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A NEW GENUS AND SPECIES OF CESTODES (CYCLOPHYLLIDEA, GRYPORHYNCHIDAE) FROM CICONIIFORM BIRDS

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A New Genus and Species of Cestodes (Cyclophyllidea, Gryporhynchidae) from Ciconiiform Birds. Kornyushin, V. V., Greben, O. B. — A monotypic genus *Proparadilepis* Kornyushin et Greben, gen. n. (type species: *Proparadilepis plegadissaakovae* sp. n.) is erected. It is similar to the genera *Paradilepis* Hsü, 1935, *Ascodilepis* Guildal, 1960 and *Dendrouterina* Fuhrmann, 1912 and differs from them by the number and shape of rostellar hooks, armament of the cirrus and shape of gravid uterus. Its type species, *P. plegadissaakovae* sp. n. is described from *Plegadis falcinellus* L. It was found by E. O. Saakova and assigned as *Paradilepis plegadis* nomen nudum because its description was not published according to the criteria of the International Code of Zoological Nomenclature. The additions to the keys of gryporhynchid tapeworms (Bona, 1994) are proposed. The genus *Dendrouterina* is divided, according to the existing groups “herodiae” and “macrospincter” distinguished by Bona (1975) into two valid genera, *Dendrouterina* and *Mashonalepis* Beverley-Burton, 1960.

Key words: Cestoda, *Proparadilepis*, *Proparadilepis plegadissaakovae*, gen. n., sp. n., *Plegadis falcinellus*, *Paradilepis*, *Ascodilepis*, *Dendrouterina*, *Mashonalepis*, Ukraine.

Новый род и вид цестод (Cyclophyllidea, Gryporhynchidae) голенастых птиц, Корнюшин В. В., Гребень О. Б. — Обоснован новый монотипичный род циклофиллидных цестод *Proparadilepis* Kornyushin et Greben, gen. n. с одним типовым видом *Proparadilepis plegadissaakovae* Kornyushin et Greben, sp. n. Он имеет сходство с родами *Paradilepis* Hsü, 1935, *Ascodilepis* Guildal, 1960 и *Dendrouterina* Fuhrmann, 1912. *Proparadilepis* gen. n. отличается от этих трёх родов количеством и формой хоботковых крючьев, вооружением цирруса и формой зрелой матки. Типовой вид *Proparadilepis plegadissaakovae*, sp. n. от *Plegadis falcinellus* был описан Э. О. Сааковой и существовал как nomen nudum, поскольку его описание не было опубликовано в соответствии с Международным кодексом зоологической номенклатуры. Предложены дополнения к ключу для определения грипоринхид (Бона, 1994). Род *Dendrouterina* разделён в соответствии с группами «herodiae» и «macrospincter», выделенными Ф. Бона (1975), на два самостоятельных рода *Dendrouterina* и *Mashonalepis* Beverley-Burton, 1960.

Ключевые слова: Cestoda, *Proparadilepis*, *Proparadilepis plegadissaakovae*, gen. n., sp. n., *Plegadis falcinellus*, *Paradilepis*, *Ascodilepis*, *Dendrouterina*, *Mashonalepis*, Украина.

Introduction

The expedition of Leningrad State University worked in the Danube delta, now “Danube Plavni Reserve” (Ukraine) during 1949–1951. The material from aquatic birds was studied by E. O. Saakova. She examined 13 specimens of the Glossy Ibis (*Plegadis falcinellus* L.). Only one cestode specimen was found from one adult female on the Lake Yalpuh. Saakova identified it as *Paradilepis plegadis* Saakova, sp. n. (Saakova, 1952). Under this name, the species was presented in the abstract and the manuscript of the dissertation; the detailed species description was given in the dissertation only. However, name *Paradilepis plegadis* Saakova, 1952 has not been in the sense of the International Code of Zoological Nomenclature (ICZN, 1999) and, therefore, that species name is to be recognised a nomen nudum. This species was mentioned in some publications as *Paradilepis*

plegadis Saakova, 1952 (Smogorjevskaya, 1976; Korniyushin et al., 2004). Cestode specimen from the Glossy Ibis with identical morphology as described in Saakova's dissertation was found in Cestode Collection of the Bulgarian Academy of Sciences by one of the present authors. It was reported as *Paradilepis plegadis* Saakova, 1952 (Korniyushin et al., 1984). Later Dr. M. M. Belopolskaja found the type specimen *Paradilepis plegadis* Saakova, 1952 in the collection of Biological faculty of Leningrad State University. This type specimen is deposited in the helminthological collection of the Schmalhausen Institute of Zoology of National Academy of Sciences of Ukraine, Kyiv (SIZK).

We recognize that species as different from known tapeworms by thorough re-examination of the specimens and comparison with other known species. In addition, some morphological characteristics distinguish this species from all other species of the genus *Paradilepis* Hsü, 1935 and justify the erection of a new cestode genus. Here, we describe the specimen mounted on Saakova's slide and designate it as the holotype of the new species *Proparadilepis plegadissaakovae* Korniyushin et Greben, gen. n. et sp. n.

