sciendo

DOI 10.2478/helm-2021-0040

HELMINTHOLOGIA, 58, 4: 364 – 371, 2021

New findings of trematodes of the superfamily Echinostomatoidea Looss, 1899 in birds from the Czech Republic

J. SITKO

Comenius Museum in Přerov, Horní náměstí 7, 750 02 Přerov, Czech Republic
E-mail: *sitko@prerovmuseum.cz*

Article info

Received October 31, 2019
Accepted October 4, 2021

Summary

In the Czech Republic, 12 freshly dead birds belonging to four species were examined helminthologically during a period of 2015 – 2019. They were six Caspian gulls *Larus cachinnans* (Lariformes), three goosanders *Mergus merganser* (Anseriformes), two common snipes *Gallinago gallinago*, and one common curlew *Numenius arquata* (Charadriiformes). Concerning trematodes, five echinostomatoids species were found, namely *Aporchis massiliensis* (obtained from one positive Caspian gull), *Echinoparyphium macrovitellatum* (one positive from six Caspian gulls), *Echinostoma academica* (one positive common curlew), *Echinostoma stantschinskii* (one positive from two common snipes), and *Echinochasmus mergi* (one positive from three goosanders). All the five echinostomatoids species represent the first records for the helminth fauna of the Czech Republic; the flukes *A. massiliensis* and *E. macrovitellatum* are recorded for the first time in the Central Europe or the Europe at all, respectively.
Keywords: flukes; Echinostomatoidea; Lariformes; Anseriformes; Charadriiformes

Introduction

Adult echinostomatoids flukes occur in different groups of vertebrates, the cercariae in snails and metacercariae in molluscs (Gastropoda, Bivalvia), planarians, fishs and tadpoles. Therefore, in Europe echinostomatoids are most frequent in water birds but rare in birds of prey and owls. Sometimes, they can be found also in songbirds of the families Corvidae and Turdidae, as some crows and thrushes occasionally feed on aquatic mollusks, fish and amphibians.

The systematics of the superfamily Echinostomatoidea was detailed in the work of Kostadinova (2005). The fauna of bird echinostomatoids is relatively well known in the Central Europe; Sitko *et al*. (2006) published the survey of the bird trematodes in the Czech Republic and Slovakia, Iskova (1985) summarized echinostomatoids trematodes in Ukraine, and Sonin (1985) studied this fluke group in fish-eating birds of the Palearctic region. However, updating these data is difficult because the diversity and abundance of birds have a long downward trend (Rosenberg *et al*., 2019).

Materials and Methods

During the years 2015 – 2019, 12 birds of four species were examined. They were six Caspian gulls *Larus cachinnans* (Lariformes), three goosanders *Mergus merganser* (Anseriformes), two common snipes *Gallinago gallinago,* and one common curlew *Numenius arquata* (Charadriiformes). The birds were provided from

the Wild Animal Rescue Stations in Bartošovice na Moravě and Přerov, Czech Republic (Stýblo & Orel, 2013). All the birds were found dead or died of injury; several water birds died caused by botulism on the ponds. Trematodes were fixed in 70 % ethanol, stained by Borax-carmine, transferred through ethanol series to xylene and mounted in Canada balsam. All measurements are in micrometres. Documentary material is deposited in the helminth collection of the Comenius Museum at Přerov, Czech Republic.

Ethical Approval and/or Informed Consent

The research related to animals complied with all the relevant national regulations and institutional policies for the care and use of animals.

Results

Aporchis massiliensis Timon-David, 1955 Fig. 1a, b
Host: *Larus cachinnans* Pallas (Lariformes).
Prevalence: one positive out of six host birds.
Site: intestine.
Locality: Sedlec u Mikulova (48.86ºN, 19.16ºE; 7266).
Specimens deposited: P–P–1858/53.
Remarks: previously found in France (Timon-David, 1955), UK (Pemberton, 1963), Spain (Bosch *et al.*, 2000), Italy (Lafuente *et al.*, 1998), Egypt (Radwan *et al.*, 2013), Russia (Kirilov & Kirilova, 2013). Hosts: *Larus argentatus*, *L. cachinnans*, *L. fuscus*, *Ichthyaetus audouinii, I. leucophthalmus*, *I. melanocephalus*, *Chroicocephalus ridibundus, Chlidonias leucoptera* and *Sterna hirundo*. The species is characterized by a head disc measuring about

