

Krzysztof ZDZITOWIECKI

*Parasitology*

DIGENETIC TREMATODES IN ALIMENTARY TRACTS OF FISHES  
OF SOUTH GEORGIA AND SOUTH SHETLANDS (ANTARCTICA)

PRZYWRY Z PRZEWODU POKARMOWEGO RYB Z OKOLIC POŁUDNIOWEJ GEORGII  
I POŁUDNIOWYCH SZETLANDÓW (ANTARKTYKA)

Research Centre of Parasitology,  
Polish Academy of Sciences, Warszawa

Digenetic trematodes were found in 30 fish individuals out of 46 examined from catches obtained off South Shetlands, while off South Georgia all 16 individuals examined were found to contain the parasites. The same 7 parasitic species were found in the two areas, *Elytrophalloides oatesi* (Leiper et Atkinson, 1914) prevailing off South Georgia and *Plagioporus pennelli* (Leiper et Atkinson, 1914) and *Genolinea bowersi* (Leiper et Atkinson, 1914) off South Shetlands. The remaining species included: *Lecithaster australis* Prudhoe et Bray, 1973; *Gonocerca phycidis* Manter, 1925; *Lepidapedon antarcticus* Byrd, 1963; and *Neolebouria georgiensis* Gibson, 1976. The descriptions of *L. antarcticus*, *L. australis* and *G. bowersi* are given along with a number of supplementary remarks concerning morphology of the remaining species found.

INTRODUCTION

The trematodes dealt with herein were collected by the author during the Polish Academy of Sciences' Antarctic Expedition, within the period of February – April 1977.

The complete list of hosts examined was published elsewhere (Zdzitowiecki, 1978). Off South Shetlands, 30 fish individuals (65%) out of 46 examined were found to contain trematodes, whereas all the 16 fishes examined off South Georgia were infested. The total number of 3471 trematode individuals belonging to 7 species were collected. Previous reports record 7 species off South Georgia (Kovaleva and Gaevskaya, 1974; Gibson, 1976) and 6 species off South Shetlands (Szidat and Graefe, 1967; Gibson, 1976).

## METHODS

Living trematodes removed from fish alimentary tracts were placed in fresh water for 1–2 hours, after which time those still alive were killed by heating the water. The animals were fixed in 75% ethyl alcohol, stained with alum carmine, alcohol-dehydrated, and mounted in creosote by gradually evaporating alcohol from the creosote-alcohol mixture (1:4 original ratio). Permanent mounting in Canada balsam proved unsuccessful, morphology of trematodes was therefore examined on temporary creosote mounts. No pressure was applied to flatten the trematodes.

## DESCRIPTIONS

*Plagioporus pennelli* (Leiper et Atkinson, 1914)

*Synonyms*: *Podocotyle pennelli* Leiper et Atkinson, 1914; *Plagioporus pennelli georgianus* Kovaleva et Gaevskaya, 1974.

Hosts and invasion intensity: see Table 1. The maximum intensity found was 105 individuals (in *Notothenia corriceps neglecta*). *Pleurogramma antarctica* and *Chaenocephalus aceratus* are new hosts.

Location: typical for the *P. pennelli* location are pyloric caeca and, frequently, anterior part of small intestine, only 2 individuals being revealed in its posterior part and 1 in large intestine.

Adult parasites were being found throughout the period of study, i.e., from February through April 1977.

Number of individuals examined: 669.

Remarks. Morphology and size of the trematodes correspond to the data found in literature (Leiper and Atkinson, 1914, 1915; Byrd, 1963; Gibson, 1976; and others). Gonads most frequently form a compact group, vitellaria covering the entire dorsal and lateral parts of the body. Some individuals show their gonads set more or less far apart. In many, vitellaria are less well-developed, sometimes giving the impression of being divided into 2–3 zones, with loosely-packed vesicles. In view of an extensive variability of those characters, the author sees no grounds for separating a subspecies, *P. pennelli georgianus*. The author's collection includes individuals identical with or to a varying degree approaching the subspecies description given by Kovaleva and Gaevskaya (1974).

A certain variability in the range of bursa cirri was found. Its proximal end is usually situated dorsally relative to the ventral sucker centre; some individuals, however, show a more posterior location, sometimes even beyond the posterior edge of ventral sucker.

Table 1

## Occurrence of trematodes off South Shetlands and South Georgia

Area	Host	Examined	Infested (mean intensity) with						
			<i>P. pen- nelii</i>	<i>N. geor- giensis</i>	<i>L. antar- cticus</i>	<i>E. oatesi</i>	<i>L. aus- tralis</i>	<i>G. bower- si</i>	<i>G. phy- cidis</i>
South Shetlands	<i>Notothenia corriceps neglecta</i> Nybelin, 1951	11	11 (37)	—	1 (1)	2 (1)	1 (1)	8 (19)	—
	<i>Notothenia rossi marmorata</i> Fischer, 1885	11	11 (21)	—	2 (1)	1 (19)	1 (1)	7 (18)	—
	<i>Notothenia gibberifrons</i> Lönnberg, 1905	9	—	—	1 (1)	—	—	1 (1)	—
	<i>Notothenia nudifrons</i> Lönnberg, 1905	5	—	—	—	—	—	1 (1)	—
	<i>Trematomus bernacchii</i> Boulenger, 1902	3	1 (1)	—	—	—	—	1 (9)	—
	<i>Pleurogramma antarctica</i> Boulenger, 1902	2	1 (2)	—	—	—	—	1 (7)	—
	<i>Chaenocephalus aceratus</i> (Lönnberg, 1906)	3	1 (4)	1 (1)	—	2 (4)	1 (1)	2 (18)	1 (2)
	Total	44	25 (26)	1 (1)	4 (1)	5 (6)	3 (1)	21 (16)	1 (2)
South Georgia	<i>Notothenia rossi marmorata</i> Fischer, 1885	5	4 (8)	—	1 (12)	5 (82)	2 (7)	5 (17)	—
	<i>Notothenia gibberifrons</i> Lönnberg, 1905	1	—	—	—	1 (4)	—	—	—
	<i>Trematomus hansonii</i> Boulenger, 1902	1	—	—	—	1 (67)	—	—	—
	<i>Parachaenichthys georgianus</i> (Fischer, 1885)	2	—	2 (2)	—	2 (19)	—	1 (4)	1 (1)
	<i>Chaenocephalus aceratus</i> (Lönnberg, 1906)	3	—	3 (5)	—	3 (38)	1 (2)	—	3 (2)
	<i>Champsocephalus gunnari</i> Lönnberg, 1905	1	—	—	—	1 (20)	—	—	—
	<i>Pseudochaenichthys georgianus</i> Norman, 1937	3	—	3 (7)	—	3 (533)	1 (1)	—	3 (5)
	Total	16	4 (8)	8 (5)	1 (12)	16 (141)	6 (15)	4 (4)	7 (3)