Material

One cestode specimen from Glossy Ibis was used for the present description. It was collected by E. O. Saakova in 1948 in the "Danube Plavni Reserve" (Odessa Region, Ukraine). It is a slightly flattened cestode specimen stained with aluminous carmine and mounted in Canada balsam (whole permanent mount). All measurements in the description of the type species are given in micrometers unless otherwise stated. The measurements from Saakova's description are given in parentheses.

Order CYCLOPHYLLIDEA van Beneden in Braun, 1900

Family GRYPORHYNCHIDAE Spassky et Spasskaya, 1973

Proparadilepis Korniyushin et Greben, gen. n.

Type species: *Proparadilepis plegadissaakovae* Korniyushin et Greben, sp. n..

Diagnosis

Strobila of medium size, proglottides numerous. Scolex not clearly distinct from strobila. By slide, rostellar apparatus similar to cyclusteroid's, but with less observable two muscular superficial layers, diagonal fibres not seen. Rostellum short, conical. Rostellar sac rather shallow, cup-shaped, weakly muscular. Suckers rounded, unarmed. Crown of 36 hooks in two rows. Difference in length between small and large hooks minor. Handle of hook longer than blade. Handle and guard rounded, with epiphyseal thickenings consisting of secondary tissue. Anterior part of strobila without external segmentation. Genital pores unilateral. Genital atrium simple. Testes four, arranged in line, usually one poral and three aporal to female organs. Cirrus-sac pear-shaped, not crossing poral osmoregulatory canals. Sperm duct forms loops at exit of cirrus-sac. Cirrus armed. Copulative part of vagina funnel-shaped. Conductive part of vagina ventral to cirrus-sac, posterior to its axis, sometimes posterior to cirrus-sac. Mature ovary consisting of two wings, lobed. Vitellarium compact, oval or transversely-oval. Fully-developed uterus sacciform, with shallow invaginations, filling entire segment. Eggs arranged closely to each other.

Differential diagnosis

Proparadilepis gen. n. is similar to some members of the genus *Paradilepis* Hsü, 1935 in the number of rostellar hooks, in small number of the testes and in sac-like uterus (table 1). The genus *Paradilepis* consists of cestode parasites from Ciconiiformes, Pelecaniformes and Accipitriformes (Matevosyan, 1963; Bona, 1975). The new genus differs from the genus *Paradilepis* by the longer strobila, by the shape of rostellar hooks and by the armament of the cirrus. The handle of hook in the genus *Proparadilepis* gen. n. is longer than the blade; it is shorter than the blade in *Paradilepis*. The cirrus in the genus *Proparadilepis* gen. n. is uniformly armed by small spines; the spines are larger and scattered in *Paradilepis*.

Table 1. Morphological characters of the genera *Mashonalepis*, *Paradilepis*, *Ascodilepis* and *Proparadilepis* gen. n.**Таблица 1. Морфологические особенности родов *Mashonalepis*, *Paradilepis*, *Ascodilepis* и *Proparadilepis* gen. n.**

Character	<i>Mashonalepis</i> Beverley-Burton, 1960	<i>Paradilepis</i> Hsü, 1935	<i>Ascodilepis</i> Guildal, 1960	<i>Proparadilepis</i> Kornyushin et Greben, gen. n.
Length of strobila	Long	Short (mainly)	Short	Long
Number of proglottides	Numerous	Not numerous	Not numerous	Numerous
Number of hooks	20	20–36	20	36
Shape of hooks	Handle longer than blade	Handle shorter than blade	Handle shorter than blade	Handle longer than blade
Number of testes	42–46	4–5	4	4
Shape and armament of cirrus	Partly evaginated cirrus cylindrical, covered with numerous medium-sized spines	Partly evaginated cirrus cylindrical, covered with large spines	Partly evaginated cirrus cylindrical, covered with large spines	Partly evaginated cirrus cylindrical, covered with numerous small spines
Genital organs	Without accessory structures. Vagina posterior to or along cirrus-sac axis, ventral	Without accessory structures. Vagina ventral to cirrus-sac, along its axis	With accessory vagina and cirrus-sac. Vagina ventral and anterior to cirrus-sac	Without accessory structures. Vagina ventral and posterior to cirrus-sac
Vitellarium	Irregular in shape, faintly lociniate	Oval, compact	Oval, compact	Transversely-oval, compact
Gravid uterus	Dendritical, with numerous lobules	Sac-like	Sac-like	Sac-like with evaginations

Note. Data for the genera *Mashonalepis*, *Paradilepis* and *Ascodilepis* are given after Bona (1975, 1994), Freeman (1954), Huey and Dronen (1981), Matevosyan (1963), Rausch (1949).

Proparadilepis gen. n. is also similar to the genus *Ascodilepis* Guildal, 1960 in small number of the testes and in sac-like uterus (table 1). The new genus differs from the genus *Ascodilepis* by the same characteristics as the genus *Paradilepis*. The genital organs in *Proparadilepis* gen. n. are without accessory structures, whereas the genital organs in the genus *Ascodilepis* are with accessory vagina and cirrus-sac.

