

REVIEW

A synopsis of the parasites from cyprinid fishes of the genus *Tribolodon* in Japan: A 2016 update and supplement

Kazuya NAGASAWA^{1)*} and Hirotaka KATAHIRA^{1,2)}

¹⁾ Graduate School of Biosphere Science, Hiroshima University,
1-4-4 Kagamiyama, Higashi-Hiroshima, Hiroshima 739-8528, Japan

²⁾ Present address: National Research Center for Protozoan Diseases, Obihiro University of
Agriculture & Veterinary Medicine, Nishi-2-13 Inada-cho, Obihiro, Hokkaido 080-8555, Japan

Abstract The synopsis of the parasites from cyprinids of the genus *Tribolodon* in Japan was published in 2013 and is here updated and supplemented using the recently published papers and those not cited before. In this updated version, information on 15 species, including six newly added species, is compiled as Parasite-Host List. For 108 years from 1908 to 2015, a total of 48 nominal species of parasites of the following taxa were reported: Ciliophora (2 species), Myxozoa (1), Trematoda (20), Monogenea (1), Cestoda (3), Nematoda (9), Acanthocephala (3), Hirudinida (1), Mollusca (1), Copepoda (6), and Isopoda (1). Those nominal species and parasites not identified to species level are listed in Host-Parasite List: 48, eight, four, and three nominal species were from *T. hakonensis*, *T. sachalinensis*, *T. brandtii maruta*, and *T. brandtii brandtii*, respectively, and one unidentified species was from *T. nakamuraii*.

Key words: parasites, synopsis, *Tribolodon brandtii brandtii*, *Tribolodon brandtii maruta*, *Tribolodon hakonensis*, *Tribolodon nakamuraii*, *Tribolodon sachalinensis*

INTRODUCTION

The synopsis of the parasites from cyprinid fishes of the genus *Tribolodon* in Japan was published in 2013 based on the literature published for 106 years between 1908 and 2013 (Nagasawa and Katahira, 2013). This synopsis contained the information on both protistan and metazoan parasites reported from the four species of *Tribolodon* (*T. hakonensis*, *T. sachalinensis*, *T. brandtii*, and *T. nakamuraii*) in Japan, and 44 nominal species of parasites were listed by higher taxon as follows: Ciliophora (2 species), Myxozoa (1), Trematoda (18), Cestoda (3), Nematoda (9), Acanthocephala (2), Hirudinida (1), Mollusca (1), Copepoda (6), and Isopoda (1). The synopsis also contained the information on unidentified species of Monogenea and Branchiura.

The synopsis is updated here based on the papers published between 2014 and 2015 (Skern-Mauritzen *et al.*, 2014; Shimazu, 2014; Shimazu *et al.*, 2015) and those overlooked in the 2013 version (Shiraki, 1974; Sicard *et al.*, 2003; Amin *et al.*, 2007; Shimazu, 2007, 2013; Nakano and Itoh, 2011). In this updated version, the following six species of metazoan parasites are newly added:

1. *Azygia rhinogobii* Shimazu, 2007 (Trematoda) from *T. hakonensis* (Shimazu, 2007, 2014);
2. *Sanguinicola ugui* Shimazu, 2007 (Trematoda) from *T. hakonensis* (Shimazu, 2007, 2013);
3. *Paradiplozoon skrjabini* Akhmerov, 1974 (Monogenea) from *T. hakonensis*, *T. sachalinensis*, and *T. brandtii brandtii* (Sicard *et al.*, 2003; Shimazu *et al.*, 2015);
4. *Contraecum osculatum* (Rudolphi, 1802) (Nematoda) from *T. hakonensis* (Shiraki, 1974);
5. *Hysterothylacium* sp. (Nematoda) from *T. hakonensis* (Shiraki, 1974); and
6. *Pseudorhadynorhynchus samegaiensis* Nakajima and Egusa, 1975 (Acanthocephala) from *T. hakonensis* (Amin *et al.*, 2007).

Shimazu *et al.* (2015) examined some institutional specimens of the monogenean listed as *Diplozoon* sp. in the previous version and identified them as *P. skrjabini*. However, no other specimens of *Diplozoon* sp. have yet been examined for identification. Thus, the information on *Diplozoon* sp. still remains here after slightly revised. For the three species, *viz.*, *Asymphylogora innominata* (Faust, 1924) (Trematoda), *Anisakis simplex* (Rudolphi, 1809) (Nematoda), and *Limnotrachelobdella okae* (Moore, 1924) (Hirudinida), Shimazu's (2007), Shiraki's (1974), and Nakano and Itoh's (2011) papers are newly cited in this version, respectively, and the information on these three parasites is revised here. Moreover, a new scientific name is adopted here for each of the following species listed before because their scientific name has currently been changed: *Isoparorchis hypselobagri* (Billet, 1898) (Trematoda), *Bothriocephalus achelilogathi* Yamaguti, 1934 (Cestoda), *Hysterothylacium aduncum* (Rudolphi, 1802) (Nematoda), *Pseudocapillaria tomentosa* (Dujardin, 1843) (Nematoda), and *Lepeophtheirus salmonis* (Krøyer, 1837) (Copepoda).