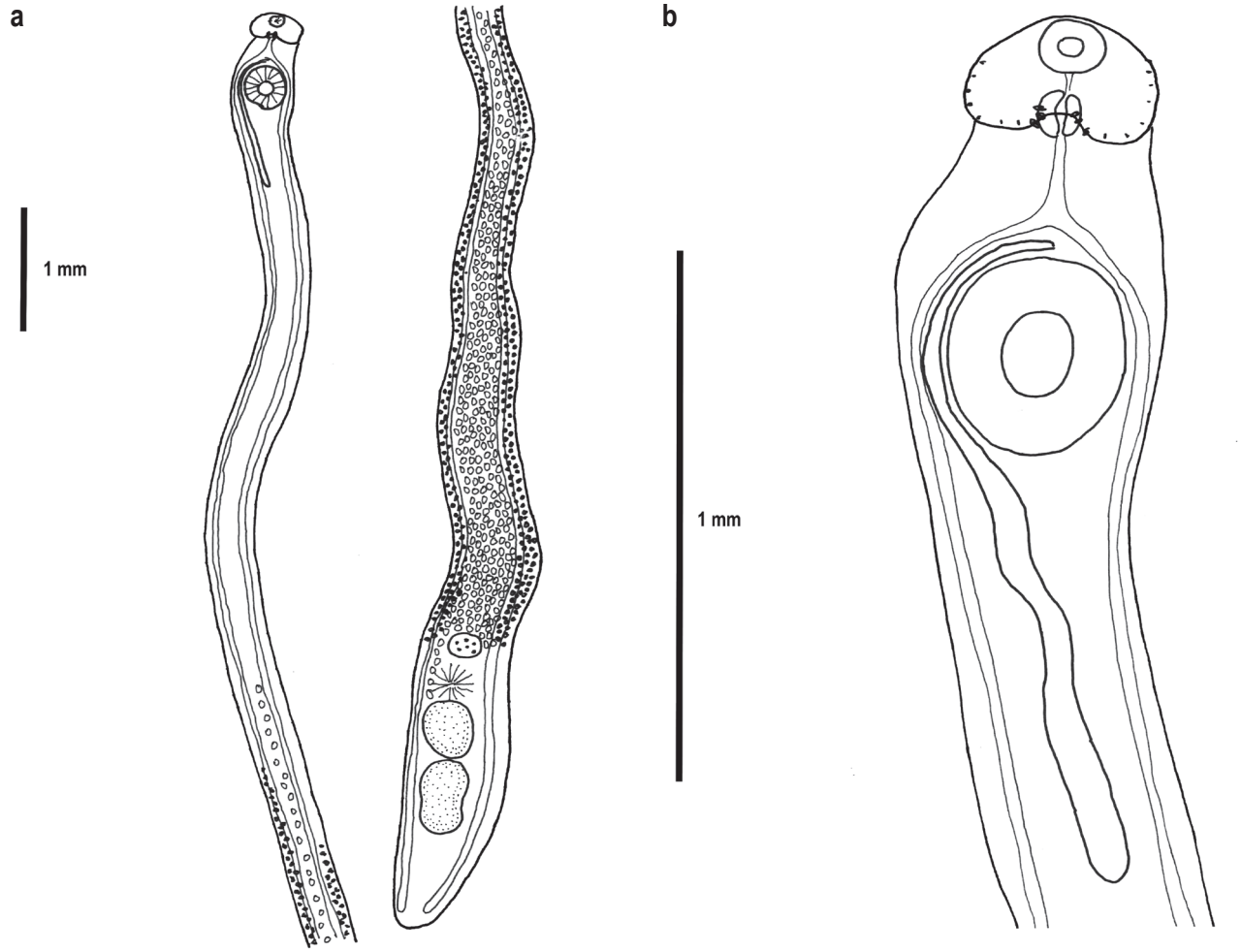

Fig.1a. *Aporchis massiliensis* Timon-David, 1955. Ventral view.
1b. Head-collar.

300, vitelline field ending at the rear edge of the ovary and egg filaments about 500 long. The number of spines could be accurately determined. Only clearly visible spines are shown. The bird was frozen before the autopsy. Present record represents the first finding in Central Europe.

Description (one specimen): Body 20,000 long, greatest width in region of ovary 714 (BW=6 %). Forebody notably short, 238 long, hindebody 19,443 (FO=2 %). Anterior part of body up to level of beginning vitelline field strewn with minute spines. Kidney shaped disc 255 × 313. Angle spines 32 × 12, dorsal lateral spines 15 × 6, dorsal oral spines 2 × 2. Oral sucker terminal 110 × 93. Prepharynx 17, pharynx long oval close behind oral sucker 110 × 81, oesophagus 203. Ventral sucker well developed 319 × 290. Cirrus pouch 1267 × 75. Intestine well developed, its bifurcation close to ventral sucker. Individual branches end at level of end of body, far behind ends of vitelline field feebly developed, contrary to remaining species of this family. They begin in posterior third of body and end before reproductive organs. As a rule, one of their branches begins considerably lower than other branch. Outlets of vitelline field and vitelline follicle, as long as developed, in region of ovary. Testes well developed, long oval, medially in tandem, anterior testis 534 × 368, posterior one 644×368 (T=6 %). Ovary spherical or ovoid, laterally at end of vitelline field, partly overlaid by loops of uterus, 344 × 232. Mehlis' gland well developed, 232 × 203. Uterus well developed (U=33 %), occupy whole space between ovary and margins of vitelline field, in anterior part of body reaching in front of vitelline field. Eggs 99 × 35, provided with long filament 500 – 510 (500).

Echinoparyphium macrovitellatum Oschmarin, 1947 Fig. 2a, b
Host: *Larus cachinnans* Pallas (Lariformes).
Prevalence: one positive out of six host birds.
Site: intestine.
Locality: Záhlinice (49.29ºN, 17.48ºE; 6770).