Some morphological characteristics of *Proparadilepis* gen. n. are close to those of the genus *Dendrouterina* Fuhrmann, 1912. This genus includes cestodes parasitizing herons (family Ardeidae). The members of both genera have long strobila with numerous proglottides and the rostellar hooks are with relatively long handle. However, *Proparadilepis* gen. n. differs from the genus *Dendrouterina* by the number of rostellar hooks (36 vs 20), the number of the testes (4 vs 31–73) and the shape of mature uterus. The uterus of *Proparadilepis* gen. n. is sac-like while the uterus of *Dendrouterina* is arborescent, with numerous outgrowths.

We assign the new genus to the family Gryporhynchidae Spassky et Spasskaya, 1973; the validity of this family was first justified by Spassky and Spasskaya (1973). We take into account Bona's opinion about independence of dilepidoid cestodes from ichthyophagous birds. This opinion on the cestode systematics Bona has expressed several times on the international workshops on cestode systematics and phylogeny. Position of the new genus

in the system of the family Gryporhynchidae and in the “Keys to the cestode parasites vertebrates” (Bona, 1994) can be specified as following:

- 22 b. True rostellar pouch present or replaced by thick mass of longitudinal, concentric fibres; rostellar structure different, apex not like flat sucker. Hooks in two circles. Uterus always sacciform, wall persistent. Seminal receptacle either subspherical, median or transverse, porally elongate; reaches vitellarium. ...25
- 25 a. Rostellar pouch strong (wall not necessarily thick), very large; cavity at times negligible when rostellum retracted. Rostellum very complex, strong, stiff, with two muscular superficial layers, at least one of them consisting of diagonal, spiral fibres; cyclusteroid pattern. Pores either regularly alternate or unilateral, left. Vagina does not change dorsoventral position with respect to cirrus-sac in right and left pores. Scolex spherical, usually very large.26
- 25 b. Rostellar pouch replaced with dense spherical mass of longitudinal, concentric fibres, surrounding rostellum cap-wise when retracted, lying behind it, bent or transverse, when protruded. Rostellum simple, triangular, often stumpy, clearly formed by dense mass of longitudinal spiral fibres (not transverse circular), shortening and becoming compact pad when protruded; parvitaenioid pattern. Pores either irregularly alternate or unilateral with right and left strobilae in same species. Dorsoventral position of vagina to cirrus-sac inverted in right and left pores. Scolex either normal or spherical, large.28
- 26 b. Pores unilateral. Testes four (seldom five or three). Ovary lobes compact, subspherical or scarcely lobulate. Uterus sacciform, forming two connected pouches, then one lobulate or ramified cavity.27
- 27 a. Genital organs without accessory structures.27aa
- 27 a a. Vagina ventral to cirrus-sac, along its axis. *Paradilepis* Hsü, 1935
- 27 a b¹. Vagina ventral and parallel to axis of cirrus-sac sometimes partly posterior of it.
..... *Proparadilepis* gen. n.
- 27 b. Genital organs with accessory vagina and cirrus-sac. True vagina ventral and anterior to cirrus-sac.
..... *Ascodilepis* Guildal, 1960
- 28 b. Pores unilateral.30
- 30 b. Osmoregulatory canals aporally inverted.34
- 34 b. Hooks different in shape. Genital ducts dorsal to osmoregulatory canals. Testes postovarian, at times also aporally lateral or in anterior group. Uterus sacciform with crowded, deep, often digitiform, ramified lobules, cavity transversely extended, or horseshoe-shaped with near extremities or circular with anterior ramified branch.34 b a
- 34 b a¹. Hooks of anterior and posterior rows essentially different in length, up to 15 (ratio of hook lengths in different rows 1.25–1.59). All testes in posterior part of median field of proglottis, ovary and vitellarium displaced to anterior margin of proglottis. Gravid uterus horseshoe-shaped. Tubular part of uterus forms two branches along elongated proglottis, digitiform lobules across proglottis.
..... *Dendrouterina* Fuhrmann, 1912².
- 34 b b¹. Hooks of anterior and posterior rows less different up to 1–5. Testes rounding aporal wing of ovary, forming small anterior group. Tubular part of uterus situated across proglottis, digitiform lobules directed anteriorly or posteriorly. *Mashonalepis* Beverly-Burton, 1960

***Proparadilepis plegadissaakovae* Korniyushin et Greben, gen. et sp. n.**

Syn. *Paradilepis plegadis* Saakova, 1952, nom. nud. (Smogorzhevskaya, 1976; Korniyushin et al., 2004; Korniyushin et al., 1984).

Type specimen. Holotype, CH2, Ukraine, Odessa Region Danube Delta, 1948 (original label: “*Paradilepis plegadis* Saakova, Type of species, Danube, 1948, collected by Saakova”). The type material is deposited in the helminthological collection of I. I. Schmalhausen Institute of Zoology of the National Academy of Sciences of Ukraine, Kyiv.

Type host. *Plegadis falcinellus* L.

Site. Small intestine.

Type locality. Ukraine, Odessa Region, Danube Delta, Lake Yalpuh (45° 25' N, 28° 37' E).

¹ Proposed additions to the keys are marked with asterisks.

² We consider gryporhynchid cestodes of bitterns as a valid genus *Cyclouterina* Gulyaev et Tkachev, 1988.