Like in Nagasawa and Katahira (2013), the information on the above mentioned parasites is assembled as Parasite–Host and Host–Parasite lists. In the **PARASITE–HOST LIST**, parasites are arranged by higher taxon in the following order: Trematoda, Monogenea, Cestoda, Nematoda, Acanthocephala, and Hirudinida. Within each higher taxon, genera and species are listed alphabetically. For each species of parasite, the following information is provided:

1) The current **scientific name**, including author(s) and date(s), followed by any original combination, recognized synonym(s), or other identifications(s) that have been used in establishing records from *Tribolodon* spp. in Japan.

2) The **habitat** in which the parasite was acquired and normally completes its life cycle is given as FW for fresh waters, B for brackish waters, and M for marine waters.

3) The **Site(s) of infection** of the parasite in or on its host. If the site was not given in the original record, the likely site was determined from other records and is enclosed in square brackets.

4) The **Distribution** of the parasite is indicated by prefecture (boundaries shown in Fig. 1), in geographical order from northeast to southwest.

5) The **Record(s)**. The authors responsible for the records are listed in chronological order. If a parasite has been reported more than once, the references are numbered, but not when there has been only one record of the parasite. Each reference is followed by the locality or localities given in two parts, first the prefecture and then the detailed collection locality or localities from which the parasite was reported. If no locality record was given, the geographical locality is shown by a dash (–). When all records are from the same prefecture, only the detailed collection locality or localities are listed.

6) Under **Remarks**, explanatory comments are given on systematics, nomenclature, useful references, and notes on specific items such as tentative parasite identifications in the original reports.

7) The **References** section includes works directly cited in the Parasite-Host List. If only a Japanese

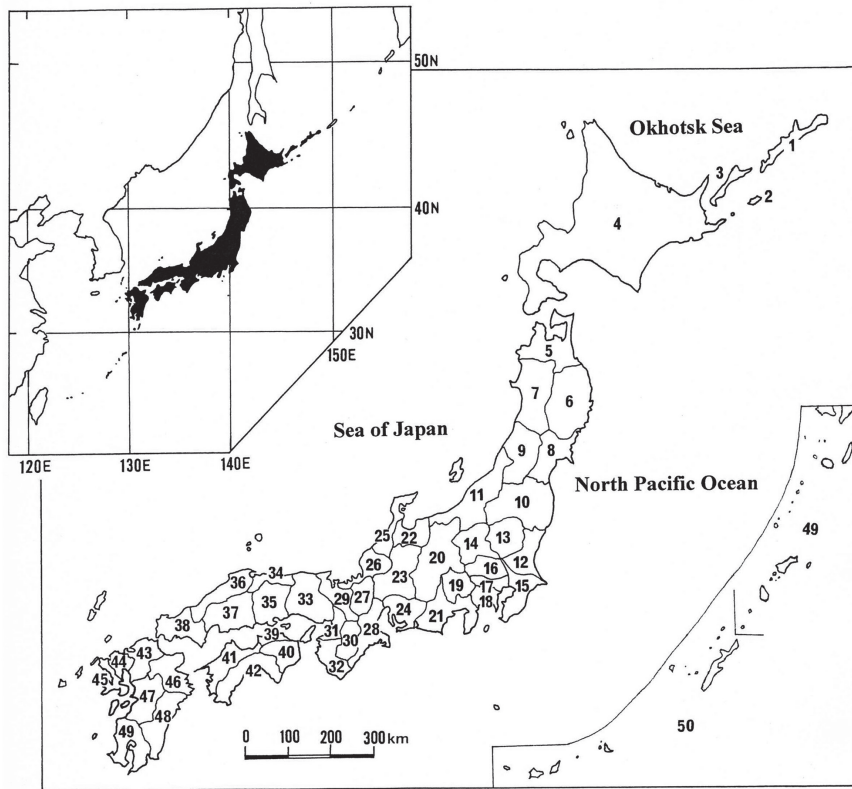


Fig. 1. Map of Japan showing the prefectural boundaries. The following prefectural names are arranged in alphabetical order: Aichi–24; Akita–7; Aomori–5; Chiba–15; Ehime–41; Etorofu Island–1; Fukui–26; Fukuoka–43; Fukushima–10; Gifu–23; Gunma–14; Hiroshima–37; Hokkaido–4; Hyogo–33; Ibaraki–12; Ishikawa–25; Iwate–6; Kagawa–39; Kagoshima–49; Kanagawa–18; Kochi–42; Kumamoto–47; Kunashiri Island–3; Kyoto–29; Mie–28; Miyagi–8; Miyazaki–48; Nagano–20; Nagasaki–45; Nara–30; Niigata–11; Oita–46; Okayama–35; Okinawa–50; Osaka–31; Saga–44; Saitama–16; Shiga–27; Shikotan Island–2; Shimane–36; Shizuoka–21; Tochigi–13; Tokushima–40; Tokyo–17; Tottori–34; Toyama–22; Wakayama–32; Yamagata–9; Yamaguchi–38; and Yamanashi–19.

title was given by the original author(s), our translation of the title into English is provided in square brackets.

In the **HOST-PARASITE LIST**, hosts are listed alphabetically. The scientific, English, and Japanese names of *Tribolodon* spp. follow Hosoya (2015), in which, in addition to *T. hakonensis*, *T. nakamuraii*, and *T. sachalinensis*, two subspecies of *T. brandtii* (*T. brandtii brandtii* and *T. brandtii maruta*) are listed based on Sakai and Amano (2014). Based on the previous and present versions of the synopsis, all the parasites reported from *Tribolodon* spp. are listed in alphabetical order in each higher taxon, and after the name of each parasite, its geographical distribution in Japan is given in parenthesis. Information on the parasites not listed here are found in Nagasawa and Katahira (2013).