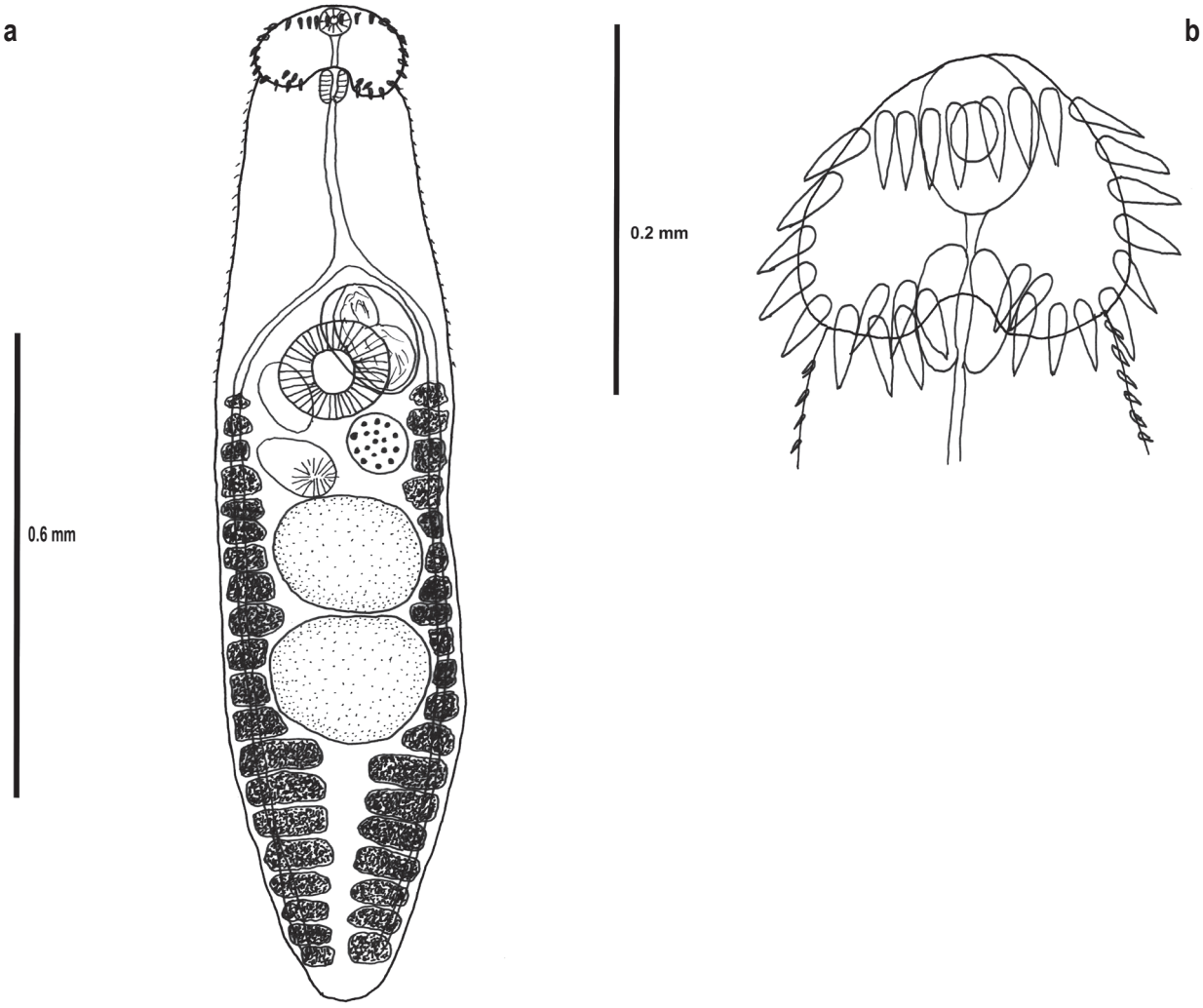

Fig. 2a. *Echinoparyphium macrovitellatum* Oschmarin, 1947. Ventral view.
2b. Head-collar.

Specimens deposited: P–P–1858/43.
Remarks: described from *Phalacrocorax carbo* in Eastern Siberia (Sonin, 1985), *Microcarbo pygmaeus* and *Pelecanus onocrotalus* in Azerbaijan (Vaidova, 1978). The species is characterized by small size, a head disc with 29 spines and vitelline field composed of large follicles. In Europe described for the first time.
Description (5 specimens): Body fusiform 1,086 – 1,386 (1225) long, maximum width 224 – 268 (239) occurring at testes, (BW=17–20 %). Forebody 368 – 522 (429), hindbody 596 – 894 (706), (FO=33–38 %). Anterior body surface covered with spines 10 – 14 (12) × 1 – 3 (2) which become rare and disappear behind ventral sucker. Head collar 116 – 122 (118) × 145 – 174 (157) bears 29 spines in two row. Angle spines 53 – 58 (55) × 12 – 14 (13). Dorsal lateral spines 34 – 36 (35) × 10 – 12 (11), dorsal oral spines 34 – 36 (34) × 10 – 12 (11). Oral sucker slightly protruding 62 – 70 (67) × 62 – 74 (69). Prepharynx absent, or 12 – 19 (13), elongated oval pharynx 62 – 75 (68) × 46 – 58 (51) continues into oesophagus 174 – 180 (177). Ventral sucker round or widely oval 139 – 154 (150) × 139 – 154 (152) at posterior half of body. Ratio of sucker length 1: 1.99 – 2.22 (2.12), width 1: 1.99 – 2.34 (2,2). Testes smooth, elongated transversely, compact, in tandem at posterior body half, anterior testis 116 – 157 (141) × 145 – 174 (152), posterior testis 145 – 203 (170) × 145 – 186 (160) (T=23–27 %). Cirrus pouch oval 197 – 209 (203) × 116 – 122 (120), dorsally between bifurcation of intestine and centre of ventral sucker, cirrus 116 – 177 (154±6) × 35 – 61 (47). Ovary oval or circular 70 – 87 (76) × 70 – 87 (76) in right part of body between ventral sucker and anterior testes. Mehlis´ gland diffuse 58 – 70 (67) × 64 – 70 (67). Vitelline field composed of large follicles at posterior end of anterior testes and reaching posterior end of body, behind testes fill up whole body space with exception of narrow strip in middle, left branch 662 – 894 (724), right branch 662 – 854 (712). Uterus short (U=6–13), with few 3 – 6 (4±2) oval eggs 81 – 87 (83) × 58 – 60 (59).