Description (fig. 1–3)

Length of moderately contracted strobila 80 mm (90 mm), greatest width — 3.5 mm. Scolex flattened, 848 (800) wide 1 mm long. Suckers almost rounded 230 × 240, or slightly oval, 200 × 250 (200 × 252). Scolex of living cestode apparently was spheroid, with deep cup-shaped suckers. Rostellum short, mushroom-shaped, 320 long. Apex of rostellum greatly expanded, 360 (320) in diameter. Hooks in double row. Total number of available hooks 33 (33), 18 small hooks, three large hooks apparently absent (one of them visible on strobila), therefore, crown consists of 36 hooks. Posterior (small) hooks 52 (up to 51)¹ long; length measurements of hook positioned at angle to surface of rostellum about 42 (37). Blade of small hooks 20–21 long, handle 23–26 long. Handle with secondary tissue epiphysis making hook 5 longer. Guard almost rectangular to hook axis, slightly bent to blade, 16 long. Oval epiphysis on guard, 13 × 16. Shape of anterior (large) hooks differing a little from that of small hooks. Total length of large hooks 69–73 (up to 51), blade 26 long, handle 31 long, guard 18 long. Oval epiphyses on end of handle and guard of both large and small hooks. Median anterior hook 21(15) long, on upper part of rostellum, presumably damaged. In view of fact that hooks of scolex are measured on permanent slide in Canada balsam, it is possible that specified sizes of hooks slightly differ from real hook sizes.

Borders of rostellar sac not clearly visible. Zone of more intensively stained tissue shows that rostellar sac reaches to level at middle of suckers. Rostellar apparatus similar to cyclusteroid's, but with less observable two muscular superficial layers, diagonal fibres not seen.

Scolex without sharp constriction gradually passing into neck. Part of strobila without genital primordial 1.5 mm long, situated behind posterior part of suckers, with width about 700. Anterior part of strobila without external segmentation. Transverse folding of cuticle forms false segments. Strobila consists of 380 proglottides, (the part without external segmentation is excluded). In anterior part, false segments can contain up to 20 genital primordia; in posterior part 3–5 genital primordia per false segment. Borders between proglottides become distinct at 7–8 mm from scolex. In these proglottides testes reach maximum development and start to disappear. Segmentation clearly visible in part with maximum developed ovary and vestigial testes (at distance c. 15 mm from scolex).



Fig. 1. *Proparadilepis plegadissaakovae* gen. et sp. n. Holotype, general view of cestoda. Scale bar 1 cm.

Рис. 1. *Proparadilepis plegadissaakovae* gen. et sp. n. голотип, общий вид. Масштабная линейка 1 см.

¹ According to the figure of hooks presented by E. O. Saakova, she gave the length of them without epiphysal thickenings.