PARASITE–HOST LIST

TREMATODA

Asymphylogora innominata (Faust, 1924) (FW)

Previous identification: *Asymphylogora macrostoma* of Yamaguti (1934), Shimazu (1992), Nakamura *et al.* (2000), Shimazu and Urabe (2005), and Shimazu (2007)

Site of infection: intestine

Host: *Tribolodon hakonensis*

Distribution: Saitama, Nagano, Toyama, Fukui, Shiga, Nara, Hiroshima

Records: 1. Yamaguti 1934 (Toyama: Namerikawa); 2. Shimazu 1992 (Saitama: Oppe River; Nagano: Nogu River, Torii River, Lake Suwa; Fukui: Obama; Shiga: Lake Biwa; Hiroshima: Eno River, Saijo River); 3. Nakamura *et al.* 2000 (Nara: Takami River); 4. Shimazu and Urabe 2005 (Nara: Takami River); 5. Shimazu 2007 (Nagano: Torii River, Lake Suwa, Hiroi River); 6. Shimazu *et al.* 2011 (Shiga: Lake Biwa)

Remarks: Although *Asymphylogora macrostoma* had been used as the scientific name of this trematode in Japan, Shimazu *et al.* (2011) used *A. innominata* for the species.

Azygia rhinogobii Shimazu, 2007 (FW)

Site of infection: intestine

Host: *Tribolodon hakonensis*

Distribution: Nagano

Records: Shimazu 2007 (Lake Suwa); Shimazu 2014 (Lake Suwa)

Remarks: *Tribolodon hakonensis* has been considered as an accidental host because this fish preys on a true final host (small gobiids) (Shimazu, 2007).

Isoparorchis eurytremum (Kobayashi, 1915) (FW)

Previous identification: *Leptolecithum eurytremum* of Kobayashi (1915, 1921)

Site of infection: body cavity

Host: *Tribolodon hakonensis*

Distribution: Ibaraki

Records: 1. Kobayashi 1915 (–); 2. Kobayashi 1921 (–); 3. Yamaguti 1934 (Ibaraki: Lake Kasumigaura [as Kasumiga-ura])

Remarks: Only immature worms of this trematode occurs in *T. hakonensis* (Kobayashi, 1915, 1921; Yamaguti, 1934). Although Kobayashi (1915, 1921) gave no detailed localities of the species, its adults were collected at various sites in Okayama Prefecture, Sawara in Chiba Prefecture, Lake Kasumigaura (as Kasumiga-ura) in Chiba Prefecture, and Lake Biwa in Shiga Prefecture. Although the species was listed as *I. hypselobagri* (Billet, 1898) in the previous version of the synopsis (Nagasawa and Katahira, 2013), it has currently been treated as *I. eurytremum* based on a revisional work on the genus *Isoparorchis* (Shimazu *et al.*, 2014). Nagasawa *et al.* (2013) reviewed the biology of the species (as *I. hypselobagri*) infecting Japanese freshwater fishes based on the literature published between 1915 and 2013.

Sanguinicola ugui Shimazu, 2007 (FW)

Sites of infection: blood vessels chiefly of the gills and rarely of the liver, kidneys, and heart.

Host: *Tribolodon hakonensis*

Distribution: Nagano

Records: Shimazu 2007 (Hiroi River, Lake Suwa, Tenryu River); Shimazu 2013 (Hiroi River, Lake Suwa, Tenryu River, Sai River)

MONOGENEA

Diplozoon sp. (FW)

Site of infection: gills

Hosts: *Tribolodon hakonensis* (1–5, 7–8)

Tribolodon sachalinensis (5)

Tribolodon nakamuraii (6)

Distribution: Hokkaido, Saitama, Niigata, Gifu, Nara

Records: 1. Okura *et al.* 1985a (Saitama: Ara River, Iruma River, Toki River, Oppe River); 2. Okura *et al.* 1985b (Saitama: Ara River, Saitama Prefectural Fisheries Experimental Station); 3. Suzuki and Okura 1987 (Saitama: Ara River, Iruma River, Toki River, Oppe River, Tone River, Kanna River); 4. Suzuki and Okura 1988 (Saitama: –); 5. Nagasawa *et al.* 1989 (Hokkaido: Horobetsu River, Teshio River, Lake Barato); 6. Shindo 1997 (Niigata: aquarium); 7. Nakamura *et al.* 2000 (Nara: Takami River); 8. Anonymous 2002 (Gifu: Kiso River)

Remarks: Currently, Nagasawa (2016) has suggested that the monogenean reported as *Diplozoon* sp. is most probably as *Paradiplozoon skrjabini* Akhmerov, 1974 (see below).