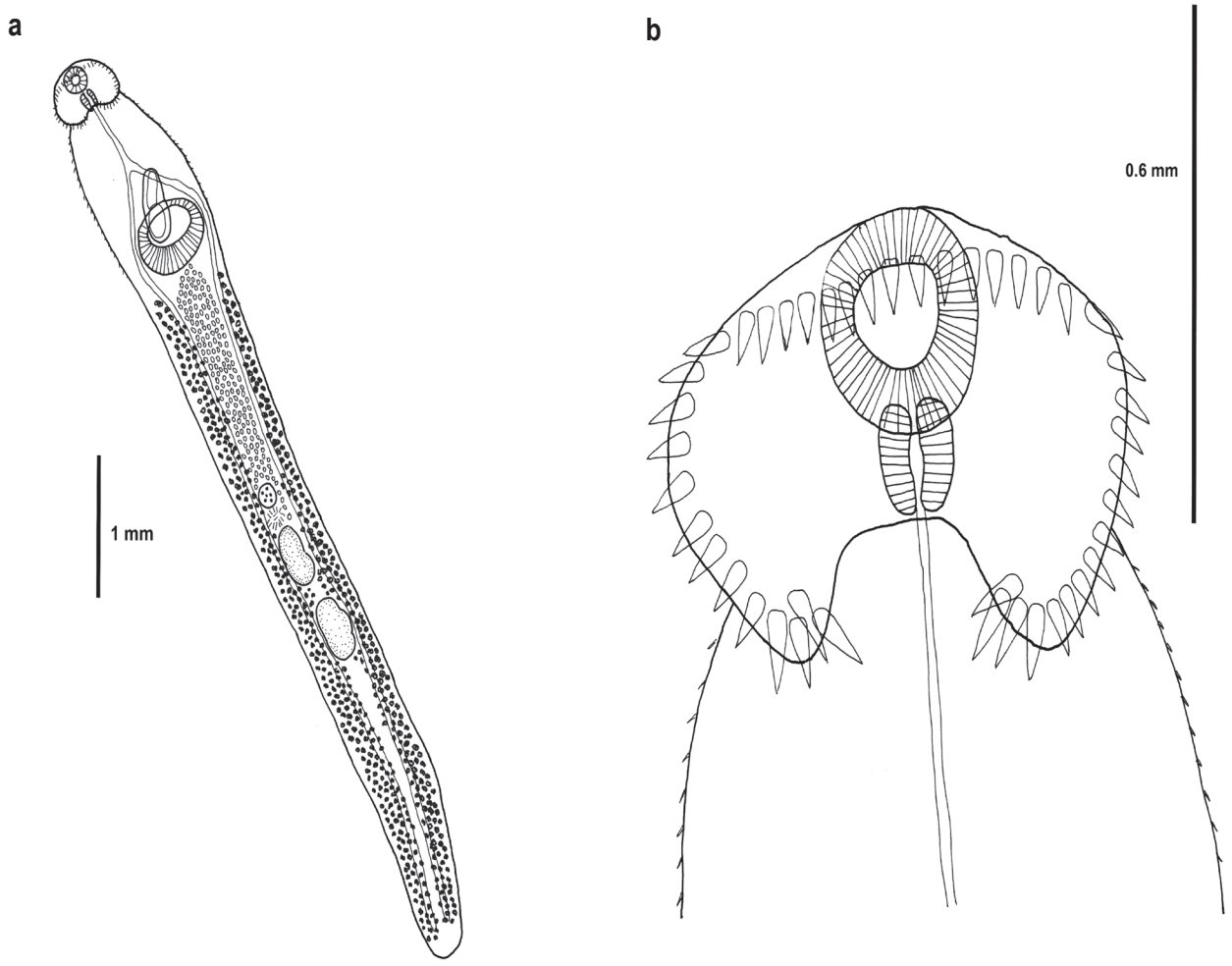

Fig.3a. *Echinostoma academica* Skrjabin, 1915. Ventral view.
3b. Head-collar.

