | *Poecilia* sp. | Lake Nicaragua | **This study** |
|  | *Posthodiplostomum* sp. 2 | L | *Amatitlania nigrofasciata* | Lake Nicaragua | Santacruz *et al*., 2021 |
|  | *Uvulifer* sp. | L | *Amatitlania nigrofasciata* | Puente Chino | Aguirre-Macedo *et al*., 2001a |
|  |  |  | *Amatitlania siquia* | Río Perez | López-Jiménez *et al.*, 2017 |
|  |  |  | *Archocentrus centrarchus* | Palo de Arquito | López-Jiménez *et al.*, 2017 |
|  |  |  | *Astyanax fasciatus* | Torsuani River | Aguirre-Macedo *et al*., 2001a |
|  |  |  | *Cribroheros alfari* | Puente Chino | Aguirre-Macedo *et al*., 2001a |
|  |  |  | *Cribroheros longimanus* | San Carlos | López-Jiménez *et al.*, 2017 |
|  |  |  | *Herotilapia multispinosa* | Loonku Creek, Bluefields | Aguirre-Macedo *et al*., 2001a |
|  |  |  | *Herotilapia multispinosa* | Mahogany River | Aguirre-Macedo *et al*., 2001a |
|  |  |  | *Hypsophrys* sp. | Palo de Arquito | López-Jiménez *et al.*, 2017 |
|  |  |  | *Vieja maculicauda* | Caño Marañon | Aguirre-Macedo *et al*., 2001a |
|  |  |  | *Vieja maculicauda* | Caño Negro | Aguirre-Macedo *et al*., 2001a |
|  |  |  | *Vieja maculicauda* | Loonku Creek, Bluefields | Aguirre-Macedo *et al*., 2001a |
|  |  |  | *Vieja maculicauda* | Mahogany River | Aguirre-Macedo *et al*., 2001a |
|  |  |  | *Vieja maculicauda* | Torsuani River | Aguirre-Macedo *et al*., 2001a |
|  | *Uvulifer spinatus* | L | *Alfaro cultratus* | Blue Fields | López-Jiménez *et al.*, 2017 |
|  |  |  | *Poecilia mexicana* | Río Perez | López-Jiménez *et al.*, 2017 |
| Gorgoderidae Looss, 1899 | *Phyllodistomum romualdae* | A | *Archocentrus centrarchus* | Finca Espavel, San Carlos | Pinacho-Pinacho *et al*., 2021 |
|  | *Phyllodistomum scotti* | A | *Rhamdia nicaraguensis* | Finca Espavel, San Carlos | Pinacho-Pinacho *et al*., 2021 |
|  |  |  | *Rhamdia nicaraguensis* | Palo de Arquito | Pinacho-Pinacho *et al*., 2021 |
| Haploporidae Nicoll, 1914 | *Saccocoelioides cichlidorum (=Culuwiya cichlidorum\*\*)* | A | *Vieja maculicauda* | Torsuani River | Andrade-Gómez *et al*., 2019 |
|  |  |  | *Vieja maculicauda* | Caño Marañon | Aguirre-Macedo & Scholz, 2005; Andrade-Gómez et al., 2017 |
|  |  |  | *Vieja maculicauda* | Torsuani River | Aguirre-Macedo & Scholz, 2005; Andrade-Gómez et al., 2017 |
|  | ***Saccocoelioides* cf. *lamothei*** | A | *Amphilophus citrinellus* | Crater lake Asosca León | Santacruz *et al*., 2021 |
|  |  |  | *Hypsophrys nematopus* | Lake Nicaragua | Santacruz *et al*., 2021 |
|  |  |  | *Oreochromis* sp. | Crater lake Asosca León | Santacruz *et al*., 2021 |
|  |  |  | *Poecilia* sp. | Crater lake Asosca León | **This study** |
|  |  |  | *Poecilia* sp. | Crater lake Xiloá | **This study** |
|  | ***Saccocoelioides orosiensis*** | A | *Amatitlania nigrofasciata* | Crater lake Apoyo | Santacruz *et al*., 2021 |
|  |  |  | *Amphilophus astorquii* | Crater lake Apoyo | Santacruz *et al*., 2021 |
|  |  |  | *Amphilophus chancho* | Crater lake Apoyo | Santacruz *et al*., 2021 |
|  |  |  | *Amphilophus sagittae* | Crater lake Xiloá | Santacruz *et al*., 2021 |
|  |  |  | *Amphilophus xiloaensis* | Crater lake Xiloá | Santacruz *et al*., 2021 |
|  |  |  | *Amphilophus zaliosus* | Crater lake Apoyo | Santacruz *et al*., 2021 |
|  |  |  | *Hypsophrys nematopus* | Crater lake Xiloá | Santacruz *et al*., 2021 |
|  |  |  | *Hypsophrys nicaraguensis* | Crater lake Xiloá | Santacruz *et al*., 2021 |
|  |  |  | *Oreochromis* sp. | Crater lake Asosca León | Santacruz *et al*., 2021 |
|  |  |  | *Poecilia* sp. | Lake Nicaragua | **This study** |
|  |  |  | *Poecilia* sp. | Crater lake Asosca León | **This study** |
|  |  |  | *Poecilia* sp. | Crater lake Xiloá | **This study** |
|  | *Saccocoelioides sogandaresi* | A | *Poecilia velifera* | Caño Marañon | Aguirre-Macedo *et al*., 2001b |
|  | *Saccocoelioides* sp. | A | *Brycon* sp. | Torsuani River | Andrade-Gómez *et al.*, 2017 |
|  |  |  | *Amphilophus astorquii* | Crater lake Apoyo | Santacruz *et al*., 2021 |
|  |  |  | *Amphilophus chancho* | Crater lake Apoyo | Santacruz *et al*., 2021 |
|  |  |  | *Amphilophus citrinellus* | Lake Managua | Santacruz *et al*., 2021 |
|  |  |  | *Amphilophus citrinellus* | Crater lake Asosca León | Santacruz *et al*., 2021 |
|  |  |  | *Amphilophus flaveolus* | Crater lake Apoyo | Santacruz *et al*., 2021 |
|  |  |  | *Amphilophus globosus* | Crater lake Apoyo | Santacruz *et al*., 2021 |
|  |  |  | *Amphilophus sagittae* | Crater lake Xiloá | Santacruz *et al*., 2021 |
|  |  |  | *Amphilophus zaliosus* | Crater lake Apoyo | Santacruz *et al*., 2021 |
|  |  |  | *Hypsophrys nematopus* | Lake Nicaragua | Santacruz *et al*., 2021 |
|  |  |  | *Oreochromis* sp. | Lake Managua | Santacruz *et al*., 2021 |
|  |  |  | *Oreochromis* sp. | Crater lake Asosca León | Santacruz *et al*., 2021 |
|  |  |  | *Parachromis* sp. | Lake Managua | Santacruz *et al*., 2021 |
|  |  |  | *Poecilia* sp. | Lake Managua | **This study** |
|  |  |  | *Poecilia* sp. | Crater lake Asosca León | **This study** |
|  |  |  | *Poecilia* sp. | Crater lake Xiloá | **This study** |
|  |  |  | *Roeboides guatemalensis* | Lake Nicaragua | Watson, 1976 |
|  | *Saccocoelioides* sp. 1 | A | *Vieja maculicauda* | Torsuani River | Aguirre-Macedo *et al*., 2001b |
|  |  |  | *Vieja maculicauda* | Caño Marañon | Aguirre-Macedo *et al*., 2001b |
|  | *Saccocoelioides* sp. 2 | A | *Astyanax fasciatus* | Torsuani River | Aguirre-Macedo *et al*., 2001b |
|  | *Saccocoelioides tkachi* | A | *Astyanax aeneus* | Palo de Arquito | Andrade-Gómez *et al*., 2019 |
|  |  |  | *Astyanax aeneus* | Río Perez | Andrade-Gómez *et al*., 2019 |
|  |  |  | *Astyanax aeneus* | Torsuani River | Andrade-Gómez *et al*., 2019 |
| Heterophyidae Leiper, 1909 | *Ascocotyle diminuta* | L | *Poecilia velifera* | Caño Marañon | Aguirre-Macedo *et al*., 2001a |
|  | *Ascocotyle mollienisicola* | L | *Poecilia velifera* | Caño Marañon | Aguirre-Macedo *et al*., 2001a |
|  | *Ascocotyle nana* | L | *Vieja maculicauda* | Torsuani River | Aguirre-Macedo *et al*., 2001a |
|  | *Ascocotyle pindoramensis* | L | *Amphilophus labiatus* | Lake Nicaragua | Santacruz *et al*., 2021 |
|  |  |  | *Parachromis* sp. | Lake Managua | Santacruz *et al*., 2021 |
|  | *Ascocotyle tenuicollis* | L | *Astyanax fasciatus* | Torsuani River | Aguirre-Macedo *et al*., 2001a |
|  |  |  | *Poecilia velifera* | Torsuani River | Aguirre-Macedo *et al*., 2001a |
|  |  |  | *Vieja maculicauda* | Torsuani River | Aguirre-Macedo *et al*., 2001a |
|  | ***Centrocestus formosanus\**** | L | *Astyanax* sp. | Lake Nicaragua | **This study** |
|  |  |  | *Astyanax* sp. | Lake Managua | **This study** |
|  | Heterophyidae gen. sp. | L | *Cribroheros alfari* | Loonku Creek, Bluefields | Aguirre-Macedo *et al*., 2001a |
|  |  |  | *Herotilapia multispinosa* | Loonku Creek, Bluefields | Aguirre-Macedo *et al*., 2001a |
|  |  |  | *Oreochromis* sp. | Lake Managua | Santacruz *et al*., 2021 |
|  |  |  | *Parachromis managuensis* | Mahogany River | Aguirre-Macedo *et al*., 2001a |
| Lepocreadiidae Odhner, 1905 | *Crassicutis cichlasomae* | A | *Archocentrus centrarchus* | Lake Nicaragua | Santacruz *et al*., 2021 |
|  |  |  | *Amatitlania nigrofasciata* | Lake Nicaragua | Santacruz *et al*., 2021 |
|  |  |  | *Amatitlania nigrofasciata* | Crater lake Xiloá | Santacruz *et al*., 2021 |
|  |  |  | *Amphilophus amarillo* | Crater lake Xiloá | Santacruz *et al*., 2021 |
|  |  |  | *Amphilophus astorquii* | Crater lake Apoyo | Santacruz *et al*., 2021 |
|  |  |  | *Amphilophus chancho* | Crater lake Apoyo | Santacruz *et al*., 2021 |
|  |  |  | *Amphilophus citrinellus* | Lake Managua | Santacruz *et al*., 2021 |
|  |  |  | *Amphilophus citrinellus* | Crater lake Asosca León | Santacruz *et al*., 2021 |
|  |  |  | *Amphilophus citrinellus* | Crater lake Apoyeque | Santacruz *et al*., 2021 |
|  |  |  | *Amphilophus citrinellus* | Crater lake Masaya | Santacruz *et al*., 2021 |
|  |  |  | *Amphilophus citrinellus* | Lake Nicaragua | Watson, 1976; Santacruz *et al*., 2021 |
|  |  |  | *Amphilophus flaveolus* | Crater lake Apoyo | Santacruz *et al*., 2021 |
|  |  |  | *Amphilophus globosus* | Crater lake Apoyo | Santacruz *et al*., 2021 |
|  |  |  | *Amphilophus labiatus* | Lake Managua | Santacruz *et al*., 2021 |
|  |  |  | *Amphilophus labiatus* | Lake Nicaragua | Watson, 1976; Santacruz *et al*., 2021 |
|  |  |  | *Amphilophus sagittae* | Crater lake Xiloá | Santacruz *et al*., 2021 |
|  |  |  | *Amphilophus xiloaensis* | Crater lake Xiloá | Santacruz *et al*., 2021 |
|  |  |  | *Amphilophus zaliosus* | Crater lake Apoyo | Santacruz *et al*., 2021 |
|  |  |  | *Cribroheros longimanus* | Crater lake Xiloá | Santacruz *et al*., 2021 |
|  |  |  | *Cribroheros longimanus* | Crater lake Masaya | Santacruz *et al*., 2021 |
|  |  |  | *Cribroheros rostratus* | Lake Managua | Santacruz *et al*., 2021 |
|  |  |  | *Cribroheros rostratus* | Crater lake Xiloá | Santacruz *et al*., 2021 |
|  |  |  | *Cribroheros rostratus* | Lake Nicaragua | Watson, 1976; Santacruz *et al*., 2021 |
|  |  |  | *Cryptoheros spilurus* | Lake Nicaragua | Watson, 1976 |
|  |  |  | *Hypsophrys nicaraguensis* | Crater lake Xiloá | Santacruz *et al*., 2021 |
|  |  |  | *Hypsophrys nematopus* | Lake Nicaragua | Santacruz *et al*., 2021 |
|  |  |  | *Hypsophrys nicaraguensis* | Lake Nicaragua | Watson, 1976; Santacruz *et al*., 2021 |
|  |  |  | *Parachromis managuensis* | Lake Nicaragua | Watson, 1976; Santacruz *et al*., 2021 |
|  |  |  | *Parachromis* sp. | Lake Managua | Santacruz *et al*., 2021 |
|  |  |  | *Parachromis* sp. | Crater lake Apoyeque | Santacruz *et al*., 2021 |
|  |  |  | *Parachromis* sp. | Crater lake Apoyo | Santacruz *et al*., 2021 |
|  |  |  | *Vieja maculicauda* | Caño Marañon | Aguirre-Macedo et al., 2001b; Santacruz et al., 2021 |
| Macroderoididae McMullen, 1937 | *Perezitrema* sp. *(=Allomacroderoides lepisostei)* | A | *Atractosteus tropicus* | Lake Nicaragua | Watson, 1976 |
| Opisthorchiidae Losss, 1899 | *Cladocystis trifolium* | A | *Parachromis managuensis* | Mahogany River | Aguirre-Macedo *et al.*, 2001a |
| Proterodiplostomidae Dubois, 1936 | Proterodiplostomidae gen sp. | A | *Astyanax fasciatus* | Torsuani River | Aguirre-Macedo *et al.*, 2001a |
|  |  |  | *Herotilapia multispinosa* | Loonku Creek, Bluefields | Aguirre-Macedo *et al.*, 2001a |
|  |  |  | *Rhamdia managuensis* | Puente Chino | Aguirre-Macedo *et al.*, 2001a |
| Strigeidae Railliet, 1919 | Strigeidae gen sp. | L | *Hypsophrys nematopus* | Lake Nicaragua | Santacruz *et al*., 2021 |
| **Cestoda** |  |  |  |  |  |
| Cyclophyllidea van Beneden in Braun, 1900 | **Cyclophylidea gen. sp.** | L | *Poecilia* sp. | Lake Nicaragua | **This study** |
| Proteocephalidae La Rue, 1911 | *Cichlidocestus janikae* | A | *Amphilophus citrinellus* | Lake Nicaragua | Santacruz *et al*., 2021 |
|  |  |  | *Hypsophrys nicaraguensis* | Lake Nicaragua | Santacruz *et al*., 2021 |
|  | **Proteocephalidae gen. sp.** | A | *Astyanax fasciatus* | Torsuani River | Aguirre-Macedo *et al.*, 2001a |
|  |  |  | *Herotilapia multispinosa* | Mahogany River | Aguirre-Macedo *et al.*, 2001a |
|  |  |  | *Parachromis managuensis* | Mahogany River | Aguirre-Macedo *et al.*, 2001a |
|  |  |  | *Rhamdia* sp. | Lake Nicaragua | **This study** |
|  | *Proteocephalus gaspari* | A | *Atractosteus tropicus* | Lake Managua | Chambrier & Vaucher, 1984 |
| Bothriocephalidae Blanchard, 1949 | *Schyzocotyle acheilognathi* | A | *Amphilophus citrinellus* | Lake Managua | Santacruz *et al*., 2021 |
|  |  |  | *Parachromis* sp. | Crater lake Xiloá | Santacruz *et al*., 2021 |