Paradiplozoon skrjabini Akhmerov, 1974 (FW)

Previous identification: *Diplozoon* sp. of Nagasawa *et al.* (1989) and Ogawa (1994); *Paradiplozoon* sp. of Sicard *et al.* (2003)

Hosts: *Tribolodon hakonensis* (1–4)

Tribolodon sachalinensis (2, 4)

Tribolodon brandtii brandtii (2, 4)

Distribution: Hokkaido, Nagano, Hiroshima

Records: 1. Nagasawa *et al.* 1989 (as “Ogawa, unpublished”: Mena River, Chitose River [as Ebetsu], Lake Toro); 2. Ogawa 1994 (Mena River, Chitose River, Lake Toro); 3. Sicard *et al.* 2003 (Nagano: Tenryu River); 4. Shimazu *et al.* 2015 (Hokkaido: Lake Abashiri, Kotoni-hassamu River, Mena River, Chitose River, Lake Toro, Kushiro River; Tokyo: Tama River; Nagano: Ueda City, Metoba River, Sai River, Lake Kizaki, Tenryu River; Hiroshima: Oota River, Takiyama River)

Remarks: Some specimens reported as *Diplozoon* sp. by Ogawa (1994) were identified as *P. skrjabini* by Shimazu *et al.* (2015). The latter authors also state that *Paradiplozoon* sp. reported by Sicard *et al.* (2003) is identical as *P. skrjabini*.

CESTODA

Schyzocotyle acheilognathi (Yamaguti, 1934) (FW)

Previous identification: *Coelobothrium oitense* of Kugi and Matsuo (1990)

Site of infection: intestine

Host: *Tribolodon hakonensis*

Distribution: Oita

Record: Kugi and Matsuo 1990 (Chikugo River)

Remarks: *Coelobothrium oitense* was regarded as a junior synonym of *Bothriocephalus acheilognathi* Yamaguti, 1934 by Kuchta and Scholz (2007). Brabec *et al.* (2015) have recently transferred *B. acheilognathi* to the genus *Schyzocotyle*.

NEMATODA

Anisakis simplex (Rudolphi, 1809) (larva) (M)

Previous identification: *Anisakis* larva (I) of Shiraki (1974) and *Anisakis* sp. type I Miyamoto and Kutsumi (1980)

Sites of infection: musculature, mesentery

Host: *Tribolodon hakonensis*

Distribution: Hokkaido, Iwate, Akita, Niigata

Records: 1. Shiraki 1974 (Akita: Yoneshiro River; Niigata: Agano River); 2. Miyamoto and Kutsumi 1980 (Hokkaido: Kushiro River); 3. Moravec *et al.* 1985 (Hokkaido: Lake Toro); 4. Hashimoto 2000 (Iwate: Hei River)

Contracaecum osculatum (Rudolphi, 1802) (larva) (M)

Previous identification: *Contracaecum*-type larva (A) of Shiraki (1974)

Site of infection: body cavity

Host: *Tribolodon hakonensis*

Distribution: Akita

Record: Shiraki 1974 (Yoneshiro River)

Remarks: Shiraki (1974) suggests that this nematode is identical as *Contracaecum osculatum* (Rudolphi, 1802). The biology of this species in Japan was reviewed by Nagasawa (2012).

Hysterothylacium gadi aduncum (Rudolphi, 1802) (larva) (FW)

Previous identification: *Hysterothylacium aduncum* of Moravec *et al.* (1985)

Site of infection: intestine

Host: *Tribolodon sachalinensis*

Distribution: Hokkaido

Record: Moravec *et al.* 1985 (Lake Toro)

Remarks: *Hysterothylacium aduncum* reported by Moravec *et al.* (1985) has currently been treated as *H. gadi aduncum* (Moravec, 2013).

Hysterothylacium sp. (larva) (M)

Previous identification: *Thynascaris* sp. of Moravec *et al.* (1985)

Site of infection: [intestine]

Host: *Tribolodon hakonensis*

Distribution: Akita, Niigata

Record: Shiraki 1974 (Akita: Yoneshiro River, Omono River; Niigata: Agano River)

Pseudocapillaria (*Pseudocapillaria*) *tomentosa* (Dujardin, 1843) (FW)

Previous identification: *Capillaria ugui* of Yamaguti (1941) and *Pseudocapillaria tomentosa* of Moravec and Nagasawa (1989), Moravec *et al.* (1998), and Nakamura *et al.* (2000)

Site of infection: intestine

Host: *Tribolodon hakonensis*

Distribution: Tokyo, Shizuoka, Fukui, Nara

Records: 1. Yamaguti 1941 (Fukui [as Hukui]: Obama); 2. Moravec and Nagasawa 1989 (Tokyo: Tama River); 3. Moravec *et al.* 1998 (Shizuoka: Okitsu River); 4. Nakamura *et al.* 2000 (Nara: Takami River)

Remarks: The current scientific name of this species follows Moravec (2013).

ACANTHOCEPHALA

Pseudorhadinorhynchus samegaiensis Nakajima and Egusa, 1975 (FW)

Site of infection: intestine

Host: *Tribolodon hakonensis*

Distribution: Shiga

Record: Amin *et al.* 2007 (Lake Biwa and rivers flowing into the lake)

COPEPODA

Lepeophtheirus salmonis oncorhynchi Skern-Mauritzen, Torrissen and Glover, 2014 (M)

Previous identification: *Lepeophtheirus salmonis* of Nagasawa *et al.* (1994)

Site of infection: body surface

Host: *Tribolodon hakonensis*

Distribution: Hokkaido

Record: Nagasawa *et al.* 1994 (Fururu River)

Remarks: Skern-Mauritzen *et al.* (2014) have separated *L. salmonis* into two subspecies, *L. salmonis salmonis* (from the Atlantic Ocean) and *L. salmonis oncorhynchi* (from the Pacific Ocean).