All the hitherto-available data on the species were collected in the Antarctica: in most subcontinental provinces (Leiper and Atkinson, 1914, 1915; Byrd, 1963; Szidat, 1965; Prudhoe and Bray, 1973, Gibson, 1976) and off South Shetlands (Szidat and Graefe, 1967). Additionally, the species was recorded in the South Georgia province (Kovaleva and Gaevskaya, 1974; Gibson, 1976). The final hosts are the *Notothenioidae*, mainly the family *Nototheniidae*, and also *Zoarcidae*.

*Neolebouria georgiensis* Gibson, 1976

Hosts and invasion intensity: see Table 1. The maximum intensity recorded was 13 individuals (in *Pseudochaenichthys georgianus*). *Ps. georgianus* is a newly-found host.

Location: entire length of intestine from pyloric caeca to large intestine, one individual being found in stomach.

Dates of findings: March 24, 1977 (off South Shetlands); April 1–4, 1977 (off South Georgia).

Number of individuals examined: 39.

Remarks. Morphology of the material on hand is in complete accordance with the original description (Gibson, 1976). Egg dimensions show a somewhat larger variability range: 0.087–0.106 x 0.039–0.054 mm.

Gibson (1976) described the trematodes in fishes caught off South Georgia. An individual found by the present author in *Chaenocephalus aceratus* off South Shetlands is the first to be found in the subcontinental province. However, the species seems to be mainly characteristic of the South Georgia province. The hosts known so far are restricted to three species of the *Bathydraconidae* and *Chaenichthyidae*

*Lepidapedon antarcticus* Byrd, 1963

Synonyms: *Lepocreadium trullaeforme* Linton, 1940 sensu Szidat (1965) and Szidat and Graefe (1967) nec sensu Linton (1940).

Hosts and invasion intensity: see Table 1. The maximum intensity found was 12 individuals (in *Notothenia rossi marmorata*). *Notothenia rossi marmorata* and *N. gibberifrons* proved new hosts.

Location: Mature and juvenile individuals in the second half of small intestine, juveniles also in large intestine.

Dates of findings: February 8 and March 3, 1977 (off South Shetlands); April 2, 1977 (off South Georgia).

Number of individuals examined: 4 mature individuals (off S. Shetlands) 1 mature and 11 juvenile individuals (off South Georgia).

Description (all measurements taken from mature individuals). Oval body measuring 1.31–1.73 x 0.403–0.575 mm. Cuticle covered with fine spines extending ventrally to about 3/4 and dorsally to the half of body length. Subterminal oral sucker measuring