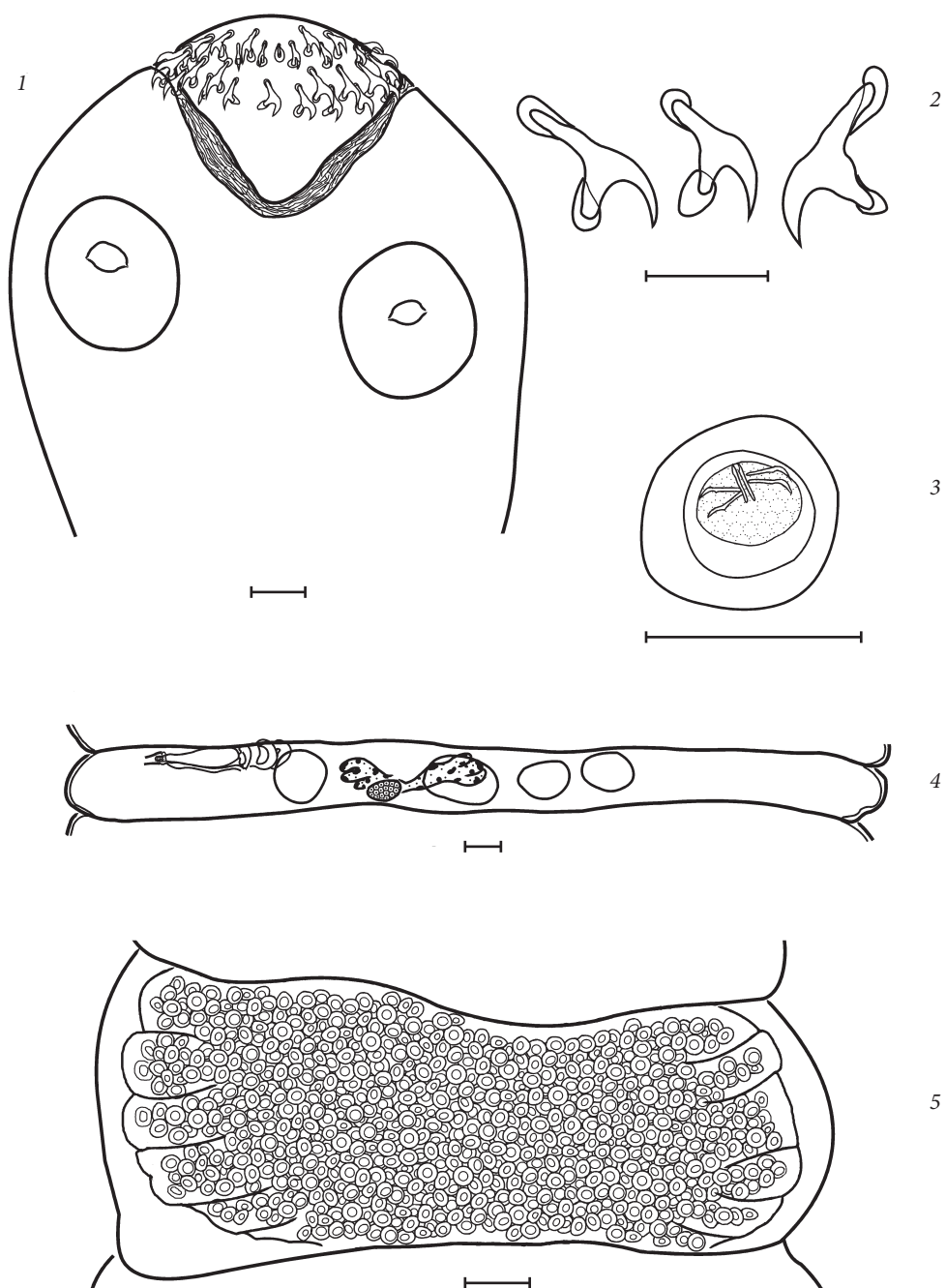


Fig. 2. *Proparadilepis plegadissaakovae* gen. et sp. n. Holotype: 1— scolex; 2— rostellar hooks; 3— egg; 4— hermaphrodyte proglottid; 5— gravid proglottid. Scale bars 1, 4, 5— 100 μ m; 2, 3— 50 μ m.

Рис. 2. *Proparadilepis plegadissaakovae* gen. et sp. n. Голотип: 1— сколекс; 2— хоботковые крючья; 3— яйцо; 4— гермафродитный членик; 5— маточный членик. Масштабные линейки: 1, 4, 5— 100 мкм; 2, 3— 50 мкм.

Proglottides wider than long. Hermaphroditic proglottides 1.3–1.4 mm wide and 100 long. Female proglottides 1.4–1.9 × 0.1–0.15 mm. Pre-gravid proglottides 2.8–3.5 mm wide and 0.1–0.2 mm long, then size becomes 1.5–1.9 × 0.5–0.7 mm. Gravid proglottides 2.4–3.3 mm wide and 1.2–1.5 mm long.

Diameter of ventral osmoregulatory canals 78–104; transverse anastomoses observed. Dorsal osmoregulatory canals not distinct. Genital ducts pass dorsal to longitudinal osmoregulatory canals. Genital pores unilateral.

Four testes in each proglottis, usually arranged in line, one poral and three aporal to female gonads. Middle aporal testis often shifting in anterior or posterior direction. Sometimes, two testes may be poral and two aporal; rarely three poral and one aporal. Testes transversely-oval, lateral often drop-shaped. Developed testes 105–133 × 57–78; poral testis smaller, 78–84 × 63–78 (51–59 × 80–85). External vas deferens very wide (7), forming some large coils between poral testis and distal part of cirrus-sac; coils arranged along anterior margin of proglottides. Cirrus-sac not crossing poral osmoregulatory canals, 147–198 × 26–40 when fully developed. Internal vas deferens forming enlargement in aporal part of cirrus-sac, resembling internal seminal vesicle. Invaginated cirrus seen at 5–8 from proglottis margin. Evaginated cirrus 38–57 long, conical. Basal part of cirrus 16–21 in diameter, distal part narrowing to 10–11; cirrus covered with small spines, 1–2 long, densely arranged, staggered. Numbers of rows of spines on cirrus unclear, at least 10–12 spines present per diagonal row. Genital atrium simple, opens at some distance (up to 150) of lateral proglottides margin.

Vagina opens behind and ventrally to cirrus-sac. Copulative part of vagina funnel-shaped, with circular musculature, 21–32 in diameter, 78–80 long. Conductive part of vagina 13–16 in diameter, with thick wall and narrow canal (approx. 2–3). In many proglottides vagina partly or completely overlapping cirrus-sac. Female and male gonads appear together. Female gonads attain maximum development in 15–20 mm behind scolex, then disappear. Ovary appears primarily as narrow transverse body with thickening on ends; mature ovary forming two wings; each of them divided to 2–5 large lobes; isthmus hardly visible, at level of vitellarium. Ovary 700–900 wide. Vitellarium compact, transversely-oval, 128–197 × 39–79. Female gonads fill entire median field of proglottis. Early development of uterus not traced. Apparently uterus appears as sac ventrally to ovary, copping its shape. When eggs start to fill uterus, peripheral aporal part of uterus becomes perceptible, later medial part perceptible, then poral part. With further maturation, shape of uterus changing. At first uterus becomes solid sac-like, then it deforms making branches. In more developed proglottides, uterus branches converge and uterus looks like simple sac with evaginations, which are especially numerous in lateral parts of uterus; uterine wall thick and well-marked. Gravid uterus occupies almost entire proglottis. Oncosphere oval 13–16 × 18–26. Embryonic hooks 12–13 long, blade 4. Embryophore spherical, thin, smooth, 26–29 in diameter. External envelope deformed. Approximate size of eggs 47–53 × 57–67. Eggs arranged closely to each other.