HIRUDINIDA

Limnotrachelobdella okae (Moore, 1924) (B or M)

Sites of infection: body surface, fins

Hosts: *Tribolodon hakonensis* (2)

Tribolodon brandtii brandtii (1)

Distribution: Niigata, Tokyo

Records: 1. Nagasawa *et al.* 2008 (Niigata: Iwafune Fishing Port); 2. Nakano and Itoh 2011 (Tokyo: -)

HOST-PARASITE LIST

Tribolodon brandtii brandtii (Dybowski, 1872) Jusan dace, "jusan-ugui" (Japanese name)

Trematoda

Metagonimus yokogawai (Hokkaido)

Monogenea

Dactylogyrus sp. (Hokkaido)

Paradiplozoon skrjabini (Hokkaido)

Diplozoon sp. (Hokkaido)

Nematoda

Rhabdochona sp. (Niigata)

Hirudinida

Limnotrachelobdella okae (Niigata)

Tribolodon brandtii maruta Sakai and Amano, 2015 Maruta dace, “maruta” (Japanese name)

Trematoda

Allocreadium japonicum (Tokyo)

Clonorchis sinensis (Miyagi)

Exorchis oviformis (Miyagi)

Metagonimus sp. (Miyagi)

Pseudexorchis major (Tokyo)

Tribolodon hakonensis (Günther, 1877) Japanese dace, “ugui” (Japanese name)

Ciliophora

Chilodonella piscicola (Hokkaido)

Trichodina fujitai (Yamagata, Osaka)

Trichodinidae gen. sp. (Yamagata, Gifu)

Ciliophora gen. sp. (Nara)

Myxozoa

Chloromyxum richardsonii (Hokkaido)

Myxozoa gen. sp. (Gifu, Nara)

Trematoda

Allocreadium japonicum (Tokyo)

Allocreadium tosai (Hokkaido)

Allocreadium tribolodontis (Iwate)

Asymphylogora innominata (Saitama, Nagano, Toyama, Fukui, Shiga, Nara, Hiroshima)

Azygia rhinogobii (Nagano)

Centrocestus armatus (Shizuoka, Gifu, Oita)

Clinostomum complanatum (Tottori)

Clonorchis sinensis (Miyagi, Toyama, Nagano, Shiga)

Echinochasmus milvi (—)

Exorchis oviformis (Niigata, Tokyo)

Holostephanus nipponicus (Yamagata)

Isoparorchis eurytremum (Ibaraki)

Metagonimus katuradai (Oita)

Metagonimus miyatai (Hokkaido, Hiroshima)

Metagonimus takahashii (Niigata, Toyama, Ishikawa, Okayama, Hiroshima, Yamaguchi, Oita)

Metagonimus yokogawai (Hokkaido, Aomori, Akita, Miyagi, Yamagata, Niigata, Gunma, Kanagawa, Shizuoka, Toyama, Ishikawa, Mie, Shimane, Hiroshima, Yamaguchi, Tokushima, Oita, Miyazaki, Kumamoto)

Metagonimus spp. (Hokkaido, Yamagata, Shizuoka, Gifu, Hiroshima)

Neoplagiopus elongatus (Shiga)

Pseudexorchis major (Tokyo, Shizuoka, Gifu, Oita)

Pseudozoogonoides ugui (Hokkaido, Iwate)

Sanguinicola ugui (Nagano)

Digenea gen. spp. (Hokkaido, Akita, Toyama, Nara)

Monogenea

Dactylogyrus sp. (Hokkaido)

Diplozoon sp. (Hokkaido, Saitama, Gifu, Nara)

Gyrodactylus sp. (Hokkaido)

Paradiplozoon skrjabini (Hokkaido, Tokyo, Nagano, Hiroshima)

Monopisthocotylea gen. sp. (Gifu)

Cestoda

Caryophyllaeides ergensi (Hokkaido, Aomori, Shizuoka, Nagano)

Caryophyllidea fam. gen. sp. (Hokkaido)

Caryophyllidae gen. sp. (Iwate)

Ligula interrupta (Hokkaido, Tochigi, Gunma, Kanagawa, Yamanashi)

Schyzocotyle acheilognathi (Oita)

Nematoda

Anisakis simplex (Hokkaido, Iwate, Akita, Niigata)

Camallanus cotti (—)

Contraecum sp. (Akita)

Gnathostoma nipponicum (Aomori)

Hysterothylacium gadi aduncum (Hokkaido)

Hysterothylacium sp. (Akita, Niigata)

Pseudocapillaria (*Pseudocapillaria*) *tomentosa* (Tokyo, Shizuoka, Fukui, Nara)

Raphidascaris gigi (Shiga)

Rhabdochona coronacauda (Nara)

Rhabdochona denunata honshuensis (Nara)

Rhabdochona zacconis (Hokkaido, Aomori, Iwate, Tokyo, Nagano, Shizuoka, Shiga, Nara)

Nematoda gen. sp. (Hokkaido)

Acanthocephala

Acanthocephalus opsariichthydis (Nagano)

Acanthocephalus sp. (Iwate)