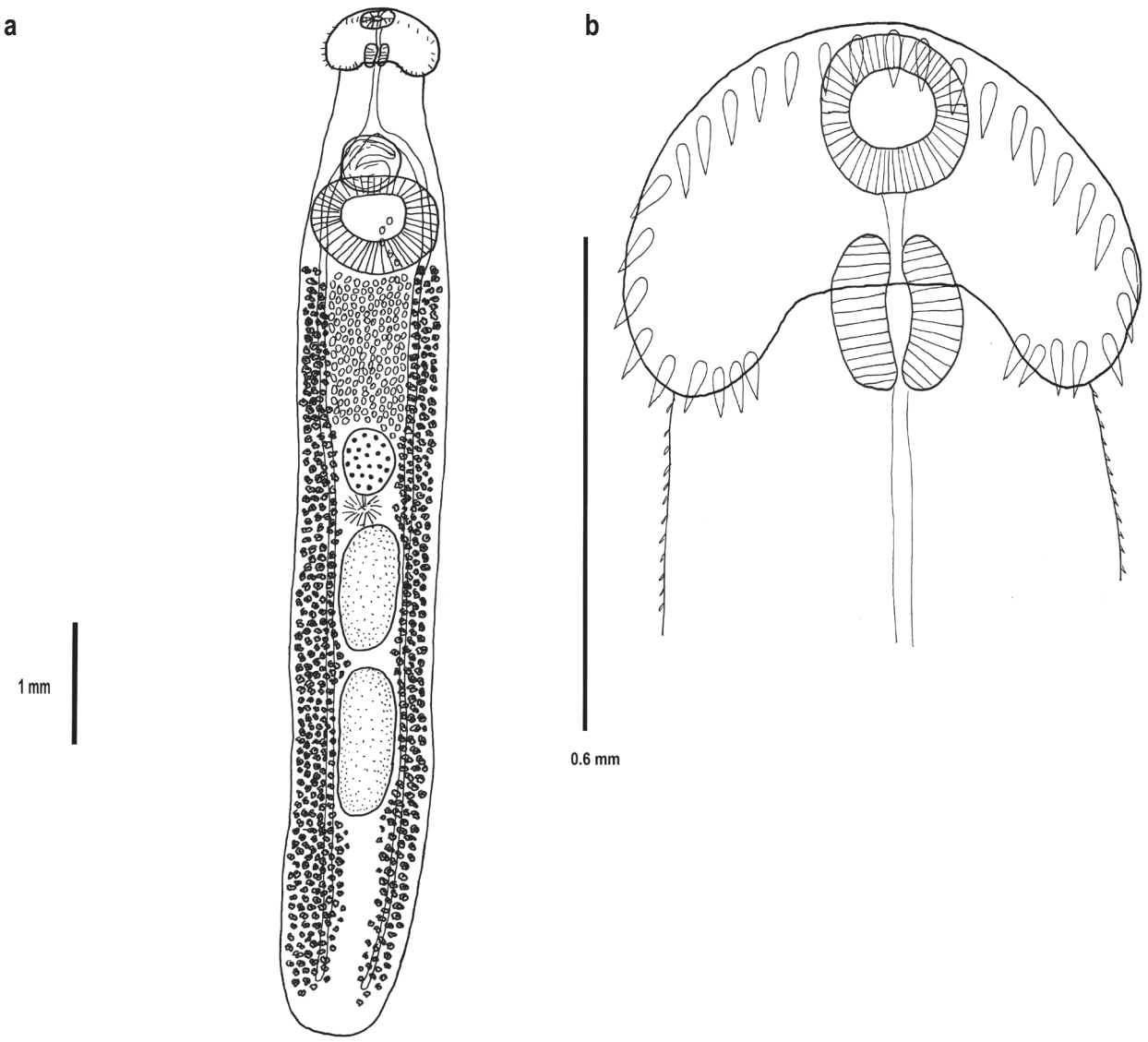

Fig.4a. *Echinostoma stantschinskii* Semenov, 1927. Ventral view.
4b. Head-collar.

Echinostoma academica Skrjabin, 1915 Fig.3a, b
Host: *Numenius arquata* (L.) (Charadriiformes).
Prevalence: one positive out of one host bird.
Site: intestine.
Locality: Přerov (49.45ºN, 17.46ºE, 6570).
Specimens deposited: P–P–1858/42.
Remarks: found in Russia from Charadiiformes – *Limosa limosa, Gallinago media* (Bykhovskaya-Pavlovskaya, 1962), *Crocethia alba* (Ivanov *et al*., 2013), Poland from
Numenius arquata (Okulewicz *et al*., 2010), Ukraine from Ralliformes – *Rallus aquaticus* (Iskova, 1985). The species is characterized by a head disc with 43 spines and tegumental spines extending to the ovary area. The present record represents the first finding in Czech Republic.