| **Monogenea** |  |  |  |  |  |
| Dactylogyridae Bychowsky, 1933 | *Aphanoblastella travassosi* | A | *Rhamdia nicaraguensis* | Macantaca River | Mendoza-Franco *et al*., 2003 |
|  |  |  | *Rhamdia nicaraguensis* | Black Water River | Mendoza-Franco *et al*., 2003 |
|  |  |  | *Rhamdia nicaraguensis* | Smaya Creek | Mendoza-Franco *et al*., 2003 |
|  |  |  | *Rhamdia nicaraguensis* | Loonku Creek, Bluefields | Mendoza-Franco *et al*., 2003 |
|  |  |  | *Rhamdia nicaraguensis* | Puente Chino | Mendoza-Franco *et al*., 2003 |
|  | Ancyrocephalinae sp. | A | *Astyanax fasciatus* | Ron River | Mendoza-Franco *et al*., 2003 |
|  | ***Characithecium costaricensis*** *(= Urocleroides costaricensis)* | A | *Astyanax* sp. | Lake Managua | **This study** |
|  |  |  | *Astyanax* sp. | Lake Nicaragua | **This study** |
|  |  |  | *Astyanax fasciatus* | Black Water River | Mendoza-Franco *et al*., 2003 |
|  |  |  | *Astyanax fasciatus* | Torsuani River | Mendoza-Franco *et al*., 2003 |
|  |  |  | *Bramocharax* sp. | Lake Managua | **This study** |
|  |  |  | *Bramocharax* sp. | Lake Nicaragua | **This study** |
|  | *Cichlidogyrus sclerosus\** | A | *Oreochromis* sp. | Crater lake Asosca León | Santacruz *et al*., 2021 |
|  | *Cleidodiscus chavarriai (=Ameloblastella chavarriai)* | A | *Rhamdia nicaraguensis* | Macantaca River | Mendoza-Franco *et al*., 2003 |
|  |  |  | *Rhamdia nicaraguensis* | Puente Chino | Mendoza-Franco *et al*., 2003 |
|  | *Cleidodiscus strombicirrus (=Urocleroides strombicirrus)* | A | *Astyanax fasciatus* | Ron River | Mendoza-Franco *et al*., 2003 |
|  |  |  | *Astyanax fasciatus* | Walpatara bridge | Mendoza-Franco *et al*., 2003 |
|  | **Dactylogyridae gen. sp.** | A | *Bramocharax* sp. | Lake Nicaragua | **This study** |
|  | *Dermophthirius maccallumi* | A | *Carcharhinus leucas* | Río San Juan, San Juan | Watson & Thorson, 1976 |
|  | *Gussevia herotilapiae* | A | *Herotilapia multispinosa* | Mahogany river | Vidal-Martínez et al., 2001 |
|  | *Heteronchocotyle leucas* | A | *Carcharhinus leucas* | Río San Juan, San Juan | Watson & Thorson, 1976 |
|  |  |  | *Carcharhinus leucas* | Zapatera Island, Lake Nicaragua | Watson & Thorson, 1976 |
|  | *Sciadicleithrum bicuense* | A | *Amatitlania nigrofasciata* | Loonku Creek, Bluefields | Vidal-Martínez et al., 2001 |
|  | *Sciadicleithrum bravohollisae* | A | *Vieja maculicauda* | Karawalas river | Mendoza-Franco *et al*., 2003 |
|  |  |  | *Vieja maculicauda* | Torsuani River | Mendoza-Franco *et al*., 2003 |
|  |  |  | *Vieja maculicauda* | Pahra Tingni River | Mendoza-Franco *et al*., 2003 |
|  |  |  | *Vieja maculicauda* | Sandy Bay Sirpi community | Mendoza-Franco *et al*., 2003 |
|  |  |  | *Vieja maculicauda* | Tuba Awala Creek | Mendoza-Franco *et al*., 2003 |
|  |  |  | *Vieja maculicauda* | Torsuani River | Mendoza-Palmero et al., 2017 |
|  | *Sciadicleithrum maculicaudae* | A | *Vieja maculicauda* | Caño Marañon | Vidal-Martínez *et al*., 2001 |
|  | *Sciadicleithrum meekii* | A | *Amatitlania nigrofasciata* | Loonku Creek, Bluefields | Vidal-Martínez *et al*., 2001 |
|  |  |  | *Amatitlania nigrofasciata* | Ron River | Mendoza-Franco *et al*., 2003 |
|  | *Sciadicleithrum mexicanum* | A | *Amphilophus amarillo* | Crater lake Xiloá | Santacruz *et al*., 2021 |
|  |  |  | *Amphilophus astorquii* | Crater lake Apoyo | Santacruz *et al*., 2021 |
|  |  |  | *Amphilophus chancho* | Crater lake Apoyo | Santacruz *et al*., 2021 |
|  |  |  | *Amphilophus citrinellus* | Lake Nicaragua | Santacruz *et al*., 2021 |
|  |  |  | *Amphilophus citrinellus* | Lake Managua | Santacruz *et al*., 2021 |
|  |  |  | *Amphilophus citrinellus* | Crater lake Masaya | Santacruz *et al*., 2021 |
|  |  |  | *Amphilophus flaveolus* | Crater lake Apoyo | Santacruz *et al*., 2021 |
|  |  |  | *Amphilophus sagittae* | Crater lake Xiloá | Santacruz *et al*., 2021 |
|  |  |  | *Amphilophus xiloaensis* | Crater lake Xiloá | Santacruz *et al*., 2021 |
|  |  |  | *Amphilophus zaliosus* | Crater lake Apoyo | Santacruz *et al*., 2021 |
|  |  |  | *Mayaheros urophthalmus* | Swakan Creek | Mendoza-Franco *et al*., 2003 |
|  |  |  | *Parachromis dovii* | Ron River | Mendoza-Franco *et al*., 2003 |
|  |  |  | *Parachromis dovii* | Torsuani River | Mendoza-Franco *et al*., 2003 |
|  |  |  | *Parachromis managuensis* | Caño Negro | Vidal-Martínez *et al*., 2001 |
|  |  |  | *Parachromis managuensis* | Puente Chino | Vidal-Martínez *et al*., 2001 |
|  |  |  | *Parachromis managuensis* | Mahogany river | Vidal-Martínez *et al*., 2001 |
|  |  |  | *Parachromis managuensis* | Macantaca River | Mendoza-Franco *et al*., 2003 |
|  |  |  | *Parachromis* sp. | Lake Nicaragua | Santacruz *et al*., 2021 |
|  |  |  | *Parachromis* sp. | Lake Managua | Santacruz *et al*., 2021 |
|  |  |  | *Parachromis* sp. | Crater lake Asosca León | Santacruz *et al*., 2021 |
|  |  |  | *Parachromis* sp. | Crater lake Apoyeque | Santacruz *et al*., 2021 |
|  |  |  | *Parachromis* sp. | Crater lake Apoyo | Santacruz *et al*., 2021 |
|  |  |  | *Tomocichla tuba* | Torsuani River | Mendoza-Franco *et al*., 2003 |
|  |  |  | *Vieja maculicauda* | Torsuani River | Vidal-Martínez *et al.*, 2001; Mendoza-Franco *et al*., 2003 |
|  |  |  | *Vieja maculicauda* | Caño Marañon | Vidal-Martínez *et al.*, 2001; Mendoza-Franco *et al*., 2003 |
|  |  |  | *Vieja maculicauda* | Ron River | Vidal-Martínez *et al.*, 2001; Mendoza-Franco *et al*., 2003 |
|  |  |  | *Vieja maculicauda* | Torsuani River | Mendoza-Palmero *et al.*, 2017 |
|  | *Sciadicleithrum nicaraguense* |  | *Cribroheros alfari* | Loonku Creek, Bluefields | Vidal-Martínez *et al.*, 2001; Mendoza-Franco *et al*., 2003 |
|  |  | A | *Cribroheros alfari* | Ron River | Vidal-Martínez *et al.*, 2001; Mendoza-Franco *et al*., 2003 |
|  |  |  | *Cribroheros alfari* | Torsuani River | Vidal-Martínez *et al.*, 2001; Mendoza-Franco *et al*., 2003 |
|  |  |  | *Cribroheros longimanus* | Crater lake Masaya | Santacruz *et al*., 2021 |
|  | *Sciadicleithrum* sp. 1 | A | *Amatitlania nigrofasciata* | Crater lake Xiloá | Santacruz *et al*., 2021 |
|  | *Sciadicleithrum* sp. 2 | A | *Cribroheros rostratus* | Lake Nicaragua | Santacruz *et al*., 2021 |
|  | *Salsuginus neotropicalis* | A | *Belonesox belizanus* | Ron River | Mendoza-Franco *et al*., 2003 |
|  | *Palombitrema heteroancistrium* | A | *Astyanax fasciatus* | Black Water River | Mendoza-Franco *et al*., 2003 |
|  |  |  | *Astyanax fasciatus* | El Padre River | Mendoza-Franco *et al*., 2003 |
| Diplectanidae Monticelli, 1903 | *Diplectanocotyla megalopis* | A | *Megalops atlanticus* | Loonku Creek, Bluefields | Mendoza-Franco *et al*., 2004 |
| Hexabothriidae Price, 1942 | *Erpocotyle carcharhini* | A | *Carcharhinus leucas* | Río San Juan, San Juan | Watson & Thorson, 1976 |
|  | *Erpocotyle caribbensis* | A | *Pristis perotteti* | Río Tipitapa, Los Cocos | Watson & Thorson, 1976 |
|  |  |  | *Pristis perotteti* | Río San Juan, San Juan | Watson & Thorson, 1976 |
|  | *Pristonchotyle intermedia* | A | *Pristis perotteti* | Río Tipitapa, Los Cocos | Watson & Thorson, 1976 |
|  |  |  | *Pristis perotteti* | Río San Juan, San Juan | Watson & Thorson, 1976 |
| **Acanthocephala** |  |  |  |  |  |
| Neoechinorhynchidae Ward, 1917 | *Neoechinorhynchus costarricense* (=*Neoechinorhynchus golvani*) | A | *Amatitlania nigrofasciata* | Lake Nicaragua | Santacruz *et al*., 2021 |
|  |  |  | *Amatitlania nigrofasciata* | Crater lake Xiloá | Santacruz *et al*., 2021 |
|  |  |  | *Amatitlania nigrofasciata* | Crater lake Apoyo | Santacruz *et al*., 2021 |
|  |  |  | *Amphilophus amarillo* | Crater lake Xiloá | Santacruz *et al*., 2021 |
|  |  |  | *Amphilophus astorquii* | Crater lake Apoyo | Santacruz *et al*., 2021 |
|  |  |  | *Amphilophus chancho* | Crater lake Apoyo | Santacruz *et al*., 2021 |
|  |  |  | *Amphilophus citrinellus* | Lake Managua | Santacruz *et al*., 2021 |
|  |  |  | *Amphilophus citrinellus* | Crater lake Asosca León | Santacruz *et al*., 2021 |
|  |  |  | *Amphilophus citrinellus* | Crater lake Apoyeque | Santacruz *et al*., 2021 |
|  |  |  | *Amphilophus citrinellus* | Crater lake Masaya | Santacruz *et al*., 2021 |
|  |  |  | *Amphilophus labiatus* | Lake Nicaragua | Santacruz *et al*., 2021 |
|  |  |  | *Amphilophus sagittae* | Crater lake Xiloá | Santacruz *et al*., 2021 |
|  |  |  | *Amphilophus xiloaensis* | Crater lake Xiloá | Santacruz *et al*., 2021 |
|  |  |  | *Amphilophus zaliosus* | Crater lake Apoyo | Santacruz *et al*., 2021 |
|  |  |  | *Cribroheros longimanus* | Crater lake Xiloá | Santacruz *et al*., 2021 |
|  |  |  | *Cribroheros alfari* | Loonku Creek, Bluefields | Aguirre-Macedo *et al*., 2001b |
|  |  |  | *Herotilapia multispinosa* | Loonku Creek, Bluefields | Aguirre-Macedo *et al*., 2001b |
|  |  |  | *Herotilapia multispinosa* | Puente Chino | Aguirre-Macedo *et al*., 2001b |
|  |  |  | *Herotilapia multispinosa* | Lake Nicaragua | Santacruz *et al*., 2021 |
|  |  |  | *Hypsophrys nicaraguensis* | Lake Nicaragua | Santacruz *et al*., 2021 |
|  |  |  | *Hypsophrys nematopus* | Lake Nicaragua | Santacruz *et al*., 2021 |
|  |  |  | *Oreochromis sp.* | Crater lake Asosca León | Santacruz *et al*., 2021 |
|  |  |  | *Parachromis managuensis* | Puente Chino | Aguirre-Macedo *et al*., 2001b |
|  |  |  | *Parachromis managuensis* | Caño Negro | Aguirre-Macedo *et al*., 2001b |
|  |  |  | *Parachromis* sp. | Lake Nicaragua | Santacruz *et al*., 2021 |
|  |  |  | *Parachromis* sp. | Crater lake Asosca León | Santacruz *et al*., 2021 |
|  |  |  | *Parachromis* sp. | Crater lake Apoyeque | Santacruz *et al*., 2021 |
|  |  |  | *Parachromis* sp. | Crater lake Xiloá | Santacruz *et al*., 2021 |
|  |  |  | *Parachromis* sp. | Crater lake Apoyo | Santacruz *et al*., 2021 |
| Polymorphidae Meyer, 1931 | *Polymorphus brevis* | L | *Amphilophus citrinellus* | Lake Nicaragua | Santacruz *et al*., 2021 |
|  |  |  | *Amphilophus labiatus* | Lake Nicaragua | Santacruz *et al*., 2021 |
|  |  |  | *Hypsophrys nematopus* | Lake Nicaragua | Santacruz *et al*., 2021 |
|  |  |  | *Parachromis* sp. | Lake Nicaragua | Santacruz *et al*., 2021 |
|  |  |  | *Vieja* sp. | Lake Nicaragua | Santacruz *et al*., 2021 |
| **Nematoda** |  |  |  |  |  |
| Anisakidae Railliet & Henry, 1912 | *Contracaecum* sp. | L | *Cribroheros alfari* | Torsuani River | Aguirre-Macedo *et al*., 2001a |
|  |  |  | *Amatitlania nigrofasciata* | Loonku Creek, Bluefields | Aguirre-Macedo *et al*., 2001a |
|  |  |  | *Amphilophus amarillo* | Crater lake Xiloá | González-Solís *et al*., 2006 |
|  |  |  | *Amphilophus sagittae* | Crater lake Xiloá | González-Solís *et al*., 2006 |
|  |  |  | *Amphilophus xiloaensis* | Crater lake Xiloá | González-Solís *et al*., 2006 |
|  |  |  | *Astyanax fasciatus* | Torsuani River | Aguirre-Macedo *et al*., 2001a |
|  |  |  | *Gobiomorus dormitor* | Crater lake Xiloá | González-Solís *et al*., 2006 |
|  |  |  | *Gobiomorus* sp. | Crater lake Masaya | Santacruz *et al*., 2021 |
|  |  |  | *Herotilapia multispinosa* | Loonku Creek, Bluefields | Aguirre-Macedo *et al*., 2001a |
|  |  |  | *Parachromis managuensis* | Mahogany River | Aguirre-Macedo *et al*., 2001a |
|  |  |  | *Parachromis managuensis* | Caño Negro | Aguirre-Macedo *et al*., 2001a |
|  |  |  | *Poecilia velifera* | Torsuani River | Aguirre-Macedo *et al*., 2001a |
|  |  |  | *Vieja maculicauda* | Loonku Creek, Bluefields | Aguirre-Macedo *et al*., 2001a |
|  | ***Contracaecum* sp. 1** | L | *Amphilophus citrinellus* | Lake Nicaragua | Santacruz *et al*., 2021 |
|  |  |  | *Amphilophus labiatus* | Lake Nicaragua | Santacruz *et al*., 2021 |