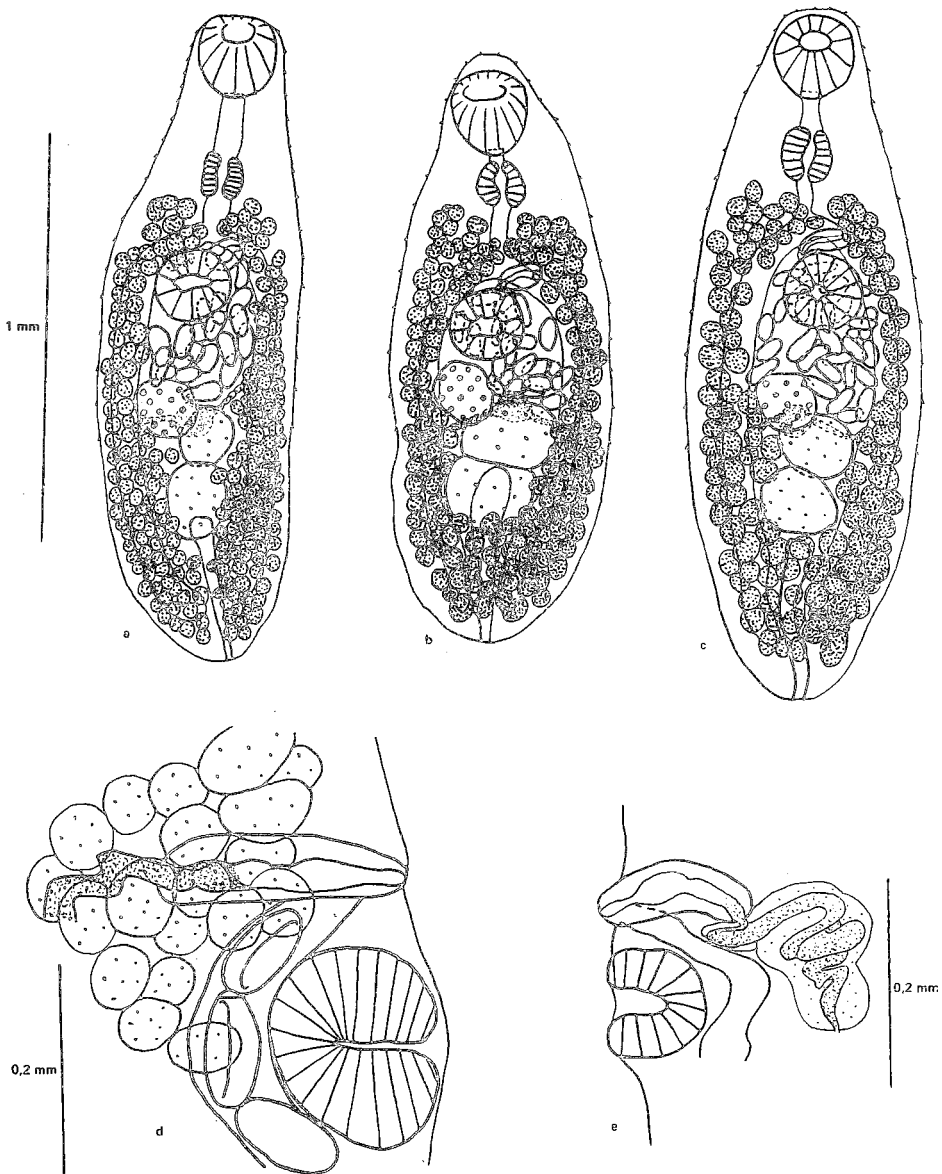


Fig. 1. *Lepidapedon antarcticus*. a–c. Individuals found off South Shetlands, total (ventral) view: a – an individual from *N. gibberifrons*, b – an individual from *N. rossi marmorata*, c – an individual from *N. corriceps neglecta*. d – an individual from *N. rossi marmorata* off South Shetlands, side view: region of bursa cirri covered by vitellaria. e – an immature individual from *N. rossi marmorata* off South Georgia, side view: region of bursa cirri

140–220 x 138–210  $\mu\text{m}$ . Pharynx dimensions: 87–137 x 91–133  $\mu\text{m}$ . Praepharynx well-developed, in some individuals contracted (minimum length of 30  $\mu\text{m}$ ), in others clearly longer than pharynx (maximum length of 145  $\mu\text{m}$ ). Esophagus 60–90  $\mu\text{m}$  long. Intestine bifurcates just before ventral sucker, caeca extending to the posterior body region. Dimensions of ventral sucker: 130–199 x 138–193  $\mu\text{m}$ . Oral/ventral sucker size ratio of 1:0.91–1:1.04 (mean ratio of 1:0.97); oral sucker size (pharynx length ratio of 1:0.61–1:0.67 (mean of 1:0.64). Ventral sucker centre located at 38–47% (mean of 43%) of body length.

Ovary situated ventrally at the right side of the body behind ventral sucker. Ovary dimensions: 111–202 x 105–161  $\mu\text{m}$ . Testes arranged one behind the other, the anterior one partly covered, at dorsal side, by ovary. Anterior testis dimensions: 150–217 x 137–254  $\mu\text{m}$ ; posterior testis measuring 167–233 x 136–255  $\mu\text{m}$ . Seminal and vitellary receptacles dorsal relative to ovary and anterior testis. Vitellaria at either body side. Both stripes of vitellaria fuse in the posterior part of the body behind testes and dorsally in the anterior part near esophagus and the area of intestinal bifurcation. Uterus containing a low number (20–30) of eggs is situated before gonads, dorsally relative to ventral sucker. Genital atrium placed before ventral sucker and to the left from the body axis. Bursa cirri extends somewhat obliquely towards the dorsal side. Bursa cirri measurements (as measured on a side view of trematodes): 167–235 x 105–125  $\mu\text{m}$ . Past bursa cirri and dorsally relative to ventral sucker there is convoluted external seminal vesicle surrounded by a membranous sac; this region, however, is ill-visible, being obscured by ventral sucker, vitellaria, and eggs in uterus. Eggs measuring 83–130 x 48–66  $\mu\text{m}$ . Excretory pore at the end of the body. Excretory vesicle terminates near posterior testis.

Remarks. Two species of the genus *Lepidapedon* have been described in Antarctic fishes: *L. garrardi* (Leiper et Atkinson, 1914) and *L. antarcticus* Byrd, 1963, the latter description only (Byrd, 1963) being considered satisfactory. According to Prudhoe and Bray (1973), the two species differ in egg dimensions and sucker size ratios. Leiper and Atkinson (1914, 1915) gave the *L. garrardi* egg length as 100  $\mu\text{m}$ , but Prudhoe and Bray (1973) stated the range of 142–170  $\mu\text{m}$  for the same individuals and 137–156  $\mu\text{m}$  for the newly-found ones. The egg length of *L. antarcticus*, as measured by Byrd (1963), was 109–148  $\mu\text{m}$ , the data of Prudhoe and Bray (1973) indicating the range of 95–118  $\mu\text{m}$ . Prudhoe and Bray (1973) are of the opinion that Byrd's (1963) data could have been derived from individuals belonging to both species. Those authors indicate the *L. antarcticus* ventral sucker to be the larger one (the ratio of 1:1–1:3), whereas the oral sucker is the larger one in *L. garrardi* (the ratio of 1:0.7–1:0.96). Those individuals found by the present author occupy an intermediate position with regard to their sucker size ratios and basically correspond with the description of *L. antarcticus* with respect to their egg size. It should be, however, emphasised that the latter character exhibits a variability range larger than that given by Prudhoe and Bray (1973). Great differences in egg sizes occur both between various individuals and between eggs in one individual's uterus. The present author's material showed egg length varying from 83–90  $\mu\text{m}$  to 112–130  $\mu\text{m}$ .

The author temporarily denotes his material as *L. antarcticus*, although in his opinion *L. antarcticus* and *L. garrardi* are very likely to be the same species.

In *Notothenia neglecta* and *Parachaenichthys charcoti* off South Orkneys, South Shetlands and Melchior Archipelago, Szidat (1965) and Szidat and Graefe (1967) found trematodes which they identified as *Lepocreadium trullaeforme* Linton, 1940 (sic, *L. trullaeforme* being the name given by Linton (1940)). Both the descriptions and figures given by Szidat (1965; Figs. 10 and 11) and Szidat and Graefe (1967; Fig. 3) fail to show a number of important characters. However, the arrangement of testes as described by Szidat (1965) and Szidat and Graefe (1967) is completely different from that shown by Linton (1940; Figs. 53–56). According to Linton (1940), egg length is larger than ventral sucker diameter, the number of eggs in uterus not exceeding 10. Linton's (1940) materials were collected off the eastern coasts of the USA, The Antarctic trematodes, according to Szidat and Graefe (1967; Figs. 3–14) produce a larger number of eggs, the length of which being clearly smaller than ventral sucker diameter. Basing on the presently-described material the author suggests *Lepocreadium trullaeforme* sensu Szidat and Szidat and Graefe nec *L. trullaeforme* Linton to be identical with *Lepocreadium antarcticus*. A part of the author's material was collected in the same region and from the same (*N. corriceps neglecta*) and related fish species. A final decision as to the specific identification of the trematodes in question cannot be reached until Szidat's and Szidat and Graefe's materials are re-checked in order to compare the structure of vas deferens.

