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Morphological variability of *Brachylecithum microtesticulatum* (Digenea: Dicrocoeliidae) in the Black Sea region

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Abstract. *Brachylecithum microtesticulatum* Timon-David, 1955 (Digenea: Dicrocoeliidae) is recorded for the first time in the Black Sea region. The morphology and variability of the digeneans recovered from *Larus argentatus* in Bulgaria and the Ukraine are described and compared with the redescription of the species (Bartoli and Mas-Coma 1989). *Lyperosomum lari* Travassos, 1917 of Smogorzhevskaya (1976) is considered a synonym of *B. microtesticulatum*.

Although there have been several studies on helminths of gulls from the Black Sea region, only one dicrocoeliid species has been reported, namely *Lyperosomum lari* Travassos, 1917 from *Larus argentatus* in the Ukraine (Smogorzhevskaya 1976).

In a long-term study of digeneans parasitizing gulls of the Bulgarian Black Sea coast, another member of Dicrocoeliidae resembling the genus *Brachylecithum* was found in the pancreatic ducts of *L. argentatus*. These specimens as well as the specimens reported as *L. lari* from the Ukraine, were compared with the recent redescription of *Brachylecithum microtesticulatum* Timon-David, 1955 (Bartoli and Mas-Coma 1989).

This paper reports on the morphology and variability of the metrical features of the Bulgarian and Ukrainian dicrocoeliids which are considered conspecific with *B. microtesticulatum*.

MATERIALS AND METHODS

A total of 147 specimens of 11 species of larid birds were examined at three localities along the Bulgarian Black Sea coast. Pancreatic dicrocoeliids were recovered in two out of 51 specimens of *Larus argentatus*. Trematodes were killed in hot water, preserved in 70 % alcohol, stained with iron-aceto-carmine (Georgiev et al. 1986), and mounted in Canada balsam.

Voucher specimens are deposited in the Natural History Museum, London, UK and Faculté des Sciences de Luminy, Université d'Aix-Marseille II, Marseille, France. The Ukrainian materials reported by Smogorzhevskaya (1976) as *L. lari* are deposited in the Institute of Zoology, Kiev, Ukraine. Drawings were made with the aid of a camera lucida. Measurements are in micrometres. Diameters and area measurements are calculated as proposed by Mas-Coma et al. (1984).

DESCRIPTION

Brachylecithum microtesticulatum Timon-David, 1955 Fig. 1

Host: *Larus argentatus* Pontoppidan, 1763.
Site: Pancreatic ducts.
Prevalence: 3.8 %.
Intensity: 12–48 specimens.
Locality: Lake Durankulak, Bulgarian Black Sea coast.
Other locality: Crimea region, Ukrainian Black Sea coast (Smogorzhevskaya 1976).
Collection dates: 8 and 9 October 1989 (Bulgaria); 29 May 1957 (Ukraine).

Description (based on 28 whole-mounts of mature worms; immature worms were not found; measurements are given in Table 1): Body elongate, filiform, with lateral margins almost parallel, maximum width at level of testes. Body length/width ratio 7.0–11.9 (mean 9.4). Tegumental spines absent. A prominent characteristic 'collar'(see Bartoli and Mas-Coma 1989) of longitudinal and transverse muscle fibres observed in post-pharyngeal region. Forebody occupying 12.0–16.0 % (13.9 %) of body length. Intersucker distance relatively small, occupying 6.1–10.4 % (8.2 %) of body length.

Oral sucker oval, subterminal, with pre-oral lobe. Ventral sucker oval, larger than oral, without lateral processes. Area ventral sucker/oral sucker 1.43–2.17 (1.67 ± 0.2). Prepharynx not visible (absent?); pharynx

elongate-oval; oesophagus short; caeca extending to 3/4 of the body length.

Testes in all specimens larger than ovary, round, tandem or slightly oblique, close to ventral sucker. Distance between ventral sucker and anterior testis represents 0–3.4 % (1.3 %) of body length. Testes separated by 1–2 uterine coils; intertestis distance 0–4.2 % (1.3 %) of body length. Cirrus-pouch elongate-oval; mainly preacetabular, reaching dorsally to mid-acetabular level; enclosing curved seminal vesicle, poorly developed pars prostatica and cirrus. Genital pore median, at level of intestinal bifurcation.