|  |  |  | *Amphilophus amarillo* | Crater lake Xiloá | Santacruz *et al*., 2021 |
|  |  |  | *Amphilophus astorquii* | Crater lake Xiloá | Santacruz *et al*., 2021 |
|  |  |  | *Amphilophus chancho* | Crater lake Xiloá | Santacruz *et al*., 2021 |
|  |  |  | *Amphilophus citrinellus* | Lake Managua | Santacruz *et al*., 2021 |
|  |  |  | *Amphilophus citrinellus* | Crater lake Asosca León | Santacruz *et al*., 2021 |
|  |  |  | *Amphilophus citrinellus* | Crater lake Masaya | Santacruz *et al*., 2021 |
|  |  |  | *Amphilophus labiatus* | Lake Managua | Santacruz *et al*., 2021 |
|  |  |  | *Amphilophus xiloaensis* | Crater lake Xiloá | Santacruz *et al*., 2021 |
|  |  |  | *Amphilophus xiloaensis* | Crater lake Xiloá | Santacruz *et al*., 2021 |
|  |  |  | *Amphilophus zaliosus* | Crater lake Xiloá | Santacruz *et al*., 2021 |
|  |  |  | Archocentrus centrarchus | Lake Nicaragua | Santacruz *et al*., 2021 |
|  |  |  | *Astyanax* sp. | Lake Managua | **This study** |
|  |  |  | *Astyanax* sp. | Lake Nicaragua | **This study** |
|  |  |  | *Cribroheros longimanus* | Crater lake Masaya | Santacruz *et al*., 2021 |
|  |  |  | *Cribroheros rostratus* | Lake Nicaragua | Santacruz *et al*., 2021 |
|  |  |  | *Cribroheros rostratus* | Lake Managua | Santacruz *et al*., 2021 |
|  |  |  | *Cribroheros rostratus* | Crater lake Xiloá | Santacruz *et al*., 2021 |
|  |  |  | *Hypsophrys nicaraguensis* | Crater lake Xiloá | Santacruz *et al*., 2021 |
|  |  |  | *Hypsophrys nematopus* | Lake Nicaragua | Santacruz *et al*., 2021 |
|  |  |  | *Hypsophrys nematopus* | Crater lake Xiloá | Santacruz *et al*., 2021 |
|  |  |  | *Hypsophrys nicaraguensis* | Lake Nicaragua | Santacruz *et al*., 2021 |
|  |  |  | *Parachromis* sp. | Lake Nicaragua | Santacruz *et al*., 2021 |
|  |  |  | *Parachromis* sp. | Crater lake Asosca León | Santacruz *et al*., 2021 |
|  |  |  | *Parachromis* sp. | Lake Managua | Santacruz *et al*., 2021 |
|  |  |  | *Parachromis* sp. | Crater lake Xiloá | Santacruz *et al*., 2021 |
|  |  |  | *Parachromis* sp. | Crater lake Xiloá | Santacruz *et al*., 2021 |
|  |  |  | *Vieja* sp. | Lake Nicaragua | Santacruz *et al*., 2021 |
|  | *Contracaecum* sp. 2 | L | *Amphilophus citrinellus* | Crater lake Asosca León | Santacruz *et al*., 2021 |
|  |  |  | *Parachromis* sp. | Crater lake Asosca León | Santacruz *et al*., 2021 |
|  | *Contracaecum* sp. 3 | L | *Amphilophus citrinellus* | Crater lake Asosca León | Santacruz *et al*., 2021 |
|  |  |  | *Parachromis* sp. | Crater lake Asosca León | Santacruz *et al*., 2021 |
| Atractidae Railliet, 1917 | *Orientatractis chiapasensis* | A | *Tomocichla tuba* | Torsuani River | González-Solís & Moravec, 2004 |
| Camallanidae Railliet & Henry, 1915 | *Procamallanus neocaballeroi* | A | *Astyanax fasciatus* | Mahogany River | Aguirre-Macedo *et al*., 2001b |
|  |  |  | *Vieja maculicauda* | Torsuani River | Aguirre-Macedo *et al*., 2001b |
|  | *Procamallanus barlowi (=Procamallanus rebecae)* | A | *Cribroheros alfari* | Torsuani River | Aguirre-Macedo *et al*., 2001b |
|  |  |  | *Amphilophus citrinellus* | Crater lake Apoyo | González-Solís *et al*., 2006 |
|  |  |  | *Amatitlania nigrofasciata* | Crater lake Apoyo | Santacruz *et al*., 2021 |
|  |  |  | *Amphilophus astorquii* | Crater lake Apoyo | Santacruz *et al*., 2021 |
|  |  |  | *Amphilophus chancho* | Crater lake Apoyo | Santacruz *et al*., 2021 |
|  |  |  | *Amphilophus citrinellus* | Lake Nicaragua | Santacruz *et al*., 2021 |
|  |  |  | *Amphilophus citrinellus* | Crater lake Asosca León | Santacruz *et al*., 2021 |
|  |  |  | *Amphilophus citrinellus* | Lake Managua | Santacruz *et al*., 2021 |
|  |  |  | *Amphilophus citrinellus* | Crater lake Masaya | Santacruz *et al*., 2021 |
|  |  |  | *Amphilophus labiatus* | Lake Nicaragua | Santacruz *et al*., 2021 |
|  |  |  | *Amphilophus labiatus* | Lake Managua | Santacruz *et al*., 2021 |
|  |  |  | *Amphilophus zaliosus* | Crater lake Apoyo | Santacruz *et al*., 2021 |
|  |  |  | *Cribroheros longimanus* | Lake Nicaragua | Santacruz *et al*., 2021 |
|  |  |  | *Cribroheros longimanus* | Crater lake Masaya | Santacruz *et al*., 2021 |
|  |  |  | *Cribroheros rostratus* | Lake Nicaragua | Santacruz *et al*., 2021 |
|  |  |  | *Herotilapia multispinosa* | Loonku Creek, Bluefields | Aguirre-Macedo *et al*., 2001b |
|  |  |  | *Hypsophrys nematopus* | Lake Nicaragua | Santacruz *et al*., 2021 |
|  |  |  | *Hypsophrys nicaraguensis* | Lake Nicaragua | Santacruz *et al*., 2021 |
|  |  |  | *Parachromis managuensis* | Crater lake Apoyo | González-Solís *et al*., 2006; Santacruz *et al.*, 2021 |
|  |  |  | *Parachromis* sp. | Crater lake Apoyeque | Santacruz *et al*., 2021 |
|  |  |  | *Parachromis* sp. | Lake Managua | Santacruz *et al*., 2021 |
|  |  |  | *Vieja maculicauda* | Loonku Creek, Bluefields | Aguirre-Macedo *et al*., 2001b |
|  | *Serpinema trispinosum* | A | *Cribroheros alfari* | Puente Chino | Aguirre-Macedo *et al.*, 2001a |
|  |  |  | *Herotilapia multispinosa* | Puente Chino | Aguirre-Macedo *et al.*, 2001a |
|  |  |  | *Parachromis managuensis* | Puente Chino | Aguirre-Macedo *et al.*, 2001a |
| Capillariidae Railliet, 1915 | *Paracapillaria teixerafreitasi* | A | *Gobiomorus dormitor* | Crater lake Xiloá | González-Solís *et al*., 2006 |
| Dioctophymatidae Railliet, 1915 | *Eustrongylides* sp. | L | *Parachromis managuensis* | Mahogany River | Aguirre-Macedo *et al.*, 2001a |
| Gnathostomatidae Railliet, 1895 | *Spiroxys* sp. | L | *Cribroheros alfari* | Puente Chino | Aguirre-Macedo *et al.*, 2001a |
|  |  |  | *Astyanax fasciatus* | Puente Chino | Aguirre-Macedo *et al.*, 2001a |
|  |  |  | *Herotilapia multispinosa* | Loonku Creek, Bluefields | Aguirre-Macedo *et al.*, 2001a |
|  |  |  | *Parachromis managuensis* | Caño Negro | Aguirre-Macedo *et al.*, 2001a |
|  |  |  | *Parachromis managuensis* | Mahogany River | Aguirre-Macedo *et al.*, 2001a |
|  |  |  | *Parachromis managuensis* | Puente Chino | Aguirre-Macedo *et al.*, 2001a |
|  |  |  | *Vieja maculicauda* | Loonku Creek, Bluefields | Aguirre-Macedo *et al.*, 2001a |
| Heterocheilidae Railliet & Henry, 1915 | *Brevimulticaecum* sp. | L | *Astyanax fasciatus* | Torsuani River | Aguirre-Macedo *et al.*, 2001a |
|  |  |  | *Rhamdia guatemalensis* | Loonku Creek, Bluefields | Aguirre-Macedo *et al.*, 2001a |
|  |  |  | *Vieja maculicauda* | Torsuani River | Aguirre-Macedo *et al.*, 2001a |
| Kathlaniidae Lane, 1914 | *Falcaustra* sp. | L | *Cribroheros alfari* | Puente Chino | Aguirre-Macedo *et al.*, 2001a |
|  |  |  | *Amatitlania nigrofasciata* | Puente Chino | Aguirre-Macedo *et al.*, 2001a |
|  |  |  | *Herotilapia multispinosa* | Mahogany River | Aguirre-Macedo *et al.*, 2001a |
|  |  |  | *Herotilapia multispinosa* | Loonku Creek, Bluefields | Aguirre-Macedo *et al.*, 2001a |
|  |  |  | *Herotilapia multispinosa* | Puente Chino | Aguirre-Macedo *et al.*, 2001a |
|  |  |  | *Vieja maculicauda* | Torsuani River | Aguirre-Macedo *et al.*, 2001a |
| Raphidascarididae Hartwich, 1954 | Acuariidae gen. sp. | L | *Amphilophus amarillo* | Crater lake Xiloá | González-Solís *et al*., 2006 |
|  | *Goezia* sp. | A | *Amphilophus sagittae* | Crater lake Xiloá | Santacruz *et al*., 2021 |
|  |  |  | *Amphilophus xiloaensis* | Crater lake Xiloá | González-Solís *et al.*, 2006 |
|  |  |  | *Amphilophus zaliosus* | Crater lake Apoyo | Santacruz *et al*., 2021 |
|  | *Hysterothylacium* sp. | L | *Parachromis* sp. | Crater lake Xiloá | Santacruz *et al*., 2021 |
| Rhabdochonidae Skrjabin, 1946 | *Rhabdochona kidderi* | A | *Amphilophus amarillo* | Crater lake Xiloá | González-Solís *et al.*, 2006 |
|  |  |  | *Amphilophus citrinellus* | Crater lake Apoyo | González-Solís *et al.*, 2006 |
|  |  |  | *Vieja maculicauda* | Torsuani River | Aguirre-Macedo *et al*., 2001b |
|  | *Rhabdochona* sp. | A | *Amphilophus citrinellus* | Lake Nicaragua | Santacruz *et al*., 2021 |
| Spirocercidae Chitwood & Wehr, 1932 | *Physocephalus* sp. | L | *Amphilophus labiatus* | Lake Nicaragua | Santacruz *et al*., 2021 |
| Spiruridae Oerley, 1885 | Spiruridae gen. sp. | L | *Gobiomorus dormitor* | Crater lake Xiloá | González-Solís *et al.*, 2006 |
| **Hirudinea** |  |  |  |  |  |
| Piscicolidae Johnston, 1865 | *Myzobdella* sp. | A | *Parachromis* sp. | Lake Nicaragua | Santacruz *et al*., 2021 |
| **Copepoda** |  |  |  |  |  |
| Ergasilidae Thorell, 1859 | ***Acusicola margulisae*** | A | *Amphilophus citrinellus* | Crater lake Asosca León | Santacruz *et al.*, 2020; Santacruz *et al*., 2021 |
|  |  |  | *Oreochromis* sp. | Crater lake Asosca León | Santacruz *et al.*, 2020; Santacruz *et al*., 2021 |
|  |  |  | *Poecilia* sp. | Crater lake Asosca León | Santacruz *et al*., 2020; **This study** |
|  | *Acusicola* sp. | A | *Amphilophus citrinellus* | Lake Nicaragua | Santacruz *et al*., 2021 |
|  |  |  | *Amphilophus labiatus* | Lake Nicaragua | Santacruz *et al*., 2021 |
|  | **Ergasilidae gen. sp.** | A | *Amphilophus citrinellus* | Lake Nicaragua | Santacruz *et al*., 2021; **this study** |
|  |  |  | *Amphilophus labiatus* | Lake Nicaragua | Santacruz *et al*., 2021 |
|  |  |  | *Amatitlania nigrofasciata* | Crater lake Xiloá | Santacruz *et al*., 2021 |
|  |  |  | *Amphilophus amarillo* | Crater lake Xiloá | Santacruz *et al*., 2021 |
|  |  |  | *Amphilophus astorquii* | Crater lake Apoyo | Santacruz *et al*., 2021 |
|  |  |  | *Amphilophus citrinellus* | Lake Managua | Santacruz *et al*., 2021 |
|  |  |  | *Amphilophus labiatus* | Lake Managua | Santacruz *et al*., 2021 |
|  |  |  | *Amphilophus sagittae* | Crater lake Xiloá | Santacruz *et al*., 2021 |
|  |  |  | *Amphilophus xiloaensis* | Crater lake Xiloá | Santacruz *et al*., 2021 |
|  |  |  | *Astyanax* sp. | Lake Managua | **This study** |
|  |  |  | *Bramocharax* sp. | Lake Nicaragua | **This study** |
|  |  |  | *Cribroheros longimanus* | Crater lake Xiloá | Santacruz *et al*., 2021 |
|  |  |  | *Cribroheros rostratus* | Lake Managua | Santacruz *et al*., 2021 |
|  |  |  | *Hypsophrys nematopus* | Lake Nicaragua | Santacruz *et al*., 2021 |
|  |  |  | *Hypsophrys nicaraguensis* | Lake Nicaragua | Santacruz *et al*., 2021 |
|  |  |  | *Hypsophrys nicaraguensis* | Crater lake Xiloá | Santacruz *et al*., 2021 |
|  |  |  | *Parachromis* sp. | Lake Nicaragua | Santacruz *et al*., 2021 |
|  |  |  | *Parachromis* sp. | Lake Managua | Santacruz *et al*., 2021 |
|  |  |  | *Parachromis* sp. | Crater lake Xiloá | Santacruz *et al*., 2021 |
|  |  |  | *Poecilia* sp. | Lake Nicaragua | **This study** |
|  |  |  | *Poecilia* sp. | Crater lake Xiloá | **This study** |
|  |  |  | *Vieja* sp. | Lake Nicaragua | Santacruz *et al*., 2021 |
| Lernaeidae Cobbold, 1879 | ***Lernaea cyprinacea*** | A | *Astyanax* sp. | Lake Managua | **This study** |
|  |  |  | *Astyanax* sp. | Lake Nicaragua | **This study** |
|  |  |  | *Bramocharax* sp. | Lake Nicaragua | **This study** |
|  |  |  | *Hypsophrys nematopus* | Lake Managua | Santacruz *et al*., 2021 |
|  | Lernaeidae gen. sp. | A | *Amphilophus citrinellus* | Lake Managua | Santacruz *et al*., 2021 |
|  |  |  | *Amphilophus labiatus* | Lake Managua | Santacruz *et al*., 2021 |
| **Branchiura** |  |  |  |  |  |
| Argulidae Leach‎, 1819‎ | *Argulus* sp. | A | *Amphilophus citrinellus* | Crater lake Asosca León | Santacruz *et al*., 2021 |
|  |  |  | *Amphilophus sagittae* | Crater lake Xiloá | Santacruz *et al*., 2021 |
| **Oribatida** |  |  |  |  |  |
| --- | **Oribatida gen. sp.** | A | *Parachromis* sp. | Crater lake Xiloá | Santacruz *et al*., 2021 |
|  |  |  | *Poecilia* sp. | Lake Nicaragua | **This study** |