*Elytrophalloides oatesi* (Leiper et Atkinson, 1914)

Synonyms: *Hemiurus oatesi* Leiper et Atkinson, 1914; *Parahemiurus oatesi* Leiper et Atkinson, 1914; *Elytrophalloides merlucii* Szidat 1955.

Hosts and invasion intensity: see Table 1. The maximum intensity found was 583 individuals (in *Pseudochaenichthys georgianus*). *P. georgianus*, *Champsocephalus gunnari*, *Notothenia corriceps neglecta* and *N. gibberifrons* are newly-found hosts.

Location: Stomach. In mass invasion also mouth cavity, gills, pyloric caeca, and proximal small intestine.

Dates of findings: March 1977 (off South Shetlands); April 1–5, 1977 (off South Georgia).

Number of individuals examined: 2279.

Remarks: Morphology of the trematodes is in complete accordance with the literature data (Gibson, 1976; and others). Body size and ecsoma length variable, ecsoma occupying from several per cent to almost half the overall body length. Ecsoma may contain excretory vesicle only or additionally ends of caeca and a part of uterus with eggs.

According to Gibson (1976), *E. oatesi* is the commonest and most frequently mentioned trematode in the Antarctic, and partly sub-Antarctic, fishes, found mainly in the *Notothenioidei* and other teleosts. The present author's own data indicate the *Chaenichthyidae* to be principal hosts, most frequently and most intensively attacked, in the area studied. The parasites are extremely common off South Georgia (all the

individuals examined proved infested); their occurrence off South Shetlands seems to be less common.

*Lecithaster australis* Prudhoe et Bray, 1973

Hosts and invasion intensity: see Table 1. The maximum intensity recorded was 7 individuals (in *Notothenia rossi marmorata*). *Pseudochaenichthys georgianus* is a newly-found host.

Location: small and large intestine.

Dates of findings: March 1977 (off South Shetlands); April 1–5, 1977 (off South Georgia).

Number of individuals examined: 19, out of which 11 mature ones were measured.

Description: Size of the South Georgia individuals: 1.78–3.13 x 0.47–1.09 mm, the largest trematodes being found in *Ps. georgianus* and *Ch. aceratus*. The South Shetlands individuals were, on the average, much smaller: 1.32–1.90 x 0.56–0.72 mm. Oral sucker subterminal, sometimes almost terminal, measuring 176–277 x 104–303  $\mu\text{m}$ . Ventral sucker measuring 272–549 x 348–571  $\mu\text{m}$ , its centre located at 30–42% (average of 37%) of body length. Oral/ventral sucker length ratio ranges within 1:1.53–1:1.79 (mean of 1:1.64). Pharynx dimensions: 119–192 x 103–108  $\mu$ . Oral sucker/pharynx size ratio ranges from 1:0.45 to 1:0.60 (mean of 1:0.52). Esophagus 155  $\mu\text{m}$  long at the most, not always visible. Caeca terminate at some distance from body end.

Genital atrium located along the body axis and ventrally relative to pharynx and intestine bifurcation. Hermaphroditic sac measuring 128–324 x 65–123  $\mu\text{m}$  (as measured on laterally arranged individuals) runs dorsally or towards the posterior. Male and female ducts fuse into a hermaphroditic one immediately after entering the sac. Pars prostacica long, ca 3–4 times longer than the sac; it extends dorsally towards the posterior. Seminal vesicle, measuring 230–518 x 134–253  $\mu\text{m}$  lies dorsally relative to ventral sucker, usually at least in part behind it, closer to one or the other side. Testes, measuring 163–464 x 140–482  $\mu\text{m}$ , situated ventro-laterally, symmetrically or obliquely, behind ventral sucker. Ovary consists of 4 follicular lobes and lies ventrally directly behind testes. Overall dimensions of ovary are 230–536 x 273–610  $\mu\text{m}$ . Receptaculum seminis, hardly visible, extends dorsally to ovary and measures 192–446 x 126–318  $\mu\text{m}$ . Vitellarium consists of 7 (seldom of 6 or 8) slightly elongated follicular lobes arranged radially; it is placed directly behind ovary. Total dimensions of vitellarium: 241–733 x 268–663  $\mu\text{m}$ . Uterus, situated dorsally and laterally to gonads and posterior part of ventral sucker, may – in those individuals with the highest number of eggs – surround the first. The terminal portion of uterus extends dorsally relative to seminal vesicle and pars prostatica, and opens to hermaphroditic sac. Eggs numerous. Mature eggs measure 23–30 x 14–20  $\mu\text{m}$ , immature eggs being smaller (ca 20  $\mu\text{m}$ ).

Excretory pore at the end of the body, some individuals having it on a top of a small protrusion. Excretory system Y-shaped, bifurcating at a point near ovary; the branches thus formed extend, in a waving manner, along the body sides closer to the ventral side,





being then directed to the dorsal part before reaching ventral sucker. Their terminal parts were not observed.

Remarks: The parasite's body structure and dimensions correspond to data given Prudhoe and Bray (1973) and Gibson (1976). No differences were observed between the South Georgia and South Shetlands trematodes, except for larger size of those individuals from the first area. Szidat and Graefe (1967) described yet another species, *L. macrocotyle* Szidat and Graefe, 1967 from off South Shetlands. The present author agrees with Gibson (1976) as to the presumed identity of the two species. The synonymy cannot be, however, fully confirmed in view of smaller eggs (18  $\mu\text{m}$ ) and a different host (*Parachaenichthys charcoti*). In order to solve the problem, the typical material must be re-checked or at least materials from a typical host should be obtained.

The parasite is known exclusively from the Antarctica. Prudhoe and Bray (1973) and Gibson (1976) were finding those trematodes in various *Notothenioides* of the Kerguelen sub-area and the South Georgia province. The region off South Shetlands is the only area known to house those parasites in the subcontinental province.