Differential diagnosis

The new species is similar to cestodes of the genus *Paradilepis* group “*scolecina*” (Bona, 1975) in the scolex armament, in the number of testes and in the shape of the young uterus.

The group “*scolecina*” includes cestode species parasitizing birds of the family Threskiornithidae, i. e. *Paradilepis patriciae* Baer et Bona, 1960 from *Platibis flavipes* in Australia, 3 cestode species from the cormorants, i. e. *P. scolecina* (Rudolphi, 1819) Hsü, 1935, *P. delachauxi* (Furmann, 1909) Joyeux and Baer, 1935 and *P. longivaginosus* (Mayhew, 1925) Freeman, 1954, and 2 cestode species from *Pandion haliaetus*, i. e. *Paradilepis rugovaginosus* Freeman, 1954 and *P. simoni* Rausch, 1949.

The new species differs from *P. patriciae* by larger general length of the strobila (80 mm vs 2–5 mm), by larger number of rostellar hooks (36 vs 20) and by the length of rostellar

hooks. Besides, hooks in *P. patriciae* are larger: 88–101.5 and 60.5–74.5 vs 69–73 and 52. It also differs from this species also by a particular structure of the copulatory apparatus. The cirrus of *P. patriciae* is covered with large sparse spines.

From all but two species of *Paradilepis* group “*scolecina*”, including the parasites of ichthyophagous birds, the new species differs by the shape of the rostellar hooks, by long strobila with more numerous proglottides and by other morphological peculiarities. The exceptions are *P. rugovaginosus* and *P. simoni*. Both species are the parasites of *Pandion haliaetus* from North America and possibly are synonymous. Scolex of these cestodes is armed of 32 and 36 hooks. The hooks' shape is similar to that of the new species. The length of the rostellar hooks in *P. rugovaginosus* and *P. simoni*, 98–103 and 68–72 respectively, is larger than that of the new species. The latter differs also by the morphology of the strobila: the cirrus of *P. rugovaginosus* is larger and covered with long spines, vagina is with vaginal cilia. Besides, *P. simoni* has 5 testes (Rausch, 1949), whereas *P. rugovaginosus* has 4 testes, sometimes 3 or 5 (Freeman, 1954).

The species of the genus *Paradilepis* group “*urceus*” have hooks of different shape: the blade of hooks, especially large ones, is longer than handle. This distinguishes them, including those parasitic in Ciconiiformes (*Paradilepis diminuta* Huey et Dronen, 1981; *P. lloydi* (Southwell, 1926) Spassky, 1954; *P. maleki* Khalil, 1961; *P. urceina* Bona, 1975; *P. urceus* (Wedl, 1885) Joyeux et Baer, 1950) from the new species.

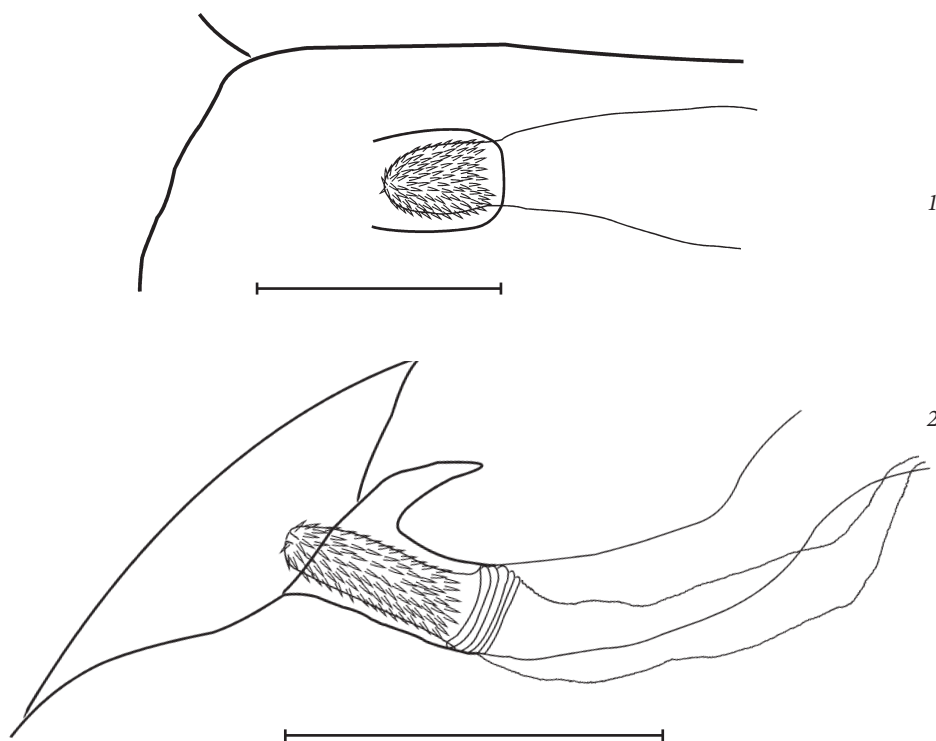


Fig. 3. *Proparadilepis plegadissaakovae* gen. et sp. n. Holotype (copulatory apparatus): 1—cirrus partly invaginated; 2—cirrus and vagina. Scale bars: 1—50 μm ; 2—100 μm .