|  |  |  |  |
| --- | --- | --- | --- |
| **Supplementary Table S2**. Host-parasite records for freshwater fishes in Nicaragua**.** The parasite group is indicated by T: Tematoda, O: Cestoda, M: Monogenea, N: Nematoda, A: Acanthocephala, C: Copepoda, B: Branchiura, M: Oribatida. | | | |
| **Host family** | **Host species** | **Parasite group** | **Parasite taxa** |
| Bryconidae | *Brycon* sp. | T | *Saccocoelioides* sp. |
| Carcharhinidae | *Carcharhinus leucas* | M | *Dermophthirius maccallumi* |
|  |  | M | *Heteronchocotyle leucas* |
|  |  | M | *Erpocotyle carcharhini* |
| Characidae | *Astyanax aeneus* | T | *Prosthenhystera caballeroi* |
|  |  | T | *Saccocoelioides tkachi* |
|  | *Astyanax fasciatus* | T | *Auriculostoma astyanace* |
|  |  | T | *Magnivitellum simplex* |
|  |  | T | *Prosthenhystera obesa* |
|  |  | T | *Uvulifer* sp. |
|  |  | T | *Saccocoelioides* sp. 2 |
|  |  | T | *Genarchella astyanactys* |
|  |  | T | *Ascocotyle tenuicollis* |
|  |  | T | Proterodiplostomidae gen sp. |
|  |  | O | Proteocephalidae gen. sp. |
|  |  | M | Ancyrocephalinae sp. |
|  |  | M | *Characithecium costaricensis* |
|  |  | M | *Cleidodiscus strombicirrus* |
|  |  | M | *Palombitrema heteroancistrium* |
|  |  | N | *Contracaecum* sp. |
|  |  | N | *Procamallanus neocaballeroi* |
|  |  | N | *Spiroxys* sp. |
|  |  | N | *Brevimulticaecum* sp. |
|  | *Astyanax* sp. | T | *Austrodiplostomum compactum* |
|  |  | T | *Genarchella astyanactys* |
|  |  | T | *Centrocestus formosanus* |
|  |  | M | *Characithecium costaricensis* |
|  |  | N | *Contracaecum* sp. 1 |
|  |  | C | Ergasilidae gen. sp. |
|  |  | C | *Lernaea cyprinacea* |
|  | *Bramocharax* sp. | M | *Characithecium costaricensis* |
|  |  | M | Dactylogyridae gen. sp. |
|  |  | C | Ergasilidae gen. sp. |
|  |  | C | *Lernaea cyprinacea* |
|  | *Roeboides guatemalensis* | T | *Saccocoelioides* sp. |
| Cichlidae | *Alfaro cultratus* | T | *Uvulifer spinatus* |
|  | *Amatitlania nigrofasciata* | T | *Posthodiplostomum minimum* |
|  |  | T | *Posthodiplostomum* sp. 2 |
|  |  | T | *Uvulifer* sp. |
|  |  | T | *Saccocoelioides orosiensis* |
|  |  | T | *Crassicutis cichlasomae* |
|  |  | M | *Sciadicleithrum bicuense* |
|  |  | M | *Sciadicleithrum meekii* |
|  |  | M | *Sciadicleithrum* sp. 1 |
|  |  | A | *Neoechinorhynchus costarricense* |
|  |  | N | *Contracaecum* sp. |
|  |  | N | *Procamallanus barlowi* |
|  |  | N | *Falcaustra* sp. |
|  |  | C | Ergasilidae gen. sp. |
|  | *Amatitlania siquia* | T | *Uvulifer* sp. |
|  | *Amphilophus amarillo* | T | *Oligogonotylus manteri* |
|  |  | T | *Crassicutis cichlasomae* |
|  |  | T | *Sciadicleithrum mexicanum* |
|  |  | A | *Neoechinorhynchus costarricense* |
|  |  | N | *Contracaecum* sp. |
|  |  | N | *Contracaecum* sp. 1 |
|  |  | N | Acuariidae gen. sp. |
|  |  | N | *Rhabdochona kidderi* |
|  |  | C | Ergasilidae gen. sp. |
|  | *Amphilophus astorquii* | T | *Oligogonotylus manteri* |
|  |  | T | *Saccocoelioides orosiensis* |
|  |  | T | *Saccocoelioides* sp. |
|  |  | T | *Crassicutis cichlasomae* |
|  |  | M | *Sciadicleithrum mexicanum* |
|  |  | A | *Neoechinorhynchus costarricense* |
|  |  | N | *Contracaecum* sp. 1 |
|  |  | N | *Procamallanus barlowi* |
|  |  | C | Ergasilidae gen. sp. |
|  | *Amphilophus chancho* | T | *Oligogonotylus manteri* |
|  |  | T | *Saccocoelioides orosiensis* |
|  |  | T | *Saccocoelioides* sp. |
|  |  | T | *Crassicutis cichlasomae* |
|  |  | M | *Sciadicleithrum mexicanum* |
|  |  | A | *Neoechinorhynchus costarricense* |
|  |  | N | *Contracaecum* sp. 1 |
|  |  | N | *Procamallanus barlowi* |
|  | *Amphilophus citrinellus* | T | *Oligogonotylus manteri* |
|  |  | T | *Austrodiplostomum compactum* |
|  |  | T | *Saccocoelioides* cf. *lamothei* |
|  |  | T | *Saccocoelioides* sp. |
|  |  | T | *Crassicutis cichlasomae* |
|  |  | O | *Cichlidocestus janikae* |
|  |  | O | *Schyzocotyle acheilognathi* |
|  |  | M | *Sciadicleithrum mexicanum* |
|  |  | A | *Neoechinorhynchus costarricense* |
|  |  | A | *Polymorphus brevis* |
|  |  | N | *Contracaecum* sp. 1 |
|  |  | N | *Contracaecum* sp. 2 |
|  |  | N | *Contracaecum* sp. 3 |
|  |  | N | *Procamallanus barlowi* |
|  |  | N | *Rhabdochona kidderi* |
|  |  | N | *Rhabdochona* sp. |
|  |  | C | *Acusicola margulisae* |
|  |  | C | *Acusicola* sp. |
|  |  | C | Ergasilidae gen. sp. |
|  |  | C | Lernaeidae gen. sp. |
|  |  | B | *Argulus* sp. |
|  | *Amphilophus flaveolus* | T | *Saccocoelioides* sp. |
|  |  | T | *Crassicutis cichlasomae* |
|  |  | M | *Sciadicleithrum mexicanum* |
|  | *Amphilophus globosus* | T | *Oligogonotylus manteri* |
|  |  | T | *Saccocoelioides* sp. |
|  |  | T | *Crassicutis cichlasomae* |
|  | *Amphilophus labiatus* | T | *Oligogonotylus manteri* |
|  |  | T | *Ascocotyle pindoramensis* |
|  |  | T | *Crassicutis cichlasomae* |
|  |  | A | *Neoechinorhynchus costarricense* |
|  |  | A | *Polymorphus brevis* |
|  |  | N | *Contracaecum* sp. 1 |
|  |  | N | *Procamallanus barlowi* |
|  |  | N | *Physocephalus* sp. |
|  |  | C | *Acusicola* sp. |
|  |  | C | Ergasilidae gen. sp. |
|  |  | C | Lernaeidae gen. sp. |
|  | *Amphilophus sagittae* | T | *Oligogonotylus manteri* |
|  |  | T | *Saccocoelioides orosiensis* |
|  |  | T | *Saccocoelioides* sp. |
|  |  | T | *Crassicutis cichlasomae* |
|  |  | M | *Sciadicleithrum mexicanum* |
|  |  | A | *Neoechinorhynchus costarricense* |
|  |  | N | *Contracaecum* sp. |
|  |  | N | *Goezia* sp. |
|  |  | C | Ergasilidae gen. sp. |
|  |  | B | *Argulus* sp. |
|  | *Amphilophus xiloaensis* | T | *Oligogonotylus manteri* |
|  |  | T | *Saccocoelioides orosiensis* |
|  |  | T | *Crassicutis cichlasomae* |
|  |  | M | *Sciadicleithrum mexicanum* |
|  |  | A | *Neoechinorhynchus costarricense* |
|  |  | N | *Contracaecum* sp. |
|  |  | N | *Contracaecum* sp. 1 |
|  |  | N | *Goezia* sp. |
|  |  | C | Ergasilidae gen. sp. |
|  | *Amphilophus zaliosus* | T | *Oligogonotylus manteri* |
|  |  | T | *Saccocoelioides orosiensis* |
|  |  | T | *Saccocoelioides* sp. |
|  |  | T | *Crassicutis cichlasomae* |
|  |  | M | *Sciadicleithrum mexicanum* |
|  |  | A | *Neoechinorhynchus costarricense* |
|  |  | N | *Contracaecum* sp. 1 |
|  |  | N | *Procamallanus barlowi* |
|  |  | N | *Goezia* sp. |
|  | Archocentrus centrarchus | T | *Uvulifer* sp. |
|  |  | T | *Phyllodistomum romualdae* |
|  |  | T | *Crassicutis cichlasomae* |
|  |  | N | *Contracaecum* sp. 1 |
|  | *Cribroheros alfari* | T | *Austrodiplostomum compactum* |
|  |  | T | *Uvulifer* sp. |
|  |  | T | Heterophyidae gen. sp. |
|  |  | M | *Sciadicleithrum nicaraguense* |
|  |  | A | *Neoechinorhynchus costarricense* |
|  |  | N | *Contracaecum* sp. |
|  |  | N | *Procamallanus barlowi* |
|  |  | N | *Serpinema trispinosum* |
|  |  | N | *Spiroxys* sp. |
|  |  | N | *Falcaustra* sp. |
|  | *Cribroheros longimanus* | T | *Oligogonotylus manteri* |
|  |  | T | *Uvulifer* sp. |
|  |  | T | *Crassicutis cichlasomae* |
|  |  | M | *Sciadicleithrum nicaraguense* |
|  |  | A | *Neoechinorhynchus costarricense* |
|  |  | N | *Contracaecum* sp. 1 |
|  |  | N | *Procamallanus barlowi* |
|  |  | C | Ergasilidae gen. sp. |
|  | *Cribroheros rostratus* | T | *Oligogonotylus manteri* |
|  |  | T | *Austrodiplostomum compactum* |
|  |  | T | *Crassicutis cichlasomae* |
|  |  | M | *Sciadicleithrum* sp. 2 |
|  |  | N | *Contracaecum* sp. 1 |
|  |  | N | *Procamallanus barlowi* |
|  |  | C | Ergasilidae gen. sp. |
|  | *Cryptoheros spilurus* | T | *Crassicutis cichlasomae* |
|  | *Herotilapia multispinosa* | T | *Posthodiplostomum minimum* |
|  |  | T | *Uvulifer* sp. |
|  |  | T | Heterophyidae gen. sp. |
|  |  | T | Proterodiplostomidae gen sp. |
|  |  | O | Proteocephalidae gen. sp. |
|  |  | M | *Gussevia herotilapiae* |
|  |  | A | *Neoechinorhynchus costarricense* |
|  |  | N | *Contracaecum* sp. |
|  |  | N | *Procamallanus barlowi* |
|  |  | N | *Serpinema trispinosum* |
|  |  | N | *Spiroxys* sp. |
|  |  | N | *Falcaustra* sp. |
|  | *Hypsophrys nematopus* | T | *Ithyoclinostomum yamaguti* |
|  |  | T | *Oligogonotylus manteri* |
|  |  | T | *Posthodiplostomum* sp. 1 |
|  |  | T | *Posthodiplostomum* sp. 2 |
|  |  | T | *Saccocoelioides* cf. *lamothei* |
|  |  | T | *Saccocoelioides orosiensis* |
|  |  | T | *Saccocoelioides* sp. |
|  |  | T | *Crassicutis cichlasomae* |
|  |  | T | Strigeidae gen sp. |
|  |  | A | *Neoechinorhynchus costarricense* |
|  |  | A | *Polymorphus brevis* |
|  |  | N | *Contracaecum* sp. 1 |
|  |  | N | *Procamallanus barlowi* |
|  |  | C | Ergasilidae gen. sp. |
|  |  | C | *Lernaea cyprinacea* |
|  | *Hypsophrys nicaraguensis* | T | *Ithyoclinostomum yamaguti* |
|  |  | T | *Oligogonotylus manteri* |
|  |  | T | *Saccocoelioides orosiensis* |
|  |  | T | *Crassicutis cichlasomae* |
|  |  | O | *Cichlidocestus janikae* |
|  |  | A | *Neoechinorhynchus costarricense* |
|  |  | N | *Contracaecum* sp. 1 |
|  |  | N | *Procamallanus barlowi* |
|  |  | C | Ergasilidae gen. sp. |
|  | *Hypsophrys* sp. | T | *Uvulifer* sp. |
|  | *Mayaheros urophthalmus* | M | *Sciadicleithrum mexicanum* |
|  | *Oreochromis* sp. | T | *Saccocoelioides* cf. *lamothei* |
|  |  | T | *Saccocoelioides orosiensis* |
|  |  | T | *Saccocoelioides* sp. |
|  |  | T | Heterophyidae gen. sp. |
|  |  | M | *Cichlidogyrus sclerosus* |
|  |  | A | *Neoechinorhynchus costarricense* |
|  |  | C | *Acusicola margulisae* |
|  | *Parachromis dovii* | M | *Sciadicleithrum mexicanum* |
|  | *Parachromis managuensis* | T | *Ithyoclinostomum yamaguti* |
|  |  | T | *Oligogonotylus manteri* |
|  |  | T | *Posthodiplostomum minimum* |
|  |  | T | Heterophyidae gen. sp. |
|  |  | T | *Crassicutis cichlasomae* |
|  |  | T | *Cladocystis trifolium* |
|  |  | O | Proteocephalidae gen. sp. |
|  |  | M | *Sciadicleithrum mexicanum* |
|  |  | A | *Neoechinorhynchus costarricense* |
|  |  | N | *Contracaecum* sp. |
|  |  | N | *Procamallanus barlowi* |
|  |  | N | *Serpinema trispinosum* |
|  |  | N | *Eustrongylides* sp. |
|  |  | N | *Spiroxys* sp. |
|  | *Parachromis* sp. | T | *Ithyoclinostomum yamaguti* |
|  |  | T | Cryptogonimidae gen. sp. |
|  |  | T | *Oligogonotylus manteri* |
|  |  | T | *Austrodiplostomum compactum* |
|  |  | T | *Saccocoelioides* sp. |
|  |  | T | *Ascocotyle pindoramensis* |
|  |  | T | *Crassicutis cichlasomae* |
|  |  | O | *Schyzocotyle acheilognathi* |
|  |  | M | *Sciadicleithrum mexicanum* |
|  |  | A | *Neoechinorhynchus costarricense* |
|  |  | A | *Polymorphus brevis* |
|  |  | N | *Contracaecum* sp. 1 |
|  |  | N | *Contracaecum* sp. 3 |
|  |  | N | *Procamallanus barlowi* |
|  |  | N | *Hysterothylacium* sp. |
|  |  | H | *Myzobdella* sp. |
|  |  | C | Ergasilidae gen. sp. |
|  |  | M | Oribatida gen. sp. |
|  | *Tomocichla tuba* | M | *Sciadicleithrum mexicanum* |
|  |  | N | *Orientatractis chiapasensis* |
|  | *Vieja maculicauda* | T | *Acanthostomum minimum* |
|  |  | T | *Oligogonotylus manteri* |
|  |  | T | *Posthodiplostomum minimum* |
|  |  | T | *Uvulifer* sp. |
|  |  | T | *Saccocoelioides cichlidorum* |
|  |  | T | *Saccocoelioides* sp. 1 |
|  |  | T | *Saccocoelioides* sp. 2 |
|  |  | T | *Ascocotyle nana* |
|  |  | T | *Ascocotyle tenuicollis* |
|  |  | T | *Crassicutis cichlasomae* |
|  |  | M | *Sciadicleithrum bravohollisae* |
|  |  | M | *Sciadicleithrum maculicaudae* |
|  |  | M | *Sciadicleithrum mexicanum* |
|  |  | N | *Contracaecum* sp. |
|  |  | N | *Procamallanus neocaballeroi* |
|  |  | N | *Procamallanus barlowi* |
|  |  | N | *Spiroxys* sp. |
|  |  | N | *Brevimulticaecum* sp. |
|  |  | N | *Falcaustra* sp. |
|  |  | N | *Rhabdochona kidderi* |
|  | *Vieja* sp. | A | *Polymorphus brevis* |
|  |  | N | *Contracaecum* sp. 1 |
|  |  | C | Ergasilidae gen. sp. |
| Eleotridae | *Gobiomorus dormitor* | N | *Contracaecum* sp. |
|  |  | N | *Paracapillaria teixerafreitasi* |
|  |  | N | Spiruridae gen. sp. |
|  | *Gobiomorus* sp. | N | *Contracaecum* sp. |
| Haemulidae | *Pomadasys croco* | T | *Neochasmus ackerti* |
| Heptateridae | *Rhamdia guatemalensis* | N | *Brevimulticaecum* sp. |
|  | *Rhamdia managuensis* | T | *Acanthostomum gnerii* |
|  |  | T | *Genarchella thorsoni* |
|  |  | T | Proterodiplostomidae gen sp. |
|  | *Rhamdia nicaraguensis* | T | *Acanthostomum astorquii* |
|  |  | T | *Acanthostomum gnerii* |
|  |  | T | *Phyllodistomum scotti* |
|  |  | M | *Aphanoblastella travassosi* |
|  |  | M | *Cleidodiscus chavarriai* |
|  | *Rhamdia* sp. | T | *Clinostomum* sp. |
|  |  | O | Proteocephalidae gen. sp. |
| Lepisosteidae | *Atractosteus tropicus* | T | *Perezitrema* sp. |
|  |  | O | *Proteocephalus gaspari* |
| Megalopidae | *Megalops atlanticus* | M | *Diplectanocotyla megalopis* |
| Poeciliidae | *Belonesox belizanus* | M | *Salsuginus neotropicalis* |
|  | *Poecilia mexicana* | T | *Uvulifer spinatus* |
|  | *Poecilia* sp. | T | *Posthodiplostomum* sp. 1 |
|  |  | T | *Saccocoelioides* cf. *lamothei* |
|  |  | T | *Saccocoelioides orosiensis* |
|  |  | T | *Saccocoelioides* sp. |
|  |  | O | Cyclophylidea gen. sp. |
|  |  | C | *Acusicola margulisae* |
|  |  | C | Ergasilidae gen. sp. |
|  |  | M | Oribatida gen. sp. |
|  | *Poecilia velifera* | T | Cryptogonimidae gen. sp. |
|  |  | T | *Posthodiplostomum minimum* |
|  |  | T | *Saccocoelioides sogandaresi* |
|  |  | T | *Ascocotyle diminuta* |
|  |  | T | *Ascocotyle mollienisicola* |
|  |  | T | *Ascocotyle tenuicollis* |
|  |  | N | *Contracaecum* sp. |
| Pristidae | *Pristis perotteti* | M | *Erpocotyle caribbensis* |
|  |  | M | *Pristonchotyle intermedia* |