*Genolinea bowersi* (Leiper et Atkinson, 1914)

Synonyms: *Aponurus bowersi* Leiper et Atkinson, 1914; *Genolinea leiperi* Byrd, 1963; *Genarches lintoni* Szidat et Graefe, 1967; *Derogenes parvus* Szidat, 1950 sensu Szidat 1965 nec sensu 1950.

Hosts and invasion intensity: see Table 1. The maximum intensity found was 96 individuals (in *N. rossi marmorata*). *Notothenia gibberifrons*, *N. nudifrons*, *Pleurogramma antarctica*, *Parachaenichthys georgianus* and *Chaenocephalus aceratus* are newly-found hosts.

Location: stomach.

Number of individuals examined: 426.

Description: Body dimensions: 1.11–2.02 x 0.285–0.579 mm. Dimensions of subterminal oral sucker: 135–183 x 143–208  $\mu\text{m}$ ; dimensions of ventral sucker 214–198 x 213–320  $\mu\text{m}$ . Oral/ventral sucker size ratio 1:1.35–1:1.78 (mean of 1:1.54). Ventral sucker centre at 27–42% (35% on the average) of body length. Pharynx dimensions: 71–119 x 87–127  $\mu\text{m}$ . Oral sucker/pharynx size ratio is 1:0.55–1:0.72 (mean of 1:0.63). Esophagus short, 55  $\mu\text{m}$  long at the most. Caeca extend to the posterior body region.

Genital atrium near the body axis just behind pharynx. Hermaphroditic sac curved bow-like, measuring 128–199 x 54–90  $\mu\text{m}$  (as measured on laterally arranged individuals). The sac may be retracted into the body; sinus-organ sometimes everted. Just behind the sac extends pars prostatica passing into long and coiled seminal vesicle situated dorsally relative to ventral sucker. Anterior and posterior testes, measuring 107–204 x 104–280 and 128–205 x 145–277  $\mu\text{m}$ , respectively, are situated obliquely just behind ventral sucker. Two vitellaria arranged one behind the other, sometimes slightly obliquely, just behind ovary. Dimensions of anterior and posterior vitellaria are 83–212 x 153–321 and 79–162 x 134–250  $\mu\text{m}$ , respectively. Receptaculum seminis

measuring 110–250 x 73–278  $\mu\text{m}$  located at the dorsal side. The region of ootype and Mehlis glands between ovary and anterior vitellarium. Uterus, at first running towards the posterior body region, past vitellaria turns to the anterior and opens into hermaphroditic sac. At its base uterus fuses with male duct to form hermaphroditic duct. Eggs very numerous, measuring 33–39 x 15–18  $\mu\text{m}$ . Excretory pore at the end of the body.

Remarks: *G. bowersi* was found to occur in all the Antarctic provinces (Leiper and Atkinson, 1914, 1915; Byrd, 1963; Szidat, 1965, Szidat and Graefe, 1967; Prudhoe and Bray, 1973). These parasites are presumably more common than it has been generally thought. The trematodes attach themselves tightly to fish stomach walls, becoming thus difficult to be seen against this background. Therefore – when collected in the field by non-helminthologists as is frequently the case during various Antarctic expeditions – they could have been easily overlooked.

*Gonocerca phycidis* Manter, 1925

Synonym: *Gonocerca trematomi* Byrd, 1963

Hosts and invasion intensity: see Table 1. The maximum intensity found was 9 individuals (in *Pseudochaenichthys georgianus*). *Ps. georgianus* and *Parachaenichthys georgianus* are the newly-found hosts.

Location: stomach, mouth cavity, gills.

Dates of findings: March 4, 1977 (off South Shetlands); April 1–5, 1977 (off South Georgia).

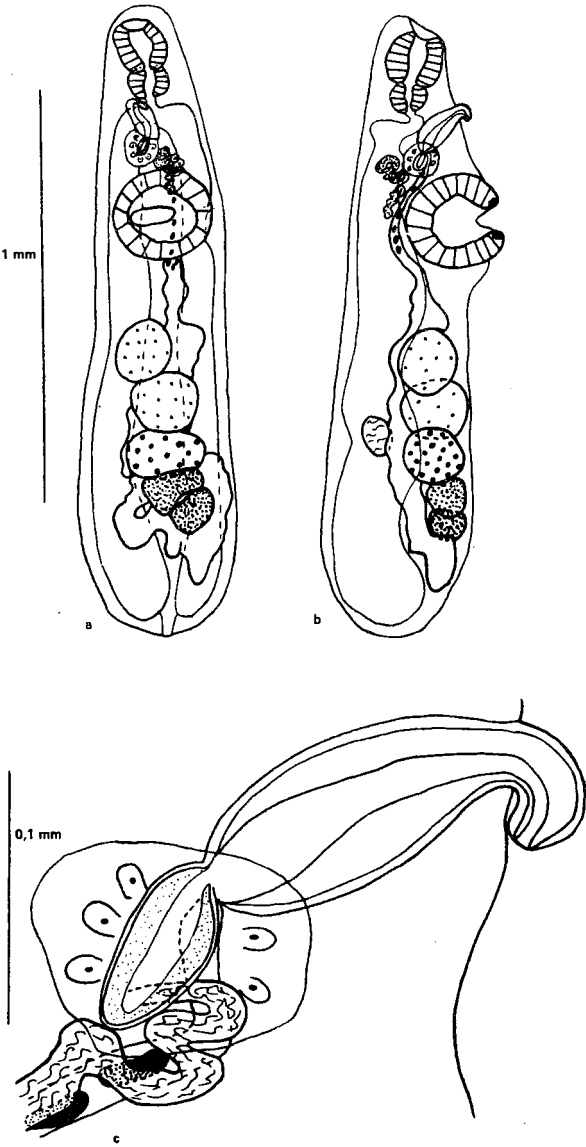
Number of individuals examined: 23, out of which 14 were measured.