Рис. 3. *Proparadilepis plegadissaakovae* gen. et sp. n. Голотип (копулятивный аппарат): 1—частично инвагинированный циррус; 2—циррус и вагина. Масштабные линейки: 1—50 мкм; 2—100 мкм.

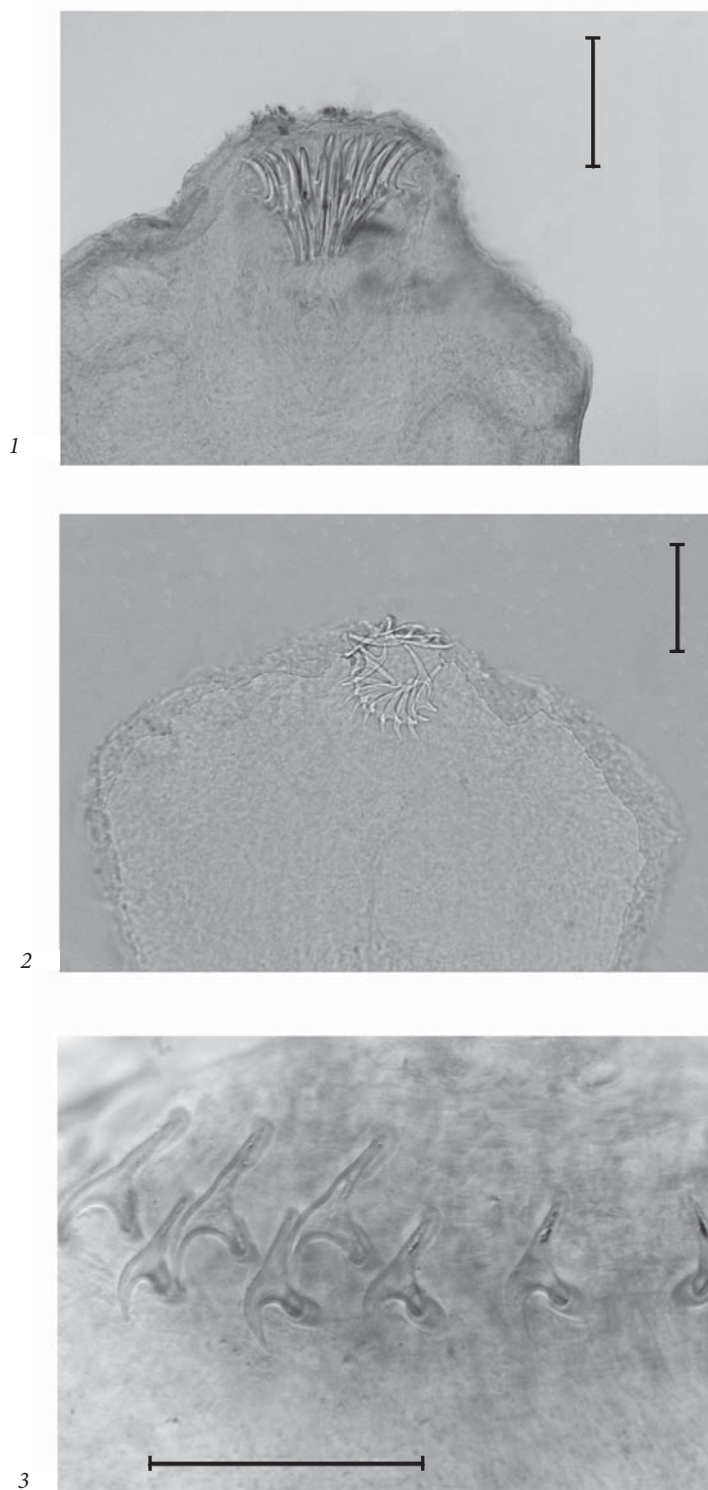


Fig. 4. Armament of scolex: 1 — *Paradilepis scolecina* (Rudolphi, 1819) Hsü, 1935; 2 — *Moshonalepis macrosphincter* (Fuhrmann, 1909) comb. n.; 3 — *Proparadilepis plegadissaakovae* gen. et sp. n. Scale bars 100 μ m.

Рис. 4. Вооружение сколекса: 1 — *Paradilepis scolecina* (Rudolphi, 1819) Hsü, 1935; 2 — *Moshonalepis macrosphincter* (Fuhrmann, 1909) comb. n.; 3 — *Proparadilepis plegadissaakovae* gen. et sp. n. Масштабные линейки 100 мкм.

The new species is similar to *Ascodilepis transfuga* (Krabbe, 1869) Guildal, 1960 (syn. *Paradilepis transfuga* (Krabbe, 1869) Baer et Bona, 1960) from *Ajaia ajaia* in Brasil. It also differs from *A. transfuga* by larger general length of the strobila (8 mm vs 2–5 mm), by larger number of rostellar hooks (36 vs 20) and by the length of rostellar hooks. *A. transfuga* has smaller hooks (55–61 and 42–44). The new species is different from this species by a particular structure of the copulatory apparatus. The cirrus armament of *A. transfuga* is similar to the cirrus armament of *Proparadilepis plegadissaakovae* gen. et sp. n., but *A. transfuga* has pseudocirrus and pseudovagina, that are absent in the new species.