|  |  |  |  |  |
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| **Supplemetary Table S3**. List for freshwater fish parasites of Costa Rica, including platyhelminths (trematodes, monogeneans and cestodes), acanthocephalans, nematodes, copepods and pentastomids. The list is based on a literature review where eight references were retrieved and analyzed. | | | | |
| **Family** | **Parasite** | **Host** | **Locality** | **Reference** |
| **Trematoda** |  |  |  |  |
| Allocreadiidae Looss, 1902 | *Auriculostoma astyanace* | *Astyanax aeneus* | Animas River, Guanacaste | Curran *et al*., 2011 |
|  | *Creptotrematina aguirrepequenoi* | *Astyanax aeneus* | Tempisque River, Guanacaste | Curran *et al.*, 2011; Pérez-Ponce de León *et al*., 2016 |
|  | *Paracreptotrema blancoi* | *Priapichthys annectens* | Orosí River | Choudhury *et al.,* 2006 |
|  |  | *Priapichthys annectens* | Guanacaste | Sandund *et al*., 2010 |
|  |  | *Priapichthys annectens* | Quebrada Plata | Pérez-Ponce de León *et al.*, 2016 |
|  | *Paracreptotrema mendezi* | *Brachyrhapis olomina* | Tempisque River, Guanacaste | Sandund *et al*., 2010 |
| Acanthocolpidae Lühe, 1906 | *Acanthostomum minimum (=Stunkardiella minima)* | *Rhamdia nicaraguense* | Guanacaste | Sandund *et al*., 2010 |
|  |  | *Rhamdia rogersi* | Paso Ancho, San José | Rodríguez-Ortíz *et al.*, 2004 |
| Callodistomidae Odhner, 1910 | *Prosthenhystera obesa* | *Astyanax aeneus* | Guanacaste | Sandund *et al.*, 2010 |
|  | *Prosthenhystera caballeroi* | *Astyanax aeneus* | Tempisque River, Guanacaste | Tkach *et al.*, 2015 |
| Clinostomidae Lühe, 1901 | *Clinostomatid* | *Poecilia gillii* | Quebrada | Chandler *et al.*, 1995 |
|  |  | *Agonostomus monticola* | Guanacaste | Sandund *et al*., 2010 |
|  |  | *Amatitlania nigrofasciata* | Guanacaste | Sandund *et al*., 2010 |
|  |  | *Cribroheros alfari* | Guanacaste | Sandund *et al*., 2010 |
|  |  | *Gymnotus cylindricus* | Guanacaste | Sandund *et al*., 2010 |
|  |  | *Rhamdia rogersi* | Guanacaste | Sandund *et al*., 2010 |
|  |  | *Sicydium salvini* | Guanacaste | Sandund *et al*., 2010 |
|  | *Ithyoclinostomum yamagutii* | *Cribroheros longimanus* | Irigaray River | Briosio-Aguilar *et al.*, 2019 |
|  |  | *Parachromis managuense* | Irigaray River | Briosio-Aguilar *et al.*, 2019 |
|  |  | *Cribroheros alfari* | Orosí River, Pitahaya | Briosio-Aguilar *et al.*, 2019 |
| Crytogonimidae Ward, 1917 | *Pseudocaecincola* sp. | *Parachromis dovii* | Guanacaste | Sandund *et al*., 2010 |
|  | *Oligogonotylus manteri* | *Parachromis dovii* | Guanacaste | Sandund *et al*., 2010 |
| Cyathocotylidae Mühling, 1898 | *Mesostephanus* sp. | *Agonostomus monticola* | Guanacaste | Sandund *et al*., 2010 |
| Derogenidae Nicoll, 1910 | *Genarchella* sp. | *Parachromis dovii* | Guanacaste | Sandund *et al*., 2010 |
| Diplostomatidae Poirier, 1886 | *Austrodiplostomum compactum* | *Cribroheros alfari* | Río Las Vueltas | Sereno-Uribe *et al.*, 2019 |
|  |  | *Amatitlania siquia* | Río Las Vueltas | Sereno-Uribe *et al.*, 2019 |
|  |  | *Cribroheros alfari* | Río Irigaray | Sereno-Uribe *et al.*, 2019 |
|  |  | *Hypsophrys nicaraguensis* | Lago el Arenal | Sereno-Uribe *et al.*, 2019 |
|  | *Diplostomum* | *Poecilia gillii* | Quebrada | Chandler *et al*., 1995 |
| Gorgoderidae Looss, 1899 | *Phyllodistomum romualdae* | *Cribroheros alfari* | Río Las Animas | Pinacho-Pinacho *et al*., 2021 |
| Haploporidae Nicoll, 1914 | *Saccocoelioides cichlidorum* | *Amatitlania nigrofasciata* | Río Las Animas | Andrade-Gómez *et al.*, 2017 |
|  |  | *Cribroheros alfari* | Río Las Animas | Andrade-Gómez *et al.*, 2017 |
|  |  | *Amatitlania siquia* | Río Las Animas | Andrade-Gómez *et al.*, 2017 |
|  |  | *Hypsophrys nematopus* | Orosí River | Andrade-Gómez *et al.*, 2017 |
|  |  | *Amatitlania siquia* | Irigaray River | Andrade-Gómez *et al.*, 2017 |
|  | *Saccocoelioides lamothei* | *Poecilia gillii* | Rio Tempisque | Curran *et al.,* 2018 |
|  |  | *Poecilia gillii* | Rio Mico | González-García *et al.*, 2020 |
|  |  | *Sicydium salvini* | Río Ciruelas | González-García *et al.*, 2020 |
|  |  | *Poecilia gillii* | Río Ciruelas | González-García *et al.*, 2020 |
|  | *Saccocoelioides orosiensis* | *Poecilia gillii* | Río Ciruelas | Andrade-Gómez *et al.,* 2019 |
|  | *Saccocoelioides sogandaresi* | *Poecilia gillii* | Irigaray River | Andrade-Gómez *et al*., 2017 |
|  |  | *Poecilia gillii* | Río Ciruelas | Andrade-Gómez *et al*., 2017 |
|  |  | *Poecilia gillii* | Río Las Vueltas | Andrade-Gómez *et al*., 2017 |
|  |  | *Poecilia gillii* | Quebrada Puercos | Andrade-Gómez *et al*., 2017 |
|  |  | *Poecilia gillii* | Centeno | Andrade-Gómez *et al*., 2017 |
|  |  | *Poecilia gillii* | Guanacaste | Sandund *et al.,* 2010 |
|  |  | *Poecilia mexicana* | Playa Grande (Puerto viejo) | Andrade-Gómez *et al*., 2017 |
|  | *Saccocoelioides* sp. | *Astyanax aeneus* | Guanacaste | Sandund *et al.,* 2010 |
|  |  | *Brycon guatemalensis* | Guanacaste | Sandund *et al.,* 2010 |
|  |  | *Hypsophrys nicaraguensis* | Guanacaste | Sandund *et al.,* 2010 |
|  | *Saccocoelioides* sp. 1 | *Bryconamericus scleroparius* | Guanacaste | Sandund *et al.,* 2010 |
|  | *Saccocoelioides* sp. 3 | *Amatitlania nigrofasciata* | Guanacaste | Sandund *et al.,* 2010 |
|  |  | *Hypsophrys nematopus* | Guanacaste | Sandund *et al.,* 2010 |
|  | *Saccocoelioides tkachi* | *Astyanax aeneus* | Río Tempisque | Curran *et al*., 2018 |
| Heterophyidae Leiper, 1909 | *Centrocestus formosanus* | *Oreochromis niloticus* | -- | Arguedas et al., 2010 |
| Lepocreadiidae Odhner, 1905 | *Crassicutis cichlasomae* | *Amatitlania nigrofasciata* | Guanacaste | Sandund *et al.,* 2010 |
|  |  | *Astatheros alfari* | Guanacaste | Sandund *et al.,* 2010 |
|  |  | *Cribroheros longimanus* | Guanacaste | Sandund *et al.,* 2010 |
|  |  | *Hypsophrys nicaraguensis* | Guanacaste | Sandund *et al.,* 2010 |
|  |  | *Parachromis dovii* | Guanacaste | Sandund *et al.,* 2010 |
|  |  | *Rhamdia nicaraguense* | Guanacaste | Sandund *et al.,* 2010 |
| Macroderoididae McMullen, 1937 | *Wallinia chavarriae* | *Astyanax aeneus* | Quebrada Limonal | Choudhury *et al*., 2002 |
|  |  | *Astyanax aeneus* | Río Sapoa | Choudhury *et al*., 2002 |
|  |  | *Astyanax aeneus* | Guanacaste | Sandlund et al., 2010 |
|  |  | *Bryconamericus scleroparius* | Quebrada Limonal | Choudhury *et al*., 2002 |
|  |  | *Bryconamericus scleroparius* | Río Sapoa | Choudhury *et al*., 2002 |
|  |  | *Bryconamericus scleroparius* | Guanacaste | Sandund *et al.,* 2010 |
| Strigeidae Railliet, 1919 | *Neascus* | *Poecilia gillii* | Quebrada | Chandler *et al.,* 1995 |
|  | Strigeidae gen. sp. | *Rhamdia rogersi* | Guanacaste | Sandund *et al.,* 2010 |
| Strigeoidea | *Uvulifer* sp. lineage 2 | *Hypsophrys nematopus* | Orosí River | López-Jiménez *et al*., 2018 |
| ----- | Digenea gen. sp. | *Amatitlania nigrofasciata* | Guanacaste | Sandund *et al.,* 2010 |
|  |  | *Arius guatemalensis* | Guanacaste | Sandund *et al.,* 2010 |
|  |  | *Arius seemani* | Guanacaste | Sandund *et al.,* 2010 |
|  |  | *Astyanax aeneus* | Guanacaste | Sandund *et al.,* 2010 |
|  |  | *Brachyrhapis olomina* | Guanacaste | Sandund *et al.,* 2010 |
|  |  | *Bryconamericus scleroparius* | Guanacaste | Sandund *et al.,* 2010 |
|  |  | *Eleotris picta* | Guanacaste | Sandund *et al.,* 2010 |
|  |  | *Gobiomorus dormitor* | Guanacaste | Sandund *et al.,* 2010 |
|  |  | *Hypsophrys nematopus* | Guanacaste | Sandund *et al.,* 2010 |
|  |  | *Poecilia gillii* | Guanacaste | Sandund *et al.,* 2010 |
|  |  | *Priapichthys annectens* | Guanacaste | Sandund *et al.,* 2010 |
|  |  | *Rhamdia nicaraguense* | Guanacaste | Sandund *et al.,* 2010 |
|  |  | *Rhamdia rogersi* | Guanacaste | Sandund *et al.,* 2010 |
|  |  | *Rivulus isthmensis* | Guanacaste | Sandund *et al.,* 2010 |
| **Cestoda** |  |  |  |  |
| Proteocephalidae La Rue, 1911 | *Cichlidocestus janikae* | *Hypsophrys nicaraguensis* | Lake Arenal | de Chambrier *et al.*, 2017 |