Dimensions: Body size 2.69–6.34 x 0.56–1.10 mm; orae sucker 320–600 x 340–630  $\mu\text{m}$ ; pharynx 120–210 x 120–220  $\mu\text{m}$ ; ventral sucker 470–880 x 490–900  $\mu\text{m}$ ; ovary 250–510 x 240–460  $\mu\text{m}$ ; right vitellarium 240–520 x 180–380  $\mu\text{m}$ ; left vitellarium 270–530 x 200–420  $\mu\text{m}$ ; anterior testis 280–840 x 350–720  $\mu\text{m}$ . Distance between genital pore and seminal vesicle proximal end (as measured on laterally arranged trematodes) 350–950  $\mu\text{m}$ . Breadth of seminal vesicle 110–300  $\mu\text{m}$ .

Situation of ventral sucker centre: 55–69% (59% on the average) of body length. Oral sucker/pharynx size ratio 1:0.27–1:0.36 (mean of 1:0.33); oral/ventral sucker size ratio 1:1.31–1:1.65 (mean of 1:1.46).

Remarks: The trematodes body structure and dimensions correspond to the literature data collected from Antarctic and New Zealand individuals (Manter, 1954; Byrd, 1963; Prudhoe and Bray, 1973; Gibson, 1976). Vitellaria usually follicular, somewhat lobed in some instances and in two cases clearly divided into two lobes, which is indicative of a negligible importance of vitellaria lobation as diagnostic character for the genus *Gonocerca*. A slightly wider range of egg size variability was observed.

*G. phycidis* was originally described from the northern hemisphere (Manter, 1925); the species is the only trematode in the present author's collection, occurring also beyond the Antarctica and Sub-antarctica. The present is the first finding of *G. phycidis* off South Shetlands.



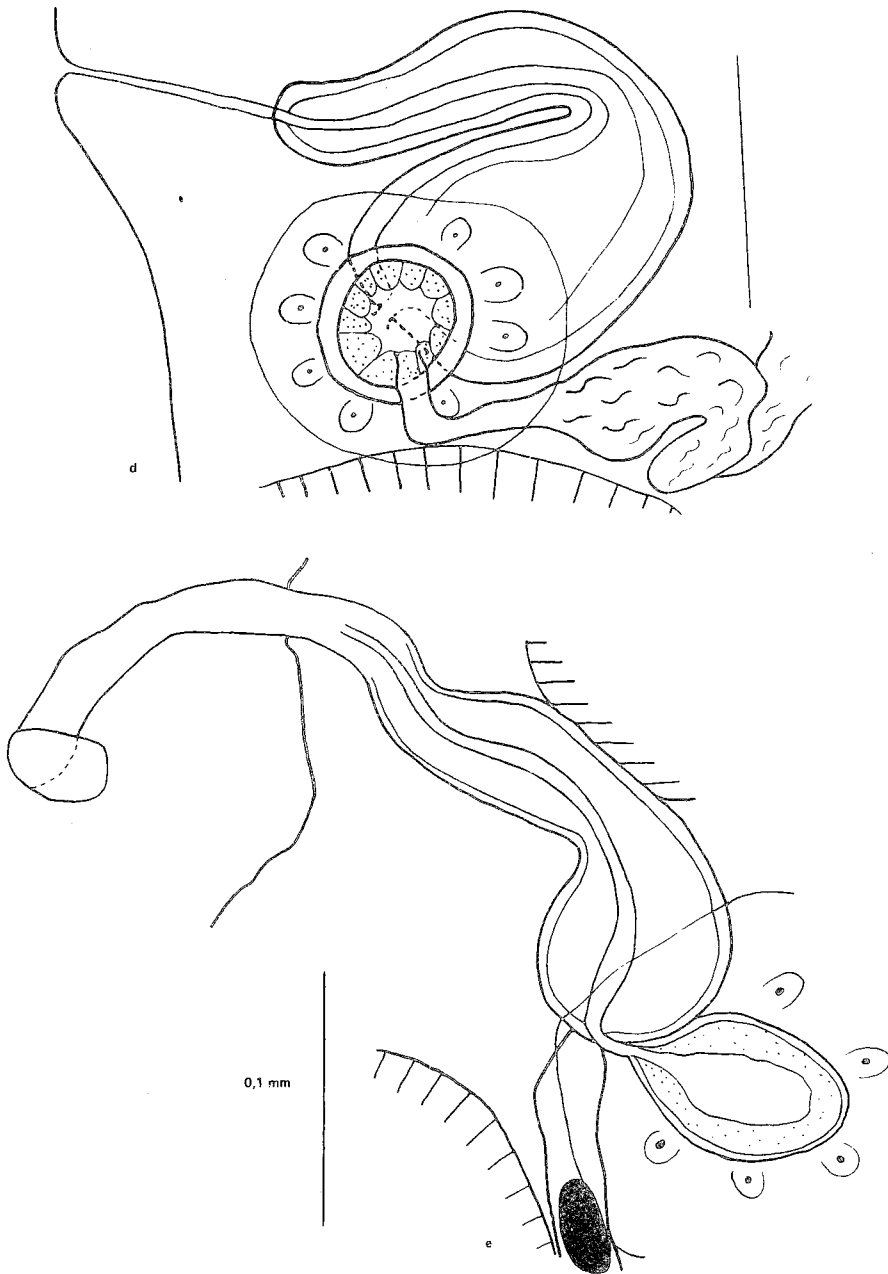


Fig. 3. *Genolinea bowersi* found off South Shetlands. a, b – an individual from *T. bernacchi*, ventral and side view, respectively. c – e: side view of hermaphroditic sac area: c – the individual from *T. bernacchi*, d – an individual from *N. rossi marmorata*, e – an individual from *N. corriceps neglecta*