Description (10 specimens): Body 7,436 – 10,860 (8,530) × 800 – 1,143 (1,003) width occurring at testes (BW=9–14 %).Forebody 1114 – 1629 (1362), hindebody 5710 – 8530 (6723) (FO=13–19 %). Anterior body surface covered with spines 7 – 12 (9) × 2 – 5 (4), which become rare and disappear behind ventral sucker. Head collar reniform 368 – 744 (508) × 492 – 782 (654) bears 43 spines. Angle spines 122 – 145 (134) × 29 – 35 (33). Dorsal lateral spines in double row 81 – 110 (100) × 23 – 29 (27), dorsal oral spines 79 – 89 (86) × 21 – 24 (22). Oral sucker subterminal, small 191 – 290 (243) × 203 – 278 (240). Prepharynx short 58 – 138 (81), pharynx well developed 162 – 203 (186) × 133 – 162 (147), oesophagus short, 406 – 690 (603). Ventral sucker large with deep cavity 506 – 708 (614) × 534 – 820 (698). Ratio of sucker length 1: 2.07 – 3.12 (2.60), width 1: 2.32 – 3.53 (2.92). Testes in tandem,

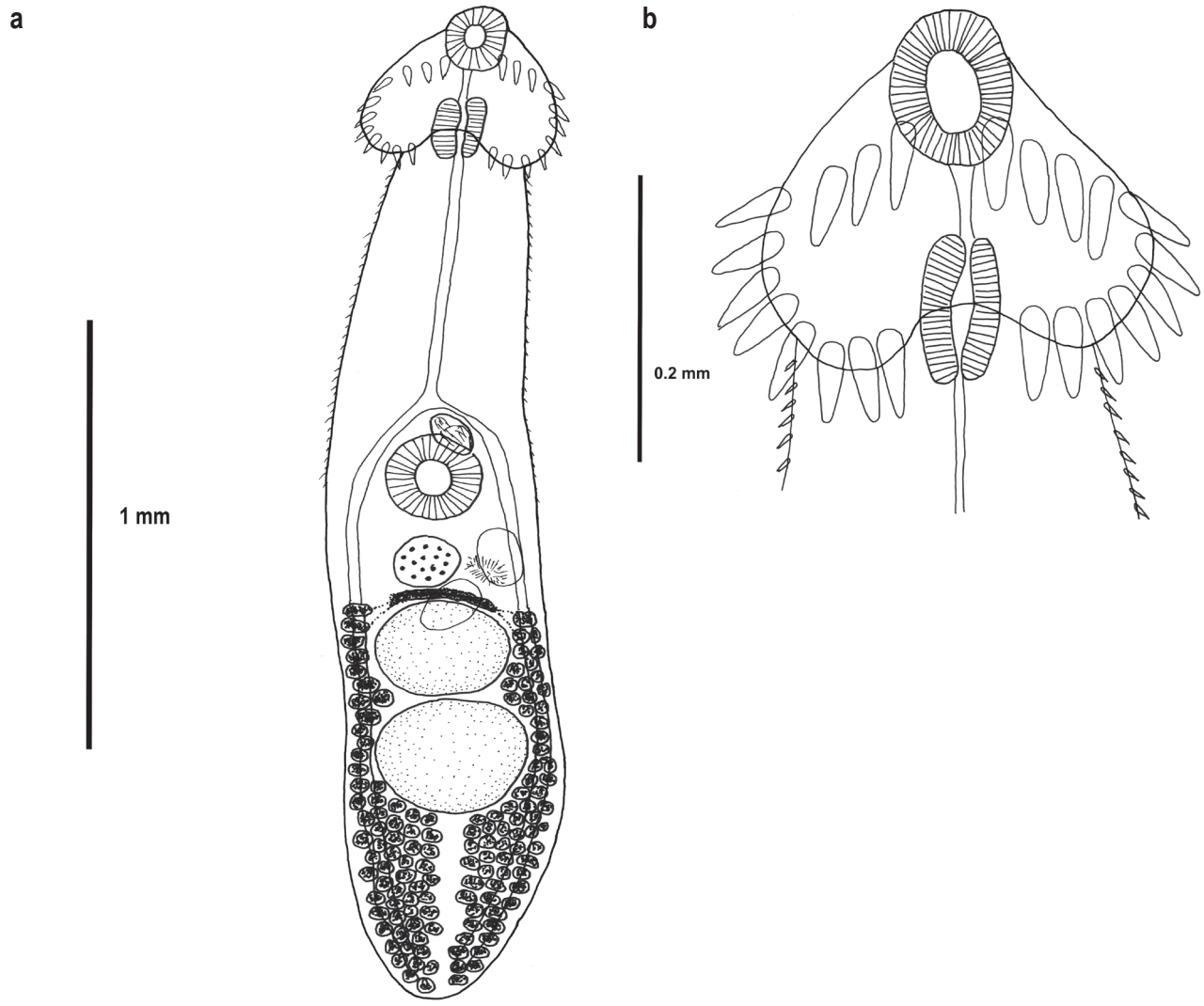

Fig.5a *Echinochasmus mergi* (Connon, 1938). Ventral view.
5b. Head-collar.

elongate oval, anterior testis 368 – 515 (430) × 184 – 276 (225), posterior testis 442 – 653 (530) × 202 – 322 (257) (T=11–13 %). Cirrus pouch oval to elongate oval, muscular between intestine bifurcation and posterior margin of ventral sucker, dorsally 232 – 644 (484) × 230 – 322 (257). Internal seminal vesicle large, with saccular posterior part and coiled tubular anterior part. Pars prostatica well developed. Ejaculatory duct long. Cirrus tubular, unspined. Ovary small, spherical, median 230 – 276 (256) × 184 – 276 (236). Mehlis´ gland muscular, 147 – 368 (286) × 147 – 276 (213). Vitelline field with small follicles, left 5,146 – 8,299 (6,012), right 4,290 – 8,170 (5,866). Uterus long with numerous loops (U=21–36 %). Eggs 104 – 116 (111) × 58 – 70 (66).