|  | Proteocephalidea gen. sp. | *Agonostomus monticola* | Guanacaste | Sandund *et al.,* 2010 |
|  |  | *Cribroheros alfari* | Guanacaste | Sandund *et al.,* 2010 |
|  |  | *Awaous transandeanus* | Guanacaste | Sandund *et al.,* 2010 |
|  |  | *Eleotris picta* | Guanacaste | Sandund *et al.,* 2010 |
|  |  | *Parachromis dovii* | Guanacaste | Sandund *et al.,* 2010 |
|  |  | *Synbranchus marmoratus* | Guanacaste | Sandund *et al.,* 2010 |
| **Monogenea** |  |  |  |  |
|  | Monogenea gen. sp. | *Agonostomus monticola* | Guanacaste | Sandund *et al.,* 2010 |
|  |  | *Astyanax aeneus* | Guanacaste | Sandund *et al.,* 2010 |
|  |  | *Brachyrhapis olomina* | Guanacaste | Sandund *et al.,* 2010 |
|  |  | *Bryconamericus scleroparius* | Guanacaste | Sandund *et al.,* 2010 |
|  |  | *Parachromis dovii* | Guanacaste | Sandund *et al.,* 2010 |
|  |  | *Parachromis managuense* | Guanacaste | Sandund *et al.,* 2010 |
|  |  | *Poecilia gillii* | Guanacaste | Sandund *et al.,* 2010 |
|  |  | *Rhamdia rogersi* | Guanacaste | Sandund *et al.,* 2010 |
| **Acanthocephala** |  |  |  |  |
| ----- | Acanthocephala gen. sp. | *Eleotris picta* | Guanacaste | Sandund *et al.,* 2010 |
| Neoechinorhynchidae Ward, 1917 | *Neoechinorhynchus* Lineage 7 */N. mamesi* | *Dormitator maculatus* | Playa Grande | Pinacho-Pinacho *et al.*, 2015 |
|  |  | *Dormitator latifrons* | Quebrada Ganados | Pinacho-Pinacho *et al.*, 2015 |
|  | *Neoechinorhynchus costarricense* | *Parachromis managuense* | Lago Jalapa | Pinacho-Pinacho *et al.,* 2018 |
|  |  | *Parachromis loisellei* | Lago Jalapa | Pinacho-Pinacho *et al.,* 2018 |
|  |  | *Cribroheros longimanus* | Lago Jalapa | Pinacho-Pinacho *et al.,* 2018 |
|  |  | *Heterotilapia multiespinosa* | Lago Jalapa | Pinacho-Pinacho *et al.,* 2018 |
|  |  | *Archocentrus centrarchus* | Lago Jalapa | Pinacho-Pinacho *et al.,* 2018 |
|  |  | *Amatitlania nigrofasciata* | Quebrada Puercos | Pinacho-Pinacho *et al.,* 2018 |
|  |  | *Amatitlania siquia* | -- | Pinacho-Pinacho *et al.*, 2018b |
|  |  | *Cribroheros alfari* | -- | Pinacho-Pinacho *et al.*, 2018b |
|  |  | *Parachromis managuense* | Guanacaste | Sandund *et al.,* 2010 |
| **Nematoda** |  |  |  |  |
| Anisakidae Railliet & Henry, 1912 | *Contracaecum* sp. | *Agonostomus monticola* | Guanacaste | Sandund *et al.,* 2010 |
|  |  | *Arius seemani* | Guanacaste | Sandund *et al.,* 2010 |
|  |  | *Cribroheros alfari* | Guanacaste | Sandund *et al.,* 2010 |
|  |  | *Astyanax aeneus* | Guanacaste | Sandund *et al.,* 2010 |
|  |  | *Cribroheros longimanus* | Guanacaste | Sandund *et al.,* 2010 |
|  |  | *Gobiomorus dormitor* | Guanacaste | Sandund *et al.,* 2010 |
|  |  | *Parachromis managuense* | Guanacaste | Sandund *et al.,* 2010 |
|  |  | *Phallichthys amates* | Guanacaste | Sandund *et al.,* 2010 |
|  |  | *Rhamdia nicaraguense* | Guanacaste | Sandund *et al.,* 2010 |
|  |  | *Rhamdia rogersi* | Guanacaste | Sandund *et al.,* 2010 |
|  |  | *Rivulus isthmensis* | Guanacaste | Sandund *et al.,* 2010 |
|  |  | *Synbranchus marmoratus* | Guanacaste | Sandund *et al.,* 2010 |
| Atractidae Railliet, 1917 | *Rondonia* cf. *rondoni* | *Amatitlania nigrofasciata* | Guanacaste | Sandund *et al.,* 2010 |
|  |  | *Hypsophrys nematopus* | Guanacaste | Sandund *et al.,* 2010 |
| Camallanidae Railliet & Henry, 1915 | *Procamallanus neocaballeroi* | *Astyanax aeneus* | Guanacaste | Sandund *et al.,* 2010 |
|  | *Procamallanus barlowi* | *Amatitlania nigrofasciata* | Río Las Animas | Santacruz *et al.*, 2021 |
|  |  | *Amatitlania nigrofasciata* | Guanacaste | Sandund *et al.,* 2010 |
|  |  | *Cribroheros alfari* | Guanacaste | Sandund *et al.,* 2010 |
|  |  | *Cribroheros longimanus* | Río Irigaray | Santacruz *et al.*, 2021 |
|  |  | *Hypsophrys nematopus* | Guanacaste | Sandund *et al.,* 2010 |
|  |  | *Parachromis dovii* | Guanacaste | Sandund *et al.,* 2010 |
|  | *Procamallanus* sp. | *Agonostomus monticola* | Guanacaste | Sandund *et al.,* 2010 |
|  |  | *Cribroheros alfari* | Guanacaste | Sandund *et al.,* 2010 |
|  |  | *Awaous transandeanus* | Guanacaste | Sandund *et al.,* 2010 |
|  |  | *Brachyrhapis olomina* | Guanacaste | Sandund *et al.,* 2010 |
|  |  | *Rhamdia guatemalensis* | Guanacaste | Sandund *et al.,* 2010 |
|  |  | *Rhamdia nicaraguense* | Guanacaste | Sandund *et al.,* 2010 |
| Capillariidae Railliet, 1915 | Capilariidae gen. sp. | *Gobiomorus dormitor* | Guanacaste | Sandund *et al.,* 2010 |
|  |  | *Rhamdia nicaraguense* | Guanacaste | Sandund *et al.,* 2010 |
|  |  | *Rhamdia rogersi* | Guanacaste | Sandund *et al.,* 2010 |
| Cucullanidae Cobbold, 1864 | *Cucullanus costaricensis* | *Bagre pinnimaculatus* | Río Tempisque | López-Caballero *et al.*, 2009 |
|  | Cucullanidae gen. sp. | *Arius seemani* | Guanacaste | Sandund *et al.,* 2010 |
|  | *Cucullanus pimelodellae* | *Rhamdia guatemalensis* | Guanacaste | Sandund *et al.,* 2010 |
|  |  | *Rhamdia nicaraguense* | Guanacaste | Sandund *et al.,* 2010 |
| Cystidicolidae Skrjabin, 1946 | *Spinitectus agonostomi* | *Agonostomus monticola* | Guanacaste | Sandund *et al.,* 2010 |
|  | *Spinitectus mexicanus* | *Priapichthys annectens* | Guanacaste | Sandund *et al.,* 2010 |
|  | *Spinitectus* sp. | *Alfaro cultratus* | Guanacaste | Sandund *et al.,* 2010 |
|  |  | *Rivulus isthmensis* | Guanacaste | Sandund *et al.,* 2010 |
| Raphidascarididae Hartwich, 1954 | *Hysterothylacium* sp. | *Astatheros alfari* | Guanacaste | Sandund *et al.,* 2010 |
| Rhabdochonidae Skrjabin, 1946 | *Rhabdochona kidderi* | *Amatitlania nigrofasciata* | Guanacaste | Sandund *et al.,* 2010 |
|  |  | *Astatheros alfari* | Guanacaste | Sandund *et al.,* 2010 |
|  |  | *Cribroheros longimanus* | Guanacaste | Sandund *et al.,* 2010 |
|  |  | *Hypsophrys nematopus* | Guanacaste | Sandund *et al.,* 2010 |
|  |  | *Parachromis dovii* | Guanacaste | Sandund *et al.,* 2010 |
|  | *Rhabdochona acuminata* | *Bryconamericus scleroparius* | Guanacaste | Sandund *et al.,* 2010 |
|  | *Rhabdochona* cf*. cubensis* | *Rivulus isthmensis* | Guanacaste | Sandund *et al.,* 2010 |
|  | *Rhabdochona* sp. | *Cribroheros alfari* | Guanacaste | Sandund *et al.,* 2010 |
|  |  | *Parachromis dovii* | Guanacaste | Sandund *et al.,* 2010 |
|  |  | *Rhamdia rogersi* | Guanacaste | Sandund *et al.,* 2010 |
|  | *Rhabdochonidae* gen. sp. | *Alfaro cultratus* | Guanacaste | Sandund *et al.,* 2010 |
|  |  | *Amatitlania nigrofasciata* | Guanacaste | Sandund *et al.,* 2010 |
|  |  | *Eleotris picta* | Guanacaste | Sandund *et al.,* 2010 |
|  |  | *Gobiomorus maculatus* | Guanacaste | Sandund *et al.,* 2010 |
|  |  | *Priapichthys annectens* | Guanacaste | Sandund *et al.,* 2010 |
| Spiruroidea Oerley, 1885 | *Spiroxys* sp. | *Cribroheros alfari* | Guanacaste | Sandund *et al.,* 2010 |
| Spiruridae Oerley, 1885 | Spirurida gen. sp. | *Alfaro cultratus* | Guanacaste | Sandund *et al.,* 2010 |
|  |  | *Priapichthys annectens* | Guanacaste | Sandund *et al.,* 2010 |
|  |  | *Rhamdia rogersi* | Guanacaste | Sandund *et al.,* 2010 |
| ----- | Nematoda gen. sp. | *Agonostomus monticola* | Guanacaste | Sandund *et al.,* 2010 |
|  |  | *Alfaro cultratus* | Guanacaste | Sandund *et al.,* 2010 |
|  |  | *Amatitlania nigrofasciata* | Guanacaste | Sandund *et al.,* 2010 |
|  |  | *Bryconamericus scleroparius* | Guanacaste | Sandund *et al.,* 2010 |
|  |  | *Cribroheros longimanus* | Guanacaste | Sandund *et al.,* 2010 |
|  |  | *Eleotris picta* | Guanacaste | Sandund *et al.,* 2010 |
|  |  | *Parachromis managuense* | Guanacaste | Sandund *et al.,* 2010 |
|  |  | *Roeboides bouchellei* | Guanacaste | Sandund *et al.,* 2010 |
| **Copepoda** |  |  |  |  |
| Ergasilidae Thorell, 1859 | Ergasilidae gen. sp. | *Astyanax aeneus* | Guanacaste | Sandund *et al.,* 2010 |
|  |  | *Bryconamericus scleroparius* | Guanacaste | Sandund *et al.,* 2010 |
|  |  | *Hypsophrys nematopus* | Guanacaste | Sandund *et al.,* 2010 |
|  |  | *Poecilia gillii* | Guanacaste | Sandund *et al.,* 2010 |