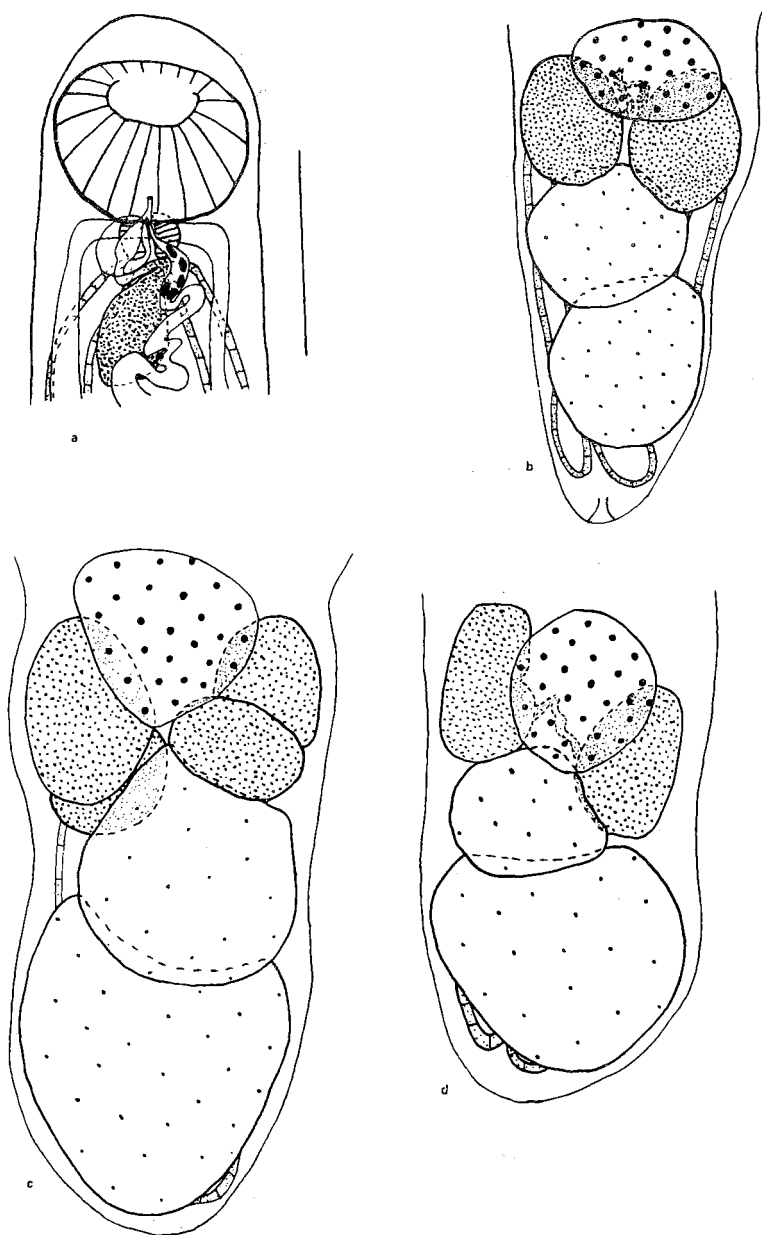


Fig. 4. *Gonocerca phycidis*, ventral view. a, b: an individual from *Par. georgianus* off South Georgia: a – anterior part of the body, b – region of gonads, c, d – region of gonads: c – an individual from *Ch. aceratus* off South Shetlands, d – an individual from *Px. georgianus* off South Georgia

## RECAPITULATION

The same 7 trematode species were found in the two areas studied. On the other hand, when the per cent incidence, invasion intensity, and literature data are taken into account, the three following species: *L. antarcticus*, *P. pennelli*, and presumably *G. bowersi* seem to be characteristic mainly of subcontinental waters. *N. georgiensis* typical of the South Georgia province, while *L. australis* is characteristic of both the Kerguelen sub-area and South Georgia province. The distribution ranges of *E. oatesi* and *G. phycidis* extend beyond the Antarctica, the two species being seemingly rarer in the subcontinental province than in the remaining ones.

The parasites new for the region off South Georgia were: *L. antarcticus* and *G. bowersi*. Off South Shetlands, *N. georgiensis*, *G. phycidis*, and *L. australis* (inasmuch as it differs from *L. macrocotyle*) were recorded for the first time. *E. oatesi* predominate off South Georgia, while *P. pennelli* and *G. bowersi* are the dominants off South Shetlands.

Three species: *E. oatesi*, *G. bowersi*, and *G. phycidis* occur mainly in stomachs, *P. pennelli* being found primarily in pyloric caeca. Two species, *L. antarcticus* and *L. australis* occur mainly in the distal part of small intestine. *N. georgiensis* was found to have been rather evenly distributed along the whole length of intestine.

## ACKNOWLEDGMENTS

The author gratefully acknowledges the help rendered to him by the Head of the Expedition, all the colleagues, as well as by the Captain and crew of MT Dalmor in the collecting of materials; particular thanks are due to Dr C. Żukowski, Mr P. Presler M.Sc., Mr K. Zubek M.Sc., and Mr A. Skowroński, the boatswain. The author wishes to thank Dr J.M. Rembiszewski for identifying the fishes examined.

## REFERENCES

- Byrd M.A., 1963: Helminth Parasites of Antarctic Vertebrates. Part I. Digenetic Trematodes of Marine Fishes. — Proc. Helminth. Soc. Wash., 30: 129–148.
- Gibson D.I., 1976: Monogenea and Digenea from fishes. — "Discovery" Rep., 36: 179–266.
- Kovaleva A.A., Gaevskaja A.V., 1974: Novye predstaviteli Plagioporus (Trematoda, Opecoelidae) ot ryb Antarktiki. — Zool. Zh., 53: 1407–1409.
- Leiper R.T., Atkinson E.L., 1914: Helminthes of the British Antarctic Expedition, 1910–1913. — Proc. zool. Soc. Lond., 1: 222–226.
- Leiper R.T., Atkinson E.L., 1915: Parasitic worms with a note on a free-living nematode. — Nat. Hist. Rep. Br. Antarct. Terra Nova Exped., Zool., 2: 19–60.
- Linton E., 1940: Trematodes from fishes mainly from the Woods Hole region, Massachusetts. — Proc. U.S. Nat. Mus., 88: 1–172.
- Manter H.W., 1925: Some marine fish trematodes of Maine. — J. Parasit., 12: 11–18.
- Manter H.W., 1954: Some digenetic trematodes from fishes of New Zealand. — Trans. R. Soc. N.Z., 82: 475–568.