Echinostoma stantschinskii Semenov, 1927 Fig. 4a,b
Host: *Gallinago gallinago* (L.) (Charadriiformes).
Prevalence: one positive out of two host birds.
Site: intestine.
Locality: Tovačov (49.42ºN, 17.25ºE; 6569).
Specimens deposited: P–P–1858/44.
Remarks: Characteristic parasite from *Gallinago gallinago*, found in Russia (Sonin, 1985), Azerbaijan (Vaidova, 1978), Kyrgyzstan (Tokobaev & Chibichenko, 1978), Ukraine (Iskova 1985), Poland (Pojmanska *et al*., 2007). The species is characterized by a head disc with 32 – 33 spines, 5 angle spines and small eggs around 80 × 45. The present record represents the first finding in Czech Republic.
Description (5 specimens): Body 7,430 – 8,000 (7,712) × 914 – 1,000 (964) width occurring at testes (BW=12–13 %). Forebody 1,000 – 1,200 (1,082), hindbody 5,430 – 5,910 (5,713) (FO=12–15 %). Anterior body surface covered with spines 12 – 17

(14) × 2 – 3 (2), which become rare and disappear behind ventral sucker. Head collar renal 460 – 506 (478) × 644 – 828 (598) bears 32 – 33 spines. Angle spines 96 – 100 (98) × 23 – 29 (26). Dorsal lateral spines in double row 87 – 96 (92) × 26 – 29 (28). Dorsal oral spines 84 – 87 (86) × 22 – 26 (24). Oral sucker subterminal, small 203 – 261 (234) × 261 – 278 (264). Prepharynx short 29 – 58 (43), pharynx well developed 203 – 232 (216) × 157 – 197 (174), oesophagus short, 460 – 644 (542). Ventral sucker large with deep cavity 736 – 894 (830) × 736 – 894 (836). Ratio of sucker length 1: 3.35 – 3.85 (3.55), width 1: 2.82 – 3.43 (3.17). Testes tandem, elongate oval, anterior testis 644 – 874 (750) × 322 – 386 (340), posterior testis 690 – 1,013 (845) × 286 – 414 (332) (T=18–21 %). Cirrus pouch oval to elongate oval, muscular between intestine bifurcation and posterior margin of ventral sucker, dorsally 368 – 894 (599±137) × 276 – 460 (362±67). Internal seminal vesicle large, with saccular posterior part and coiled tubular anterior part. Pars prostatica well developed. Ejaculatory duct long. Cirrus tubular, without spine. Ovary small, spherical, median 368 – 460 (418) × 322 – 377 (357). Mehlis´ gland muscular, 230 – 368 (304) × 368 – 414 (383). Vitelline field with small follicles, left 2,860 – 5,140 (3,602), right 2,860 – 4,860 (3,474). Uterus long with numerous loops (U=16–24 %). Eggs 80 – 85 (83) × 40 – 45 (43).

Echinochasmus mergi (Cannon, 1938) Fig. 5a, b
Host: *Mergus merganser* L. (Anseriformes).
Prevalence: one positive out of three host birds.
Site: intestine.
Locality: Záhlinice (49.29ºN, 17.48ºE; 6770).
Specimens deposited: P–P–1858/48.
Remarks: Found in Canada (Yamaguti, 1971) and Germany from *Mergus merganser* (Odening, 1963). The species has a head disk with 22 spines, prepharynx is longer than the oral sucker, vitelline field of large follicles connect behind the testes. The present record represents the first finding in Czech Republic.
Description (6 specimens): Body 1,386 – 1,490 (1,453) × 238 – 286 (267) width occurring at testes (BW=16–20 %). Forebody 644 – 715 (681), hindbody 581 – 700 (634), (FO=44–50 %). Anterior body surface covered with spines 12 – 17 (14±2) × 2 – 5 (2±1), which become rare and disappear behind ventral sucker. Head collar renal 209 – 249 (227) × 215 – 232 (232) bears 22 spines in one row. Angle spines 38 – 50 (48) × 12 – 14 (13), dorsal lateral spines 60 – 65 (62) × 14 – 17 (16), dorsal oral spines 55 – 60 (58) × 15 – 17 (16). Oral sucker subterminal, small 64 – 75 (69) × 58 – 75 (66). Prepharynx 75 – 87 (78), pharynx well developed 87 – 110 (99) × 52 – 60 (57), oesophagus 348 – 452 (402). Ventral sucker large with deep cavity 116 – 174 (142) × 128 – 157 (144). Ratio of sucker length 1: 1.73 – 2.49 (2.05), width 1: 1.83 – 2.50 (2.20). Testes tandem, elongate oval, anterior testis 70 – 174 (108) × 116 – 203 (152), posterior testis 104 – 174 (133) × 116 – 203 (152) (T=13–24 %). Cirrus pouch oval to elongate oval, between intestine bifurcation and posterior margin of ventral sucker, dorsally 87 – 128 (108) × 64 – 93 (78). Internal seminal vesicle large, with saccular posterior part and coiled tubular anterior part. Pars prostatica well developed. Ejaculatory duct long. Ovary small, spherical, median 58 – 70 (68) × 58 – 70 (60). Mehlis´ gland 58 – 70 (64) × 58 – 70 (65). Vitelline field with small follicles, left 477 – 598 (559), right 536 – 598 (572). Uterus short with a small number of eggs (U=8–13 %). Eggs 75 – 93 (82) × 50 – 58 (56).