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| **Supplemetary table S4.** List of freshwater fish parasites of Panama, including platyhelminths (trematodes, monogeneans and cestodes), acanthocephalans, nematodes and crustaceans. The list is based on a literature review where 21 references were retrieved and analyzed. | | | | |
| **Family** | **Parasite** | **Host** | **Locality** | **Reference** |
| **Trematoda** |  |  |  |  |
| Acanthostomatidae Poche, 1926 | *Acanthostomum minimum* (=*Stunkardiella minima*) | *Vieja maculicauda* | Panama Canal | Roche *et al.*, 2010 |
|  | *Atrophacaecum astorquii* | *Vieja maculicauda* | Panama Canal | Roche *et al.,* 2010 |
|  |  | *Oreochromis niloticus* | Panama Canal | Roche *et al.,* 2010 |
|  | *Pelaezia loosi* | *Vieja maculicauda* | Panama Canal | Roche *et al.,* 2010 |
|  |  | *Oreochromis niloticus* | Panama Canal | Roche *et al.,* 2010 |
| Allocreadiidae Losos, 1902 | *Creptotrema* sp. | *Pimelodella chagresi* | Río Frijolito | Choudhury *et al.*, 2017 |
|  | *Creptotrematina* sp. | *Bryconamericus emperador* | Quebrada Juan Grande | Choudhury *et al*., 2017 |
|  | *Paracreptotrema mendezi (= Fellodistomum mendezi)* | *Brachyrhaphis episcopi* | Gatun Lake; Barro Colorado Island | Sogandares-Bernal, 1955; Choudhury *et al*., 2017 |
|  | *Wallinia chavarriae* | *Gephyrocharax atricaudatus* | Río Frijolito | Choudhury *et al*., 2017 |
| Callodistomidae Poche, 1926 | *Prosthenhystera obesa* | *Bryconamericus emperador* | Río Frijolito | Choudhury *et al*., 2017 |
| Clinostomidae Lühe, 1901 | *Clinostomum complanatum* | *Vieja maculicauda* | Panama Canal | Roche *et al.,* 2010 |
| Crytogonimidae Ward, 1917 | *Acanthostomum gnerii* | *Pimelodella chagresi* | Río Frijolito | Choudhury *et al*., 2017 |
|  | *Oligogonotylus manteri* | *Vieja maculicauda* | Panama Canal | Roche *et al.,* 2010 |
| Derogenidae Nicoll, 1910 | *Genarchella* sp. *(= Halipegus genarchellus)* | *Roeboides guatemalensis* | Quebrada Juan Grande | Sogandares-Bernal, 1955; Choudhury *et al*., 2017 |
|  |  | *Hoplias malabaricus* | Quebrada Juan Grande | Choudhury *et al*., 2017 |
|  |  | *Vieja maculicauda* | Panama Canal | Roche *et al.,* 2010 |
| Diplostomatidae Poirier, 1886 | *Austrodiplostomum compactum* | *Vieja maculicauda* | Panama Canal | Roche *et al.,* 2010 |
|  |  | *Oreochromis niloticus* | Panama Canal | Roche *et al.,* 2010 |
|  | *Posthodiplostomum* sp. | *Vieja maculicauda* | Panama Canal | Roche *et al.,* 2010 |
| Fellodistomatidae Nicoll, 1913 | *Fellodistomum mendez* | *Brachyrhaphis episcopi* | Gatun Lake | Sogandares-Bernal, 1955 |
| Gorgoderidae Looss, 1899 | *Phyllodistomum* sp. | *Pimelodella chagresi* | Río Frijolito | Choudhury *et al*., 2017 |
|  |  | *Hoplias microlepis* | Quebrada Juan Grande | Choudhury *et al*., 2017 |
| Haploporidae Nicoll, 1914 | *Saccocoelioides cichlidorum (=Culuwiya cichlidorum)* | *Vieja maculicauda* | Panama Canal | Roche *et al.,* 2010 |
|  |  | *Oreochromis niloticus* | Panama Canal | Roche *et al.,* 2010 |
| Heterophyidae Leiper, 1909 | *Ascocotyle sp.* | *Vieja maculicauda* | Panama Canal | Roche *et al.,* 2010 |
| Hemuridae | *Halipegus genarchellus* | *Roeboides guatemalensis* | Gatun Lake | Sogandares-Bernal, 1955 |
| Opisthorchiidae Losss, 1899 | *Cladocystis trifolium* | *Vieja maculicauda* | Panama Canal | Roche *et al.,* 2010 |
| Proterodiplostomidae Dubois, 1936 | *Proterodiplostomidae* sp. 1 | *Vieja maculicauda* | Panama Canal | Roche *et al.,* 2010 |
|  | *Proterodiplostomidae* sp. 2 | *Vieja maculicauda* | Panama Canal | Roche *et al.,* 2010 |
| **Cestoda** |  |  |  |  |
| Bothiocephalidae | *Schyzocotyle acheilognathi* | *Aequidens coeruleopunctatus* | Chagres River, Panama | Choudhury *et al*., 2013 |
|  |  | *Aequidens coeruleopunctatus* | Quebrada Juan Grande | Choudhury *et al*., 2017 |
|  |  | *Cryptoheros panamensis* | Chagres River, Panama | Choudhury *et al.,* 2013 |
|  |  |  | Quebrada Juan Grande | Choudhury *et al*., 2017 |
| **Monogenea** |  |  |  |  |
| Dactylogyridae | *Aphanoblastella chagresii* | *Pimelodella chagresi* | Río Frijolito | Mendoza-Franco *et al.,* 2007 |
|  | *Aphanoblastella travassosi* | *Rhamdia quelen* | Lago Alajuela | Mendoza-Franco *et al.*, 2007 |
|  | *Aristocleidus hastatus* | *Eugerres brasilianus* | Lake Gatun | Mendoza-Franco *et al.*, 2009b |
|  | *Characithecium costaricensis* | *Astyanax aeneus* | Nigua River | Mendoza-Franco *et al*., 2009 |
|  | *Cichlidogyrus dossoui* | *Oreochromis niloticus* | Panama Canal | Roche *et al.,* 2010 |
|  | *Cichlidogyrus* sp. 1 | *Vieja maculicauda* | Panama Canal | Roche *et al.,* 2010 |
|  | *Cichlidogyrus* sp. 2 | *Vieja maculicauda* | Panama Canal | Roche *et al.,* 2010 |
|  | *Diaphorocleidus kabatai* | *Astyanax aeneus* | Nigua, Caldera | Mendoza-Franco *et al*., 2009 |
|  |  | *Astyanax aeneus* | Chiriquicito Rivers | Mendoza-Franco *et al*., 2009 |
|  | *Diaphorocleidus orthodusus* | *Astyanax orthodus* | Nigua River | Mendoza-Franco *et al*., 2009 |
|  | *Diaphorocleidus petrosusi* | *Brycon petrosus* | Río Frijolito | Mendoza-Franco *et al.*, 2007 |
|  | *Diplectanum gatunense* | *Eugerres brasilianus* | Gatun Lake | Mendoza-Franco *et al*., 2008 |
|  | *Gussevia asota* | *Astronotus ocellatus* | Lago Gatun | Mendoza-Franco *et al.*, 2007 |
|  | *Neotetraonchus vegrandis* | *Ariopsis guatemalensis* | Puerto Mutis, Gulf of Montijo | Kritsky *et al.*, 2009 |
|  | *Octouncuhaptor eugerrei* | *Eugerres brasilianus* | Gatun Lake | Mendoza-Franco *et al*., 2008 |
|  | *Palombitrema heteroancistrium* | *Astyanax aeneus* | Nigua River | Mendoza-Franco *et al*., 2009 |
|  |  | *Astyanax aeneus* | Quebrada Rivers | Mendoza-Franco *et al*., 2009 |
|  | *Sciadicleithrum panamensis* | *Aequidens coeruleopunctatus* | Río Frijolito | Mendoza-Franco *et al.*, 2007 |
|  | *Urocleidoides advenai* | *Brachyhypopomus occidentalis* | Aguas Claras River | Mendoza-Franco *et al.*, 2009 |
|  | *Urocleidoides cultellus* | *Brachyhypopomus occidentalis* | Aguas Claras River | Mendoza-Franco *et al.*, 2009 |
|  | *Urocleidoides flegomai* | *Piabucina panamensis* | Río Frijolito | Mendoza-Franco *et al.,* 2007 |
|  | *Urocleidoides neotropicalis* | *Saccodon dariensis* | Piriati River | Mendoza-Franco & Reina, 2008 |
|  | *Urocleidoides piriatiu* | *Ctenolucius beani* | Piriati River | Mendoza-Franco & Reina, 2008 |
|  | *Urocleidoides similuncus* | *Poecilia gillii* | Río Frijolito | Mendoza-Franco *et al.,* 2007 |
|  | *Urocleidoides strombicirrus* | *Astyanax aeneus* | Quebrada Rivers | Mendoza-Franco *et al.,* 2009 |
|  |  | *Astyanax aeneus* | Chiriquicito Rivers | Mendoza-Franco *et al.,* 2009 |
|  |  | *Astyanax aeneus* | Piriati River | Mendoza-Franco *et al.*, 2009 |
|  | *Urocleidoides visiofortatus* | *Brachyhypopomus occidentalis* | Aguas Claras River | Mendoza-Franco *et al.*, 2009 |
| **Acantocephala** |  |  |  |  |
| Oligacanthorhynchidae Southwell et Macfie, 1925 | *Oncicola* sp. | *Vieja maculicauda* | Panama Canal | Roche *et al.,* 2010 |
| **Nematoda** |  |  |  |  |
| Anisakidae Railliet & Henry, 1912 | *Contracaecum* sp. type 2 | *Vieja maculicauda* | Panama Canal | Roche *et al.,* 2010 |
| Cucullanidae Cobbold in 1864 | *Cucullanus pimelodellae* | *Pimelodella chagresi* | Río Frijolito | Choudhury *et al*., 2017 |
| Cystidicolidae Skrjabin, 1946 | *Spinitectus* sp. | *Brachyrhaphis cascajalensis* | Río Frijolito | Choudhury *et al*., 2017 |
| Dioctophymatidae Railliet, 1915 | *Eustrongylides* sp. | *Vieja maculicauda* | Panama Canal | Roche *et al.,* 2010 |
| Heterocheilidae Railliet & Henry, 1915 | *Brevimulticaecum* sp. | *Vieja maculicauda* | Panama Canal | Roche *et al.,* 2010 |
|  |  | *Oreochromis niloticus* | Panama Canal | Roche *et al.,* 2010 |
| Kathlaniidae Lane, 1914 | *Falcaustra* sp. | *Vieja maculicauda* | Panama Canal | Roche *et al.,* 2010 |
|  |  | *Oreochromis niloticus* | Panama Canal | Roche *et al.,* 2010 |
| Oxyuridae Cobbold, 1864 | *Cosmoxynemoides* sp. | *Astyanax sp.* | Quebrada Juan Grande | Choudhury *et al*., 2017 |
| Quadrigyridae Van Cleave, 1920 | *Quadrigyrus* sp. | *Hoplias microlepis* | Quebrada Juan Grande | Choudhury *et al*., 2017 |
| Quimperiidae Gendre, 1928 | *Paraseuratum* sp. | *Hoplias microlepis* | Quebrada Juan Grande | Choudhury *et al*., 2017 |
| Raphidascarididae Hartwich, 1954 | *Hysterothylacium* sp. | *Vieja maculicauda* | Panama Canal | Roche *et al.,* 2010 |
|  | *Raphidascaris* sp. | *Vieja maculicauda* | Panama Canal | Roche *et al.,* 2010 |
| Rhabdochonidae Skrjabin, 1946 | *Rhabdochona* sp. | *Bryconamericus emperador* | Río Frijolito | Choudhury *et al*., 2017 |
| Spiruroidea | *Spiroxys* sp. | *Oreochromis niloticus* | Panama Canal | Roche *et al.,* 2010 |
| **Copepoda** |  |  |  |  |
| Ergasilidae Thorell, 1859 | *Ergasilus* sp. | *Oreochromis niloticus* | Panama Canal | Roche *et al.,* 2010 |
|  |  | *Vieja maculicauda* | Panama Canal | Roche *et al.,* 2010 |
| **Pentastomida** |  |  |  |  |
|  | unidentified | *Vieja maculicauda* | Panama Canal | Roche *et al.,* 2010 |