Ovary oval, post-testicular, in some cases subtriangular, usually smaller than testes, separated from posterior testis by 1–3 uterine loops (distance occupying 1–4.4 % (2.3 %) of body length). Seminal receptacle voluminous, reaching size of ovary, just post-ovarian. Vitellarium follicular; in two lateral fields consisting of 8–12 (mean 9) large compact follicles each, in middle of the body posterior to seminal receptacle. Uterus extending from level of intestinal bifurcation and occupying all free body space posterior to ventral sucker. Eggs numerous.

Comments: The present material is identified as belonging to the genus *Brachylecithum* on the basis of its morphology, i.e. the position of the genital pore at the level of the intestinal bifurcation and the characteristic shape and position of its vitelline fields. Its gross morphology is consistent with that of most other *Brachylecithum* species, but differs in its host (a larid bird) and microhabitat (pancreatic ducts) specificity. Other characteristic features of the Black Sea material of *B. microtesticulatum* are the presence of a pre-oral lobe and a muscular post-pharyngeal 'collar', and the size of the testes, which are larger than ovary in all specimens.

The ranges, means, standard deviations and coefficients of variation of the metrical features of *B. microtesticulatum* collected in Bulgaria are presented in Table 1. The coefficients of variation (CV) indicate a low level of variation within the Bulgarian set of specimens for most of the metrical features (having CV values lower than 10 %): the lengths of body, fore- and hindbody; the measurements of the oral sucker, pharynx and ventral sucker, and the ratios of their diameters; the size of cirrus-pouch, ovary and eggs. The measurements of the Ukrainian specimens vary within the range of the Bulgarian material (see Table 1). Since no qualitative or quantitative differences between the Bulgarian and the Ukrainian sets of specimens were found, *L. lari* of Smogorzhevskaya (1976) is considered a synonym of *B. microtesticulatum*.

Comparison of the morphometri c data of the specimens recovered from Black Sea *L. argentatus* with the detailed re-description of *B. microtesticulatum* from

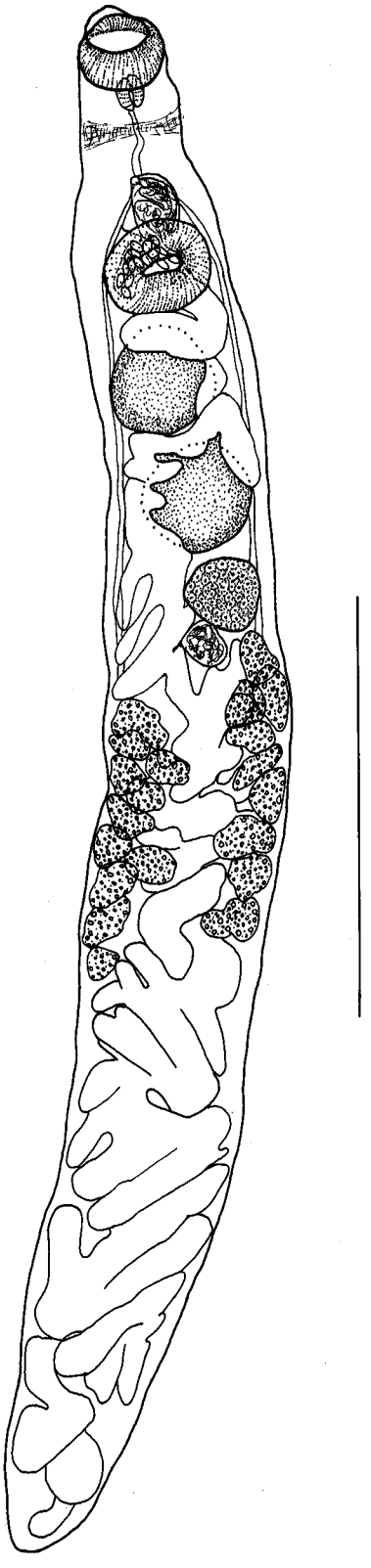

Fig. 1. *Brachylecithum microtesticulatum* Timon-David, 1955 from *Larus argentatus*, Bulgarian Black Sea coast. Scale bar = 1 mm.