Pseudorhadinorhynchus leuciscus (Hokkaido, Iwate)

Pseudorhadinorhynchus samegaiensis (Shiga)

Acanthocephala gen. sp. (Gifu)

Hirudinida

Limnotrachelobdella okae (Tokyo)

Mollusca

Pronodularia japonensis (Chiba)

Branchiura

Argulus sp. (Nara)

Copepoda

- Caligus orientalis* (Hokkaido)
Caligus punctatus (Aomori, Miyagi)
Ergasilus hypomesi (Hokkaido)
Lepeophtheirus salmonis oncorhynchi (Hokkaido)
Lernaea cyprinacea (Hokkaido)
Neoergasilus japonicus (Hokkaido)

Isopoda

- Nerocila japonica* (Shimane)

Tribolodon nakamuraii Doi and Shinzawa, 2000 Long lowerjaw dace, “ukekuchi-ugui” (Japanese name)

Monogenea

- Diplozoon* sp. (Niigata)

Tribolodon sachalinensis (Nikolskii, 1889) Ainu dace, “ezo-ugui” (Japanese name)

Trematoda

- Allocreadium tosai* (Hokkaido)
Allocreadium tribolodontis (Hokkaido)
Metagonimus miyatai (Hokkaido)
Metagonimus takahashii (Hokkaido)
Metagonimus yokogawai (Hokkaido)
 Digenea gen. spp. (Hokkaido)

Monogenea

- Dactylogyrus* sp. (Hokkaido)
Diplozoon sp. (Hokkaido)
Paradiplozoon skrjabini (Hokkaido)

Cestoda

- Caryophyllaeides ergensi* (Hokkaido)
Ligula interrupta (Hokkaido)

Nematoda

- Camallanidae gen. sp. (Hokkaido)
 Rhabdochonidae gen. sp. (Hokkaido)
 Nematoda gen. sp. (Hokkaido)

Tribolodon sp.

Trematoda

- Metagonimus yokogawai* (Hokkaido, Yamagata, Niigata, Toyama)

Nematoda

- Nematoda gen. sp. (Hokkaido)

REFERENCES

- Amin, O. M., Nagasawa, K., Grygier, M. J., 2007. Host and seasonal distribution of fish acanthocephalans from the Lake Biwa basin. *Comparative Parasitology*, **74**: 244-253.
- Anonymous, 2002. [The parasite fauna of fishes in an experimental river and its characteristics]. *Annual Report of the Aqua Restoration Research Center 2001*: 206-218. [In Japanese].
- Brabec, J., Waeschenbach, A., Scholz, T., Littlewood, D. T. J., Kuchta, R., 2015. Molecular phylogeny of the Bothriocephalidea (Cestoda): molecular data challenge morphological classification. *International Journal for Parasitology*, **45**: 761-771.
- Hashimoto, K., 2000. Comparison between fluvial and anadromous types of Japanese dace based on *Pseudozoogonoides ugui* Shimazu, 1974 (Digenea, Zoogonidae). *Japanese Society for Systematic Parasitology Circular*, **18**: 1-4. [In Japanese].
- Hosoya, K. ed., 2015. *Freshwater Fishes of Japan*. Yama-kei, Tokyo. 527 pp. [In Japanese].
- Kobayashi, H., 1915. Studies of endoparasitic trematodes from Japan (2). *Dobutsugaku Zasshi (Zoological Magazine)*, **27**: 50-57, 1 pl. [In Japanese].
- Kobayashi, H., 1921. One some digenetic trematodes in Japan. *Parasitology*, **12**: 380-410, 3 pls.
- Kuchta, R., Scholz, T., 2007. Diversity and distribution of fish tapeworms of the "Bothriocephalidea" (Eucestoda). *Parassitologia*, **49**: 129-146.
- Kugi, G., Matsuo, K., 1990. A new cestode, *Coelobothrium oitense* n.sp. (Pseudophyllidea: Ptychobothriidae) from a Japanese freshwater fish, *Tribolodon hakonensis*. *Japanese Journal of Parasitology*, **39**: 255-257.
- Miyamoto, K., Kutsumi, H., 1980. Studies on zoonoses in Hokkaido III [sic]. Prevalence rate of *Metagonimus yokogawai* metacercariae on [sic] the daces over Hokkaido. *Japanese Journal of Parasitology*, **29**: 415-422. [In Japanese with English abstract].
- Moravec, F., 2013. *Parasitic Nematodes of Freshwater Fishes of Europe*. Revised Second Edition. Academia, Prague: 601 pp.
- Moravec, F., Nagasawa, K., 1989. Observations on some nematodes parasitic in Japanese freshwater fishes. *Folia Parasitologica*, **36**: 127-141.
- Moravec, F., Nagasawa, K., Urawa, S., 1985. Some fish nematodes from fresh waters in Hokkaido, Japan. *Folia Parasitologica*, **32**: 305-316.
- Moravec, F., Nagasawa, K., Urushibara, Y., 1998. Observations on the seasonal maturation of the nematode *Rhabdochona zacconis* in Japanese dace, *Tribolodon hakonensis*, of the Okitsu River, Japan. *Acta Societatis Zoologicae Bohemicae*, **62**: 45-50.
- Nagasawa, K., 2012. The biology of *Contracaecum osculatum* sensu lato and *C. osculatum* A (Nematoda: Anisakidae) in Japanese waters: a review. *Biosphere Science*, **51**: 61-69.
- Nagasawa, K., 2016. A note on *Eudiplozoon nipponicum* and *Diplozoon* sp. (Monogenea: Diplozoidae) parasitic on cyprinids in Japan, with a list of the works of Dr. Satoru Kamegai on diplozoids. *Biosphere Science*, **55**: (in press). [In Japanese with English abstract].
- Nagasawa, K., Katahira, H., 2013. A synopsis of the parasites from cyprinids of the genus *Tribolodon* in Japan (1908-2013). *Biosphere Science*, **52**: 87-115.
- Nagasawa, K., Urawa, S., Awakura, T., 1989. A checklist and bibliography of parasites of freshwater fishes of Hokkaido. *Scientific Reports of the Hokkaido Fish Hatchery*, **44**: 1-49.
- Nagasawa, K., Takami, T., Murakami, Y., 1994. *Lepeophtheirus salmonis* (Copepoda: Caligidae) from