**REFERENCES**

Aguirre-Macedo, M.L. & Scholz, T. 2005. Culuwiya cichlidorum n. sp. (Digenea: Haploporidae) from the black-belt cichlid Vieja maculicauda (Pisces: Cichlidae) from Nicaragua. *J. Parasitol.* **91**: 1379–1384.

Aguirre-Macedo, M.L., Scholz, T., González-Solís, D., Vidal-Martínez, V.M., Posel, P., Arjona-Torres, G., *et al.* 2001a. Some adult endohelminths parasitizing freshwater fishes from the Atlantic Drainages of Nicaragua. *Comp. Parasitol.* **68**: 190–195.

Aguirre-Macedo, M.L., Scholz, T., Gonźalez-Solís, D., Vidal-Martínez, V.M., Posel, P., Arjona-Torres, G., *et al.* 2001b. Larval helminths parasitizing freshwater fishes from the atlantic coast of Nicaragua. *Comp. Parasitol.* **68**: 42–51.

Andrade-Gómez, L., Pinacho-Pinacho, C.D. & García-Varela, M. 2017. Molecular, morphological, and ecological data of *Saccocoelioides* Szidat, 1954 (Digenea: Haploporidae) from Middle America supported the reallocation from *Culuwiya cichlidorum* to *Saccocoelioides*. *J. Parasitol.* **103**: 257–267.

Andrade-Gómez, L., Sereno-Uribe, A.L. & García-Varela, M. 2019. Description of a new species and understanding the genetic diversity of Saccocoelioides Szidat, 1954 (Haploporidae) in Middle America using mitochondrial and nuclear DNA sequences. *Parasitol. Int.* **71**: 87–98.

Arguedas Cortés, D., Dolz, G., Zúñiga, J.J.R., Rocha, A.E.J. & Alán, D.L. 2010. *Centrocestus formosanus* (Opisthorchiida: Heterophyidae) como causa de muerte de alevines de tilapia gris *Oreochromis niloticus* (Perciforme: Cichlidae) en el Pacífico seco de Costa Rica. *Rev. Biol. Trop.* **58**: 1453–1465.

Briosio-Aguilar, R., García-Varela, M., Hernández-Mena, D.I., Rubio-Godoy, M. & Pérez-Ponce De León, G. 2019. Morphological and molecular characterization of an enigmatic clinostomid trematode (Digenea: Clinostomidae) parasitic as metacercariae in the body cavity of freshwater fishes (Cichlidae) across Middle America. *J. Helminthol.* **93**: 461–474.

Chandler, M., Chapman, L.J. & Chapman, C.A. 1995. Patchiness in the abundance of metacercariae parasitizing Poecilia gillii (Poeciliidae) isolated in pools of an intermittent tropical stream. *Environ. Biol. Fishes* **42**: 313–321.

Choudhury, A., Daverdin, R.H. & Brooks, D.R. 2002. *Wallinia chavarriae* n. sp. (Trematoda: Macroderoididae) in *Astyanax aeneus* (Gunther, 1860) and *Bryconamericus scleroparius* (Regan, 1908) (Osteichthyes: Characidae) from the Area De Conservacion Guanacaste, Costa Rica. *J. Parasitol.* **88**: 107–112.

Choudhury, A., García-Varela, M. & Pérez-Ponce de León, G. 2017. Parasites of freshwater fishes and the Great American Biotic Interchange: A bridge too far? *J. Helminthol.* **91**: 174–196.

Choudhury, A., Pérez Ponce de León, G., Brooks, D.R. & Daverdin, R. 2006. *Paracreptotrema blancoi* n. gen., n. sp. (Digenea: Plagiorchiformes: Allocreadiidae) in the olomina, *Priapichthys annectens* (Osteichthyes: Poeciliidae), from the Área de Conservación Guanacaste, Costa Rica. *J. Parasitol.* **92**: 565–568.

Curran, S.S., Pulis, E.E., Andres, M.J. & Overstreet, R.M. 2018. Two new species of *Saccocoelioides* (Digenea: Haploporidae) with phylogenetic analysis of the family, including species of *Saccocoelioides* from North, Middle, and South America. *J. Parasitol.* **104**: 221–239.

de Chambrier, A., Pinacho-Pinacho, C.D., Hernández-Orts, J.S. & Scholz, T. 2017. A new genus and two new species of proteocephalidean tapeworms (Cestoda) from cichlid fish (Perciformes: Cichlidae) in the neotropics. *J. Parasitol.* **103**: 83–94.

de Chambrier, A. & Vaucher, C. 1984. *Proteocephalus gaspari* n. sp. (Cestoda: Proteocephalidae), parasite de *Lepisosteus tropicus* (Gill.) au Lac Managua (Nicaragua). *Rev. suisse Zool.* **91**: 229–233.

González-García, M.T., Andrade-Gómez, L., Pinacho-Pinacho, C.D., Sereno-Uribe, A.L. & García-Varela, M. 2021. Host-induced phenotypic plasticity in *Saccocoelioides lamothei* Aguirre-Macedo and Violante-González, 2008 (Digenea: Haploporidae) a parasite of freshwater, brackish and marine fishes from Middle America. *Parasitology* **148**: 519–531.

González-Solís, A.D. & Jiménez-García, M.I. 2006. Parasitic nematodes of freshwater fishes from two nicaraguan crater lakes. *Comp. Parasitol.* **73**: 188–192.

González-Solís, D. & Moravec, F. 2004. Two new nematode species, *Orientatractis campechensis* n. sp. and *Orientatractis chiapasensis* n. sp. (Nematoda: Atractidae) from cichlid fishes in southern Mexico and Nicaragua. *J. Parasitol.* **90**: 1443–1449.

Kritsky, D.C., Mendoza-Franco, E.F., Bullard, S.A. & Vidal-Martínez, V.M. 2009. Revision of the amphiamerican Neotetraonchus Bravo-Hollis, 1968 (Monogenoidea: Dactylogyridae), with a description of N. vegrandis n. sp. from the gill lamellae of the blue sea catfish Ariopsis guatemalensis (Siluriformes: Ariidae) off the Pacific Coast o. *Syst. Parasitol.* **74**: 1–15.

López-Caballero, J., Osorio-Sarabia, D. & Garcia-Prieto, L. 2009. *Cucullanus costaricensis* n. sp. (Nematoda: Cucullanidae), a parasite of *Bagre pinnimaculatus* (Siluriformes: Ariidae) from Río Tempisque, Costa Rica. *J. Parasitol.* **95**: 413–423.

López-Jiménez, A., Pérez-Ponce de León, G. & García-Varela, M. 2018. Molecular data reveal high diversity of *Uvulifer* (Trematoda: Diplostomidae) in Middle America, with the description of a new species. *J. Helminthol.* **92**: 725–739.

Mendoza-Franco, E.F., Aguirre-Macedo, M.L. & Vidal-Martínez, V.M. 2007. New and previously described species of Dactylogyridae (Monogenoidea) from the gills of Panamanian freshwater fishes (Teleostei). *J. Parasitol.* **93**: 761–771.

Mendoza-Franco, E.F., Posel, P. & Dumailo, S. 2003. Monogeneans (Dactylogyridae: Ancyrocephalinae) of freshwater fishes from the Caribbean coast of Nicaragua. *Comp. Parasitol.* **70**: 32–41.

Mendoza-Franco, E.F., Reina, R.G.. & Torchin, M.E. 2009. Dactylogyrids (Monogenoidea) parasitizing the gills of *Astyanax* spp. (Characidae) from Panama and Southeast Mexico, a new species of *Diaphorocleidus*. *J. Parasitol.* **95**: 46–55.

Mendoza-Palmero, C.A., Blasco-Costa, I., Hernández-Mena, D. & Pérez-Ponce de León, G. 2017. *Parasciadicleithrum octofasciatum* n. gen., n. sp. (Monogenoidea: Dactylogyridae), parasite of *Rocio octofasciata* (Regan) (Cichlidae: Perciformes) from Mexico characterised by morphological and molecular evidence. *Parasitol. Int.* **66**: 152–162.

Pinacho-Pinacho, C.D., Sereno-Uribe, A.L., De León, G.P.P. & García-Varela, M. 2015. Checklist of the species of *Neoechinorhynchus* (Acanthocephala: Neoechinorhynchidae) in fishes and turtles in Middle-America, and their delimitation based on sequences of the 28S rDNA. *Zootaxa* **3985**: 98–116.

Pinacho-Pinacho, C.D., Sereno-Uribe, A.L., García-Varela, M. & Pérez-Ponce De León, G. 2018. A closer look at the morphological and molecular diversity of Neoechinorhynchus (Acanthocephala) in Middle American cichlids (Osteichthyes: Cichlidae), with the description of a new species from Costa Rica. *J. Helminthol.* **94**: XX–XX. Cambridge University Press.

Pinacho-Pinacho, C.D., Sereno-Uribe, A.L., Hernández-Orts, J.S., García-Varela, M. & Pérez–Ponce de León, G. 2021. Integrative taxonomy reveals an even greater diversity within the speciose genus Phyllodistomum (Platyhelminthes : Trematoda : Gorgoderidae), parasitic in the urinary bladder of Middle American freshwater fishes, with descriptions of five new species. *Invertebr. Syst.*

Roche, D.G., Leung, B., Mendoza Franco, E.F. & Torchin, M.E. 2010. Higher parasite richness, abundance and impact in native versus introduced cichlid fishes. *Int. J. Parasitol.* **40**: 1525–1530.

Rodríguez-Ortíz, B., García-Prieto, L. & Pérez-Ponce De León, G. 2004. Checklist of the helminth parasites of vertebrates in Costa Rica. *Rev. Biol. Trop.* **52**: 313–353.

Sandlund, O.T., Daverdin, R.H., Choudhury, A., Brooks, D.R. & Diserud, O.H. 2010. *A survey of freshwater fishes and their macroparasites in the Guanacaste Conservation Area (ACG), Costa Rica*. Trondheim, NO.

Santacruz, A., Barluenga, M. & Pérez-Ponce De León, G.P. 2021. Macroparasite diversity in cichlid fish from Nicaraguan lakes: first steps towards understanding host-parasite diversification and speciation in a model system. *Rev.*

Scholz, T., Aguirre-Macedo, M.L. & Choudhury, A. 2004. *Auriculostoma astyanace* n. gen., n. sp. (Digenea: Allocreadiidae), from the banded astyanax, *Astyanax fasciatus* (Characiformes: Characidae), from Nicaragua, with a reevaluation of neotropical *Crepidostomum* spp. *J. Parasitol.* **90**: 1128–1132.

Sereno-Uribe, A.L., Gómez, L.A., Núñez, M.O. De, León, G.P.P. De & García-Varela, M. 2019. Assessing the taxonomic validity of *Austrodiplostomum* spp. (Digenea: Diplostomidae) through nuclear and mitochondrial data. *J. Parasitol.* **105**: 102–112.

Sogandares-Bernal, F. 1955. Some helminth parasites of fresh and brackish water fishes from Louisiana and Panama. *J. Parasitol.* **41**: 587–594.

Tkach, V. V. & Curran, S.S. 2015. *Prosthenystera oonastica* n. sp. (Digenea: Callodistomidae) from ictalurid catfishes in southeastern United States and molecular evidence differentiating species in the genus across Americas. *Syst. Parasitol.* **90**: 39–51.

Watson, D.E. 1976. Digenea of Fishes from Lake Nicaragua. In: *Investigations of the Ichthyofauna of Nicaraguan Lakes* (Thorson T. B., ed), pp. 251–260. University of Nebraska Press.

Watson, D.E. & Thorson, T.B. 1976. Helminths from Elasmobranchs in Central American Fresh Waters. *Ichthyofauna Nicar. Lakes* **1**: 629–640.