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## THE FIRST RECORD OF *ASYMPHYLODORA PROGENETICA* (TREMATODA, MONORCHIIDAE) IN UKRAINE

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**The First Record of *Asymphyiodora progenetica* (Trematoda, Monorchidae) in Ukraine.** Kudlai O. S. — The trematode *Asymphyiodora progenetica* Serkova et Bychovskii, 1940 was found in freshwater mollusks *Bithynia tentaculata* (Linnaeus, 1758) collected from the Kalmius River (near the city of Donetsk) in Ukraine. This species was recorded for the first time in Ukraine. Previously unknown encysted metacercariae and all detected stages of development are described and figured.

**Key words:** Trematoda, *Asymphyiodora progenetica*, redia, metacercaria, progenesis, *Bithynia tentaculata*, Kalmius River.

**Первая регистрация *Asymphyiodora progenetica* (Trematoda, Monorchidae) в Украине.** Кудлай Е. С. — Трематода *Asymphyiodora progenetica* Serkova et Bychovskii, 1940, обнаруженная у моллюсков *Bithynia tentaculata* (Linnaeus, 1758), впервые зарегистрирована на территории Украины. Материал собран в р. Кальмиус (окр. г. Донецк). Выявлены и описаны ранее неизвестные для этого вида инцистированные метацеркарии. Приведены промеры, рисунки и морфологическая характеристика вида на всех выявленных стадиях.

**Ключевые слова:** Trematoda, *Asymphyiodora progenetica*, редия, метацеркария, прогенез, *Bithynia tentaculata*, р. Кальмиус.

### Introduction

Digenean species of the genus *Asymphyiodora* Looss, 1899 are widely distributed parasites of freshwater fish mainly from the Palaearctic Region (Našincová, Scholz, 1994). Species of the genus inhabit the intestine of their vertebrate hosts. The life cycle of these trematodes involves two hosts: mollusk as an intermediate host and fish as a definitive one; progenesis is characteristic for several species of the genus (Sudarikov et al., 2002).

In Ukraine, six species of this genus were reported from fishes (Gaevskaia et al., 1975). The intermediate hosts are known only for three species: *Asymphyiodora tincae* (Modeer 1790), *A. markewitschi* Kulakowskaja 1947 (Wergun, 1962) and *Asymphyiodora* sp. cf. *imitans* (Chernogorenko, 1983; Zdun, 1961). During the studies of the trematode fauna of *Bithynia tentaculata* (Linnaeus, 1758) from the Kalmius River we have found the larval trematodes at separate stages of development: redia, encysted and unencysted metacercariae with well developed ovary and testis, and progenetic metacercariae with eggs in uterus. Detailed study of the metacercariae structure resulted in their identification as *Asymphyiodora progenetica* Serkova et Bychovskii, 1940 (Trematoda, Monorchidae). This species was not recorded previously in Ukraine.

### Material and methods

Naturally infected *B. tentaculata* were collected in the Kalmius River near the city of Donetsk (47°53'N, 37°54'E) in June, 2010. Thirty-six mollusks were dissected and their tissues were compressed between two Petri dishes of different diameters and examined under low-magnification microscope in order to establish the localization of the trematode larvae. Larval trematodes were observed alive, and then a part of larvae was fixed in 70% ethanol, stained in iron acetocarmine, dehydrated in ascending alcohol series, cleared in clove oil and mounted in Canada balsam. The other part of larvae was fixed in 70% ethanol, stained in iron acetocarmine and mounted in Berlese's medium. The drawings were made with the aid of the drawing tube RA-6. All measurements are in millimetres; mean values are followed by limits in parentheses.

## Results

A total of 36 mollusks were examined, 27 appeared to be infected ( $P = 75\%$ ). Intensity of infection was 4 (1–16) specimens. Rediae were found in hepatopancreas in only one mollusk. Other stages were found in genital ducts of mollusks. Experimental infection of the carp fish *Carassius carassius* (Linnaeus, 1758) by metacercariae of *A. progenetica* was not successful. One fish was fed with metacercariae repeatedly; in 3 days after the first feeding the fish was dissected but trematodes were not found.

### Description of separate stages of development

**Redia** (fig. 1, 1). Measurements and description are based on 9 live specimens.

Body cylindrical, 0.33–0.53 (0.45) long, 0.10–0.14 (0.12) wide. Pharynx spherical, 0.02–0.04 (0.03) in diameter. Intestine short, 0.08–0.1 (0.1) long and filled with dark particles of food. Rediae with ca. 1–4 cercariae at different stages of development.