- white-spotted charr (*Salvelinus leucomaenis*), juvenile chum salmon (*Oncorhynchus keta*), and Japanese dace (*Tribolodon hakonensis*) from northern Japan. *Scientific Reports of the Hokkaido Fish Hatchery*, **48**: 95-97.
- Nagasawa, K., Yamauchi, T., Umino, T., 2008. Synopsis of leeches of the families Piscicolidae and Ozobranchidae (Annelida, Rhynchobdellida) in Japan (1895-2008). *Bulletin of the Biogeographical Society of Japan*, **63**: 151-171. [In Japanese with English abstract].
- Nagasawa, K., Katahira, H., Nitta, M., 2013. *Isoparorchis hypselobagri* (Trematoda: Isoparorchidae) from freshwater fishes in western Japan, with a review of its host-parasite relationships in Japan (1915-2013). *Biogeography*, **15**: 11-20.
- Nakamura, S., Urabe, M., Nagoshi, M., 2000. Seasonal change of prevalence and distribution of parasites in freshwater fishes at Higashi-yoshino, Nara Prefecture. *Biology of Inland Waters*, **15**: 12-19. [In Japanese with English abstract].
- Nakano, T., Itoh, T., 2011. A list of the leech (Clitellata: Hirudinida) collection deposited in the Department of Zoology, The University Museum, The University of Tokyo. In: Catalogue of invertebrate collection deposited in the Department of Zoology, The University Museum, The University of Tokyo (3). Phylum Annelida (Class Polychaeta, Oligochaeta, and Hirudinida), ed. Ueshima, R., *The University Museum, The University of Tokyo, Material Reports*, **90**: 85-94.
- Ogawa, K., 1994. Monogenean parasites of freshwater fishes of Hokkaido, Japan. *Scientific Reports of the Hokkaido Fish Hatchery*, **48**: 59-67.
- Okura, T., Suzuki, S., Ootomo, Y., Tazaki, S., 1985a. [Distribution of *Diplozoon* sp. in the Arakawa River system and seasonal changes in prevalence on *Tribolodon hakonensis*]. *Bulletin of the Saitama Prefectural Fisheries Experimental Station*, **44**: 82-85. [In Japanese].
- Okura, T., Suzuki, S., Ootomo, Y., 1985b. [Treatment method of *Diplozoon* sp. infecting *Tribolodon hakonensis* and changes in hematological features after treatment]. *Bulletin of the Saitama Prefectural Fisheries Experimental Station*, **44**: 86-93. [In Japanese].
- Sakai, H., Amano, S., 2014. A new subspecies of anadromous Far Eastern dace, *Tribolodon brandtii maruta* subsp. nov. (Teleostei, Cyprinidae) from Japan. *Bulletin of the National Museum of Nature and Science, Series A*, **40**: 219-229.
- Shimazu, T., 1992. Trematodes of the genera *Asymphylogora*, *Anapalaeorchis* and *Palaeorchis* (Digenea: Lissorchiidae) from freshwater fishes of Japan. *Journal of Nagano-ken Junior College*, **47**: 1-19.
- Shimazu, T., 2007. Digeneans (Trematoda) of freshwater fishes from Nagano Prefecture, central Japan. *Bulletin of the National Museum of Nature and Science, Series A*, **33**: 1-30.
- Shimazu, T., 2013. Digeneans parasitic in freshwater fishes (Osteichthyes) of Japan. I. Aprocotylidae, Bivesculidae and Haploporidae. *Bulletin of the National Museum of Nature and Science, Series A*, **39**: 167-184.
- Shimazu, T., 2014. Digeneans parasitic in freshwater fishes (Osteichthyes) of Japan. III. Azygiidae and Bucephalidae. *Bulletin of the National Museum of Nature and Science, Series A*, **40**: 167-190.
- Shimazu, T., Urabe, M., 2005. Digeneans found in freshwater fishes of the Uji River at Uji, Kyoto Prefecture, and the Takami River at Higashiyoshino, Nara Prefecture, Japan. *Journal of Nagano Prefectural College*, **60**: 1-14.
- Shimazu, T., Urabe, M., Grygier, M. J., 2011. Digeneans (Trematoda) parasitic in freshwater fishes (Osteichthyes) of the Lake Biwa basin in Shiga Prefecture, central Honshu, Japan. *National Museum of Nature and Science Monographs*, **43**: 1-105.