Some characteristics of *P. plegadissaakovae* gen. et sp. n. are similar to some in cestodes of the genus *Dendrouterina*. Species of the genus *Dendrouterina* were divided by F. V. Bona (1975) into two groups: “*herodiae*” and “*macrosphincter*”, which we consider as valid genera as stated above. The new species is similar to the species of the group “*macrosphincter*” (corresponding to the genus *Mashonalepis*) by a number of characters, especially by the ratio between the lengths of small and large hooks.

Mashonalepis macrosphincter (Fuhrmann, 1909) comb. n. (= *Dendrouterina macrosphincter* (Fuhrmann, 1909) Baer et Bona, 1960), parasitic in Ardeidae from Europe, Asia, Africa, undoubtedly belongs to this group.

Five more species (*D. ardeae* (Rausch, 1955) Mahon, 1956 parasitic in *Ardea herodias* from the USA; *D. arcana* Bona, 1975 parasitic in *Ardea purpurea* from Slovakia; *D. crassirostrata* (Fuhrmann, 1908) Baer et Bona, 1960 parasitic in *Tigrisoma lineatum* from Brazil; *D. australiensis* Baer et Bona, 1960 parasitic in *Ardea pacifica* and *Ardea novaehollandiae* from Australia; *D. junonia* Bona, 1975 parasitic in Ardeidae sp. from Madagascar) presumably may be assigned to *Mashonalepis*, but they need additional morphological studies. These species have 20 hooks with length different from that in the new species and tens of the testes in each proglottis.

D. ardeae and *D. junonia* are similar to the new species by the shape of the rostellar hooks, since the handle of hooks is relatively short. *D. ardeae* is a typical *Dendrouterina* by all other characters. *D. junonia* is incompletely described. The affiliation of *D. junonia* to the genus *Dendrouterina* requires studying of additional new material.

The species of the genus *Dendrouterina* group “*herodiae*” are characterized by great difference between the length of small and large hooks. This distinguishes these species from a new species.

We have studied specimens of *Mashonalepis macrosphincter* (Fuhrmann, 1909) comb. n. and *Paradilepis scolecina* from our collection and compared them to the new species. Essential differences between the new species and the members of these genera were found (fig. 3).

Discussion

On the basis of the above-mentioned, the genus *Proparadilepis* gen. n. is monotypic, with type species *Proparadilepis plegadissaakovae* gen. et sp. n. It is possible that *D. junonia* may also belong in the genus *Proparadilepis* gen. n. The shape of its rostellar hooks is similar to that of *P. plegadissaakovae* gen. et sp. n. Data on the number of testes, strobila size and formation of the uterus are absent in the description of *D. junonia*. Only scolex was described in details. It is armed with 20 hooks arranged in a double row (Bona, 1975).

Two species of the genus *Paradilepis*, i. e. *P. rugovaginosus* and *P. simoni*, both parasites of *Pandion haliaetus*, are similar to a new genus by some characteristics. Alike to *P. plegadissaakovae* gen. et sp. n., they have longer strobila with numerous proglottides, similar shape and armament of the cirrus, almost the same number of hooks, small

number of testes. It is possible *P. rugovaginosus* and *P. simoni* can be assigned to the genus *Proparadilepis* gen. n., although we have not seen the type material to be confident. *P. rugovaginosus* differs from *P. simoni* by the number of the rostellar hooks (32 vs 36) (the length of the rostellar hooks is the same), by the number of the testes (4 vs 5) and by the position of the genital ducts (between osmoregulatory canals vs dorsally to osmoregulatory canals) (Rausch, 1949; Freeman, 1954; Matevosyan, 1963). In the description of *P. simoni*, Rausch (1949) supposed that *P. simoni* is an “accidental” parasite of the osprey (Rausch, 1949). In that publication he wrote about 36 rostellar hooks. The type material (paratype) of *P. simoni* was studied by Ching (1982) for comparison it with her material representing — larval stages of *P. simoni*. She reported that the number of rostellar hooks in the type specimen was 30. A range of 30 to 36 hooks has been observed for the metacestodes (Ching, 1982). Perhaps because of its protected status, the osprey has not been surveyed in details for helminth parasites. Beside the description, it has been only one publication (Kinsella et al., 1996) with analysis of the helminthes of this bird. Both species, *P. rugovaginosus* and *P. simoni*, were found by the author but the descriptions were not presented. The questions on the synonymy of *P. rugovaginosus* and *P. simoni* and their attribution to the genus *Proparadilepis* gen. n. remain open because of the lack of collected material from osprey. To our point of view, using the remarks above, the morphology of *P. rugovaginosus* and *P. simoni* does not correspond exactly to the diagnosis of the genus *Paradilepis* and needs additional study.

The newly-erected genus *Proparadilepis* gen. n. occupies an intermediate position between the genera *Paradilepis*, *Ascodilepis* and *Dendrouterina*. These four genera are likely related phylogenetically.

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