**Encysted metacercariae** (fig. 1, 2). Measurements and description are based on 7 live specimens.

Metacercariae located in spherical cysts, 0.250–0.305 (0.270) in diameter. Cyst wall very thin. Oral sucker subterminal, 0.095–0.110 (0.101) long, 0.100–0.110 (0.106) wide. Pharynx 0.040–0.045 (0.041) in diameter. Ventral sucker 0.110–0.135 (0.126) long, 0.130–0.160 (0.142) wide. Metacercariae actively moving in cysts.

**Metacercariae** (fig. 1, 3). Description and measurements are based on 6 specimens mounted in Canada balsam.

Body length 0.42–0.60 (0.52), maximum width 0.17–0.23 (0.21). Body surface covered with sharp spines. Large oral sucker subterminal, 0.065–0.1 (0.085) in diameter. Prepharynx short, 0.01–0.03 (0.02) long. Pharynx large, 0.035–0.045 (0.039) in diameter. Oesophagus 0.06–0.13 (0.09) long. Bifurcation at 0.21–0.25 (0.23) from anterior end. Ventral sucker 0.10–0.14 (0.12) in diameter. Its centre at 0.27–0.38 (0.32) from anterior end. Intestinal branches reaching level of middle of testis primordium. Primordia of genital system well developed. Testis primordium single, 0.06–0.07 (0.06) in diameter. Primordium of cirrus sac 0.58–0.75 (0.067) long. Ovary primordium 0.030–0.040 long (0.034), 0.030–0.045 (0.037) wide. Excretory bladder egg-shaped.

**Progenetic metacercariae** (fig. 1, 4). Description and measurements are based on 12 specimens mounted in Berlese's medium.

Body length 0.61–0.82 (0.68), maximum width near ventral sucker 0.21–0.30 (0.24). Body surface covered with sharp spines, more numerous in anterior part. Oral sucker subterminal, 0.075–0.110 (0.088) long and 0.080–0.130 (0.094) wide. Prepharynx short, 0.005–0.02 (0.015) long; pharynx oval, 0.040–0.055 (0.047) in diameter. Ventral sucker larger than oral one, 0.110–0.200 (0.134) in diameter. Its centre located at 0.305–0.455 (0.400) from anterior end. Oesophagus long, 0.060–0.170 (0.115) in length. Intestinal branches wide and varying in length. Branches lying along sides of body, reaching posterior end of testis. Single testis lying medially in posterior part of body. Testis oval, 0.055–0.11 (0.087) long and 0.050–0.080 (0.062) wide. Cirrus sac situated at level of ventral sucker, 0.080–0.160 (0.123) long. Its base broad, located behind ventral sucker. Cirrus covered with slender sharp spines along entire length. Cirrus sac opening on left side, at about middle of ventral sucker. Ovary smaller than testis, 0.06–0.09 (0.073) long, 0.045–0.06 (0.052) wide, located in front and to left of testis. Lateral vitellaria forming 9–11 follicles on each side. Vitelline follicles extending from posterior end of ventral sucker to level of bladder. Each follicle joined with single duct; each duct uniting with others and forms vitelline reservoir at level of ovary. Eggs pear-shaped, 0.025–0.033 (0.028) long and 0.013–0.015 (0.015) wide. Number of eggs in uterus — 35 (6–42). Terminal excretory pore opening directly into short egg-shaped bladder, 0.06 long and 0.03 wide.