Conflict of Interest

Authors state no conflict of interest.

Acknowledgements

The author is grateful to the members of the Wild Animal Rescue Stations in Bartošovice na Moravě and Přerov, Czech Republic, for helpful cooperation in obtaining bird material. The research was supported by Comenius Museum at Přerov, Czech Republic.

References

Bosch, M., Torres, J., Figuerola, J. (2000): A helminth community in breeding Yellow-legged Gulls (*Larus cachinnans*): pattern of association and its effect on host fitness. *Can. J. Zool.*, 78(5): 777 – 786. https://doi.org/10.1139/z99-252

Bykhovskaya-Pavlovskaya, I.E. (1962): *Trematodes of the birds in the fauna of the USSR*. The Publishing House of the All-Union Academy of Sciences, Moscow-Leningrad, 1962, 407 pp. (In Russian)

Iskova, N.I. (1985): *Fauna of Ukraine. Vol. 34. Trematoda. No. 4. Echinostomatata.* Naukova Dumka. Kiev, 200 pp. (In Russian)

Ivanov, M., Kalmykov, A., Semenova, N. (2013): Influence of trophic relations of birds on their helminth fauna along the Volga and North Caspian. *Povolzhskii Ekolog. Zhurnal*, 1: 29 – 41 (In Russian)

Kirilov, A., Kirilova, N. (2013): Trematodes of birds from the Middle Volga Region. 1. Orders Brachylaimida, Cyclocoelida, Echinostomatida, Notocotylida, and Opistorchiida. *Parazitologiya*, 47 (1): 47 – 76 (In Russian)

Kostadinova, A. (2005): Family Echinostomatidae Looss, 1899. In Jones, A., Bray, R.A., Gibson, D.I. (Eds): *Keys to the Trematoda.* Vol. 2. CAB International and The Natural History Museum, London: 9 – 64

Lafuente, M., Rocca, V., Carbonell, E. (1998): Trematodes of Audouin's gull, *Larus audouinii* (Aves, Laridae), from Chafarinas Islands (W Mediterranean). *Misc. Zool.*, 21(2): 105 – 112

Odening, K. (1963): Echinostomatoidea, Notocotylata und Cyclocoelida (Trematoda, Digenea, Redioinei) aus Vögeln des Berliner Tierparks. *Bijdragen tot de Dierkunde* 33(1): 37 – 60. DOI: 10.1163/26660644-03301002

Okulewicz, A., Okulewicz, J., Sitko, J., Weselowska, M. (2010): New records of digenean flukes (Trematoda) in birds in Poland.

Wiad. Parasitol., 56: 67 – 70
Pojmańska T., Niewiadomska K., Okulewicz, A. (2007): *Parasitic helminths of Poland. Species hosts white spots.* Polskie Towarzystwo Parazitologiczne. Warzsawa, 360 pp. (In Polish)
Pemberton, R.T. (1963): Helminth parasites of three species of British Gulls, *Larus argentatus* Pont., *L. fuscus* L. and *L. ridibundus* L. *J. Helminthol.,* 37(1–2): 57 – 88
Radwan, N.A. (2014): *Aporchis massiliensis* (Digenea: Echinostomatidae) from *Larus leucophthalmus* (Aves: Laridae) from the Red Sea, Egypt, with scanning electron microscopy of the tegumental surface. *Global Veterinaria*, 12 (6): 760 – 767
Rosenberg, K.V., Dokter, A.M., Blancher, P.J., Sauer, J.R., Smith, A.C., Smith, P.A., Stanton, J.C., Panjabi, A., Helft, L., Parr, M., Marra, P.P. (2019): Decline of the North American avifauna. *Science*, 366(6461): 120 – 124. DOI: 10.1126/science.aaw1313
Sitko, J., Faltýnková, A., Scholz, T. (2006): *Checklist of the Trematodes (Digenea) of Birds of the Czech and Slovak Republics.* Academia. Praha, 111 pp.
Sonin, M.D. (1985): *Key to trematodes fish-eating birds from Palearctic Region*. Nauka, Moscow, 256 pp. (In Russian)
Stýblo, P.N., Orel, P. (2013): National network of Wild Animal Rescue Stations in the Czech Republic – history, the present and outputs. Ochrana přírody/Nature Conservation Journal 1/2013, 9 – 13
Timon–David, J. (1955): Trematodes des Goélands de l´Ile de Riou. *Ann. de Parasitol.*, 30(5-6): 446 – 476 (In French)
Tokobaev, M., Chibichenko, N. (1978): *Trematodes of fauna of Kyrgyzstan*. Ilim. Frunze, 234 pp. (In Russian)
Vaidova, S.M. (1978): *Helminths of birds in Azerbaijan*. Elm. Baku, 238 pp. (In Russian)
Yamaguti, S. (1971): *Synopsis of digenetic trematodes of vertebrates.* Parts I, II. Keigaku Publishing Co., Tokyo. 1074 pp. 349 Plates