- Shimazu, T., Cribb, T. H., Miller, T. L., Urabe, M., Van Ha, N., Binh, T. T., Shed'ko, M. B., 2014. Revision of *Isoparorchis* Southwell, 1913 (Digenea, Hemiuroidea, Isoparorchidae), parasites of the air bladder of freshwater catfishes: a molecular and morphological study. *Bulletin of the National Museum of Nature and Science, Series A*, **40**: 15-51.
- Shimazu, T., Kobayashi, K., Tojo, K., Besprozvannkh, V. V., Ogawa, K., 2015. *Paradiplozoon skrjabini* (Monogenea, Diplozoidae), an ectoparasite on the gills of freshwater fishes (Cyprinidae, Leuciscinae) of Japan and Primorsky Region, Russia: a morphological and molecular study. *Bulletin of the National Museum of Nature and Science, Series A*, **41** : 137-154.
- Shindo, J., 1997. Parasitism of trematodes, *Diplozoon* sp., on the gills of captive cyprinid fish, *Tribolodon* sp. *Journal of Japanese Association of Zoos and Aquariums*, **38**: 88-92. [In Japanese].
- Shiraki, T., 1974. Larval nematodes of family Anisakidae (Nematoda) in the northern sea of Japan – as a causative agent of eosinophilic phlegmone or granuloma in the human gastro-intestinal tract – . *Acta Medica et Biologica*, **22**: 57-98.
- Sicard, M., Desmarais, E., Vigneux, F., Shimazu, T., Lambert, A., 2003. Molecular phylogeny of the Diplozoidae (Monogenea, Polyopisthocotylea) parasitizing 12 species of Cyprinidae (Teleostei): new data about speciation. In: *Taxonomy, Ecology and Evolution of Metazoan Parasites*, eds. Combes, C. and Jourdan, **2**: 199–211. Presses Universitaires de Perpignan, Perpignan.
- Skern-Mauritzen, R., Torrissen, O., Glover, K. A., 2014. Pacific and Atlantic *Lepeophtheirus salmonis* (Krøyer, 1838) are allopatric subspecies: *Lepeophtheirus salmonis salmonis* and *L. salmonis oncorhynchi* subspecies novo. *BMC Genetics*, **15**: 32. <http://www.biomedcentral.com/1471-2165/15/32>
- Suzuki, S., Okura, T., 1987. [Distribution of *Diplozoon* sp. in rivers of Saitama Prefecture in 1984-1986]. *Bulletin of the Saitama Prefectural Fisheries Experimental Station*, **46**: 76-87. [In Japanese].
- Suzuki, S., Okura, T., 1988. [Effects to kill the eggs of *Diplozoon* sp., a parasite of *Tribolodon hakonensis*]. *Bulletin of the Saitama Prefectural Fisheries Experimental Station*, **47**: 88-90. [In Japanese].
- Yamaguti, S., 1934. Studies on the helminth fauna of Japan. Part 2. Trematodes of fishes, I. *Japanese Journal of Zoology*, **5**: 249-541.
- Yamaguti, S., 1941. Studies on the helminth fauna of Japan. Part 33. Nematodes of fishes, II. *Japanese Journal of Zoology*, **9**: 343-396, 3 pls.

日本産ウグイ属魚類の寄生虫目録：補足（2016年）

長澤和也¹⁾・片平浩孝^{1,2)}

¹⁾ 広島大学大学院生物圏科学研究科，〒739-8528 広島県東広島市鏡山1-4-4

²⁾ 現住所：帯広畜産大学原虫病研究センター，〒080-8555 北海道帯広市稲田町西2線13番地

要 旨 1908年以降に出版された文献に基づき、2013年に日本産ウグイ属魚類4種（ウグイ *Tribolodon hakonensis*, エゾウグイ *T. sachalinensis*, マルタ *T. brandtii*, ウケクチウグイ *T. nakamurai*）の寄生虫に関する情報を整理した目録を出版した。今回、その後に出版された情報と2013年の目録に収録されなかった情報を加えて、この目録を補足した。宿主に関して、従来のマルタは2015年に2亜種（マルタ *T. brandtii maruta*, ジュウサンウグイ *T. brandtii brandtii*）に分けられたので、各亜種における寄生虫の情報を整理した。本目録では、新たに追加した6種の寄生虫（吸虫類2種、単生類1種、線虫類2種、鉤頭虫類1種）を含む15種の寄生虫に関する情報を寄生虫-宿主リストに整理して示した。今回の作業により、1908～2015年の108年間にわが国のウグイ属魚類からは48名義種の寄生虫（絨毛虫類2種、ミクソゾア類1種、吸虫類20種、単生類1種、糸虫類3種、線虫類9種、鉤頭動物3種、ヒル類1種、軟体動物1種、カイアシ類6種、ワラジムシ類1種）が報告されていたことが分かった。種まで同定された寄生虫の種数を魚種別に示すと、ウグイから48種、エゾウグイから8種、マルタから4種、ジュウサンウグイから3種で、ウグイから最も多くの寄生虫が報告されていた。ウケクチウグイからは1未同定種のみが記録されていた。

キーワード：ウグイ、ウケクチウグイ、エゾウグイ、寄生虫、ジュウサンウグイ、マルタ、目録