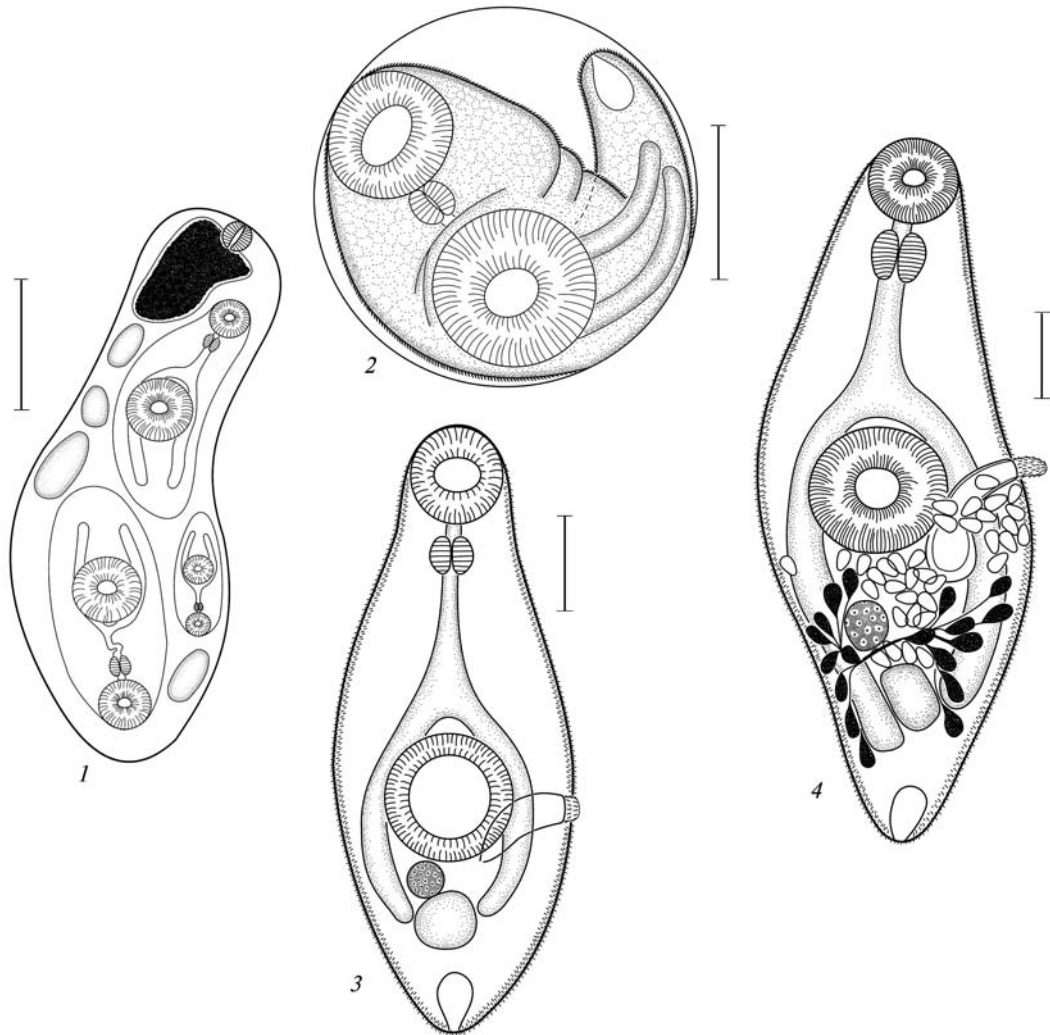


Fig.1. *Asymphyiodora progenetica*: 1 — redia; 2 — encysted metacercaria; 3 — metacercaria; 4 — progenetic metacercaria. Scale bar 0.1 mm.

Рис. 1. *Asymphyiodora progenetica*: 1 — редия; 2 — инцистированная метацеркария; 3 — метацеркария; 4 — прогенетическая метацеркария. Масштабная линейка 0,1 мм.

## Discussion

*Asymphyiodora progenetica* was originally described from *B. tentaculata* in reservoirs near the city of Leningrad (Russia) (Sercova, Bykhovskii, 1940). The authors performed an experimental infection of the trematode-free specimens of *B. tentaculata*. This experiment showed that the mollusks were definitive hosts for this species. In addition, the authors experimentally confirmed another path of the life cycle in which trematodes reached maturity in fish [*C. carassius*, *Rutilus rutilus* (Linnaeus, 1758)].

Progenetic stage of *A. progenetica* was registered in Kazakhstan in *Bithynia leachi* (Sheppard, 1823) (Beljakova, 1981) and in Russia in *B. tentaculata* (Kupriyanova-Shakhmatova, 1959). In Ukraine, trematodes of this species were found in *B. tentaculata* and *B. leachi* (Wergun, 1966), but those results were not published.

Later Kulakova (1982) found specimens of *A. progenetica* mounted on slides identified as *A. markewitschi*. Trematodes were collected from the intestine of *Leuciscus idus* (Linnaeus, 1758). Based on examination of these mounted specimens and 9 syntypes of

*A. progenetica* from the helminthological collection of the Zoological Institute AS USSR, she transferred the species to the genus *Parasymphylodora* Szidat, 1943 (Kulakova, 1982).

Sobolev (1955) considered the genus *Parasymphylodora* insufficiently grounded and synonymised it with *Asymphylodora*. The synonymisation was accepted in «Key to the Trematoda Vol. 3» (Bray, 2008).

Our specimens possess the characters peculiar to both the genera *Asymphylodora* (small and thin excretory bladder, intestinal branches wide and reach the posterior end of testis), and *Parasymphylodora* (relatively small cirrus sac). This fact, in our opinion, supports synonymisation of the genera.

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