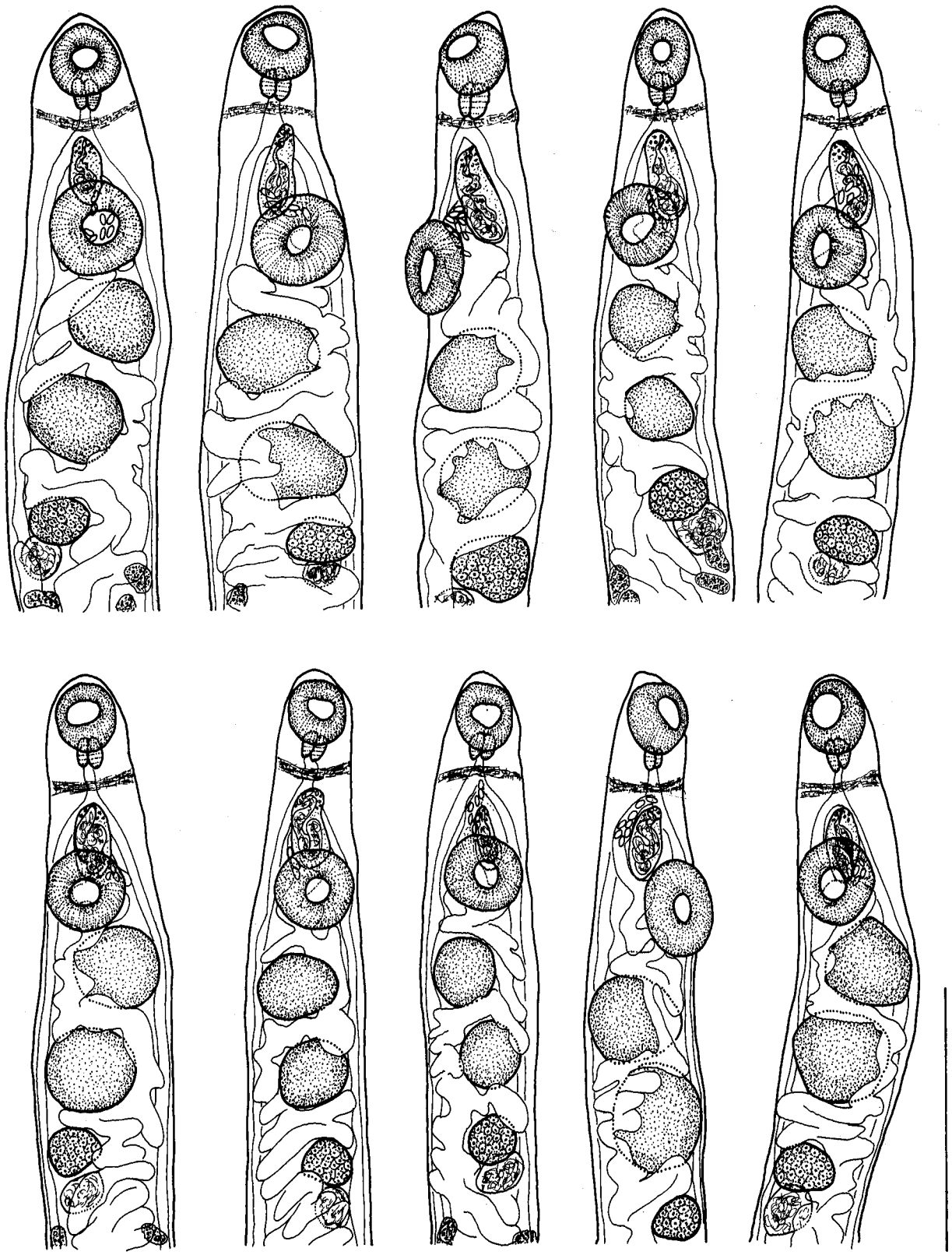

Fig. 2. *Brachylecithum microtesticulatum* Timon-David, 1955 from *Larus argentatus*, Bulgarian Black Sea coast. Variations in the relative size and position of the gonads. Scale bar = 500 μm.

Table 1. Measurements of mature *Brachylecithum microtesticulatum*.