- Prudhoe S., Bray R.A., 1973: Digenetic trematodes from fishes. — Rep. B.A.N.Z. antarct. Res. Exped., ser. B, 8: 195–225.
- Szidat L., 1965: Estudios sobre la fauna de parasitos de peces antarticos. I. Los parasitos de *Notothenia neglecta* Nybelin. — Servicio de Hidrografia Naval, Secretaria de Marina, Republica Argentina, Publico H, 910: 1–84.
- Szidat L., Graefe G., 1967: Estudios sobre la fauna de parasitos de peces antarticos. II. Los parasitos de *Parachaenichthys charcoti*. — Servicio de Hidrografia Naval, Armada Argentina, Republica Argentina, Publico H, 911: 1–27.
- Zdzitowiecki K., 1978: Occurrence of juvenile forms of Acanthocephala from the genus *Corynosoma* Lühe, 1904 in fishes off South Georgia and off the South Shetlands (Antarctic). — Acta Ichthyologica et Piscatoria, 8:

Translated: mgr Teresa Radziejewska

## PRZYWRY Z PRZEWODU POKARMOWEGO RYB Z OKOLIC POŁUDNIOWEJ GEORGII I POŁUDNIOWYCH SZETLANDÓW (ANTARKTYKA)

### Streszczenie

Badano przywry z przewodu pokarmowego ryb zebrane w czasie Ekspedycji Antarktycznej Instytutu Ekologii PAN w okresie luty – kwiecień 1977 r. W okolicach Południowych Szetlandów na 46 zbadanych ryb zarażonych przywrami było 30 (65%), a w okolicach Południowej Georgii przywry stwierdzono we wszystkich 16 zbadanych rybach. Na obu terenach występowało te same 7 gatunków pasożytów. W okolicach Południowej Georgii gatunkiem dominującym był *Elytrophalloides oatesi* (Leiper et Atkinson, 1914) występujący głównie w żołądku. W okolicach Południowych Szetlandów najczęstsze były *Plagioporus pennelli* (Leiper et Atkinson, 1914) zasiedlający głównie wyrostki pyloryczne i *Genolinea bowersi* (Leiper et Atkinson, 1914), występująca tylko w żołądku. Ponadto stwierdzono jeszcze 1 gatunek żołądkowy, *Gonocerca phycidis* Manter, 1925, i 3 gatunki jelitowe, *Neolebouria georgiensis* Gibson, 1976, *Lepidapedon antarcticus* Byrd, 1963 i *Lecithaster australis* Prudhoe et Bray, 1973. Spośród powyższych gatunków *N. georgiensis*, *L. australis* i *G. phycidis* nie były dotychczas znajdowane w okolicach Południowych Szetlandów, a 2 inne gatunki, *L. antarcticus* i *G. bowersi*, są nowymi elementami fauny okolic Południowej Georgii.

Na podstawie własnych badań i danych z piśmiennictwa autor sądzi, że 3 gatunki przywr, *L. antarcticus*, *P. pennelli* i chyba *G. bowersi*, występują głównie w prowincjach subkontynentalnych oraz rzadko w pozostałych prowincjach Antarktyki. Z kolei *N. georgiensis* i *L. australis* są charakterystyczne raczej dla niższych szerokości geograficznych (subregion Kerguelen i prowincja Południowa Georgia), przy czym *N. georgiensis* znany tylko z półkuli zachodniej. Zasięg *E. oatesi* i *G. phycidis* wykracza poza Antarktykę.

Zamieszczono opisy 3 gatunków, *L. antarcticus*, *L. australis* i *G. bowersi*, oraz uwagi i uzupełnienia dotyczące pozostałych.

К. Здитовецки

## ТРЕМАТОДЫ ИЗ ПИЩЕВАРИТЕЛЬНОГО ТРАКТА РЫБ РАЙОНА ЮЖНОЙ ГЕОРГИИ И ИЖАННЫХ ШЕТЛАНДСКИХ ОСТРОВОВ (АНТАРКТИКА)

### Резюме

Исследованы трематоды из пищеварительного тракта рыб, собранные во  
времены антарктической экспедиции Института Экологии РАН за период фев-



раль-апрель 1977 года. В районе южных Шетландских островов среди 46 исследованных рыб, зараженных трематодами, было 30 (65%), а в районе южной Георгии обнаружены трематоды у всех исследованных рыб (16). На обеих территориях находились те же 7 видов паразитов. В районе южной Георгии доминирующим видом был *Elytrophalloides oatesi* (Leiper et Atkinson, 1914), выступающий главным образом в желудке. В районе южных Шетландских островов наиболее часто находили *Plagioporus pennelli* (Leiper et Atkinson, 1914), заселяющий главным образом пилорические отростки, и *Genolinea bowersi* (Leiper et Atkinson, 1914), выступающий только в желудке. Кроме того, найден ещё один вид, появляющийся в желудке - *Gonocerca phycidis* Manter, 1925 - и 3 вида, выступающие в кишечнике - *Neolebouria georgiensis* Gibson, 1976, *Lepidapeon antarcticus* Byrd, 1963 и *Lecithaster australis* Prudhoe et Bray, 1973. Среди вышеуказанных видов *N. georgiensis*, *L. australis* и *G. phycidis* до сих пор не находили в районе южных Шетландских островов, а 2 других вида - *L. antarcticus* и *G. bowersi* - являются новыми элементами фауны р-на южной Георгии.

На основании собственных исследований и литературных данных автор предполагает, что 3 вида трематод - *L. antarcticus*, *P. pennelli* и, возможно, *G. bowersi* - находятся главным образом в субконтинентальных областях, а редко в остальных областях Антарктики. В свою очередь *N. georgiensis* и *L. australis* являются характерными для более низких географических широт (субрегион Kerguelen и область южной Георгии), при этом о *N. georgiensis* известно только из западного полушария. Диапазон *E. oatesi* и *G. phycidis* выходит за пределы Антарктики.

Помещено описание 3 видов - *L. antarcticus*, *L. australis* и *G. bowersi* -, а также заметки и дополнения, касающиеся остальных видов.

Address:

Received: 20 X 1978 г.

Dr Krzysztof Zdzitowiecki  
Zakład Parazytologii  
Polskiej Akademii Nauk  
Pasteura 3 s.p.153  
00-973 Warszawa