	Present study					Bartoli and Mas-Coma 1989		Ukraine (n = 3)
Character	n	Range	Mean	SD	CV%	Range	Mean	Range
Body: length	28	2840–4060	3482	294	8.4	4548–6056	5245	3500–3720
width	28	290–470	377	50	13.2	319–595	468	330–450
Oral sucker: length	27	160–214	188	13	7.0	171–235	204	179–183
width	26	172–211	190	11	6.0	181–256	221	199–203
Pharynx: length	29	74–101	83	6	7.1	69–91	79	74–78
width	29	78–94	83	5	5.4	69–101	84	70–74
Oesophagus length	21	58–136	102	21	20.6	69–213	123	90–94
Ventral sucker: length	29	207–292	252	18	7.3	240–346	280	273
width	19	211–273	237	17	7.4	229–346	280	246–257
Anterior testis: length	28	199–304	242	27	11	91–453	205	195–254
width	28	148–351	255	41	15.9	144–373	225	234–254
Posterior testis: length	28	187–351	239	37	15.7	107–341	191	207–273
width	28	179–351	259	37	14.3	133–341	228	250–273
Cirrus-pouch: length	29	195–273	238	20	8.4	213–346	271	215–261
width	28	82–129	108	12	10.8	59–117	90	113–125
Ovary: length	27	125–179	146	12	8.4	160–267	224	101–176
width	27	117–226	176	27	15.4	187–256	229	160–183
Seminal receptacle: length	10	98–187	134	32	24.3	107–160	142	90–117
width	20	98–168	126	20	16.0	80–256	165	86–98
Mehlis gland: length	1	144	–	–	–	–	–	–
width	4	117–230	–	–	–	–	–	–
Eggs: length	34	35–43	39	2.3	5.9	35–43	39	34–41
width	34	20–23	21	1.3	6.2	17–25	21	19–25
Distance OS-VS	29	218–370	285	31	11.0	277–506	386	260–300
Distance VS-AT	28	0–140	48	38	81.1	85–336	202	51–117
Distance AT-PT	28	0–156	47	36	77.0	107–213	143	20–59
Distance PT-O	28	27–164	80	32	40.5	91–213	152	0–66
Forebody	29	430–580	482	30	6.3	489–701	594	470–500
Hindbody	28	2160–3211	2747	269	9.8	3761–5100	4378	2757–3270
Hindbody/Forebody	28	4.74–6.74	5.71	0.58	10.1	6.3–11.1	7.7	5.9
dVS/dOS	19	1.15–1.39	1.24	0.07	5.3	1.22–1.51	1.36	1.2–1.3
Area VS/OS	19	1.43–2.17	1.67	0.2	11.8	1.39–2.13	1.72	–
dPhar/dOS	26	0.39–0.47	0.44	0.02	5.0	0.34–0.45	0.38	0.35–0.36

Abbreviations: OS – oral sucker, VS – ventral sucker, AT – anterior testis, PT – posterior testis, O – ovary, d – diameter

L. cachinnans michaellis in Corsica (Bartoli and Mas-Coma 1989) revealed some differences which extend the knowledge of its intraspecific variability.

The Black Sea material is generally characterized by the smaller size of the body, hindbody, and the hindbody/forebody ratio, varying outside the range given for the Corsican population. The measurements of forebody, oral and ventral suckers, ovary, seminal receptacle, and the lengths of the oesophagus and cirrus-pouch of the Black Sea population exhibit variations within the lower range of the Corsican material, having mean values smaller than those given by Bartoli and Mas-Coma (1989). The distances (intersucker, intertestis, between ventral sucker and anterior testis, between posterior testis and ovary) also had considerably lower means.

Bartoli and Mas-Coma (1989) have shown that the use of the testes size (particularly as related to the ovary) as a taxonomic character for the species is doubtful. These authors reported testes larger than the ovary in 6 out of 17 specimens. The results of the present study confirm their suggestion (see Table 1 and Fig. 2). Although the ranges for testis size in the two sets show an overlap, the mean values in the Black Sea material are higher, and the testes are larger than ovary in all specimens.

The dissimilarities in the metrical features observed, however, cannot be considered great enough to separate the Mediterranean and Black Sea materials as distinct species, since the intraspecific variability (including the allometry effects) in *B. microtesticulatum* has to be further evaluated. At present the two sets of specimens are considered samples of two allopatric populations (Mediterranean and Black Sea) of *B. microtesticulatum*. This is the first record of *B. microtesticulatum* in the Black Sea region.

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