SOME CONSIDERATIONS REGARDING BRONCHIAL MICROHABITAT PARASITISM IN *PHOXINUS PHOXINUS* (TELEOSTEI: CYPRINIDAE) FROM THE SOMEŞ BASIN

CONSIDERAȚII PRIVIND PARAZITISMUL MICROHABITATULUI BRANHIAL LA *PHOXINUS PHOXINUS* (TELEOSTEI: CYPRINIDAE) DIN BAZINUL SOMEŞULUI

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Abstract: *The current paper treats some ecological aspects of bronchial microhabitat on minnow (Phoxinus phoxinus), host fish for the monogenean Paradiplozoon homoion. For the collected parasites, we discussed: spatial distribution, affinity for the fixing sites, epidemiological parameters. The using of Student-t test showed an equal global charge of both bronchial cavities (right and left) and symmetry of infection.*

Rezumat: *Prezenta lucrare tratează câteva aspecte ecologice ale microhabitatului branhial la boiştean (Phoxinus phoxinus), peşte gazdă pentru monogenul Paradiplozoon homoion. Pentru paraziții colectați, sunt discutate: distribuția spațială, preferința pentru situsurile de fixare, parametrii epidemiologici. Folosirea testului statistic t–Student a arătat o încărcătură globală egală a celor două cavități branhiale (dreaptă şi stângă) şi simetria infestării.*

Keywords: *spatial distribution, bronchial microhabitat, Paradiplozoon homoion, Phoxinus phoxinus*
Cuvinte cheie: *distribuție spațială, microhabitat branhial, Paradiplozoon homoion, Phoxinus phoxinus*

INTRODUCTION

Although on the global level freshwater fish parasite species received proper attention a long time ago, the Romanian literature data related to this subject are scarce. Poor knowledge about monogeneans and intimate relationships established with their hosts is due to the quantification difficulties that occur in the host-parasite equation and for the species identification, considering their millimetric dimensions, characteristic for these platyhelminthes, which is time consuming for the researchers.

The present study aims some ecological aspects of the *Paradiplozoon homoion* monogenean fauna existing on bronchial microhabitat level in the cyprinid *Phoxinus phoxinus*.

MATERIALS AND METHOD

In November 2006 42 minnow specimens (*Phoxinus phoxinus*) were sampled by electro fishing from the Someş Basin (near Ilva Mică place). After the capture, fish were placed into 5% formaldehyde and transported to the laboratory for analysis. With the aid of a binocular microscope, we collected from bronchial gills 138 monogenean adult stages belonging to the *Paradiplozoon homoion* parasite.

The bronchial arches were numbered from 1 to 4, in antero-posterior way and divided into three zones: dorsal (Z1), median (Z2) and ventral (Z3). Each bronchial arch consists of two hemibranhes: external and internal.

The parasite preferences for the above mentioned sites were notated on topographic worksheets. The conclusions were drawn by using the statistic Student-*t* test.

RESULTS AND DISCUSSION

From the 42 minnow specimens, 38 were parasited by monogeneans (prevalence of infection 90.48%). Other epidemiological parameters calculated (after MARGOLIS *et al.*, 1982) were the **mean intensity** (3.63) and **abundance** (3.29) (table 4).

The most numerous *Paradiplozoon homoion* adults were found on the: **first bronchial arch** (figure 1), **median zone** (table 5), **and internal hemibranch** (table 1).

Table 1

Differences between pairs of variable values representing the degree of infection with *Paradiplozoon homoion* in both bronchial cavities, at internal (HI) and external (HE) *Phoxinus phoxinus* hemibranch (paired Student-*t* test)

Habitat	Mean	95% confidence interval for the mean	Standard deviation	Average absolute deviation from the mean	t value	Degrees of freedom	p (probability)
HI	0.00	(-0.5331-0.5331)	1.71	1.29	0.00	41	1.000
HE	-0.238	(-0.5521-7.5877E-02)	1.01	0.619	-1.53	41	0.133

The comparison between the mean number of parasites from the two cavities (right and left), by statistic Student-*t* test showed an equal parasite global charge ("**p"**=0.5) (table 2).

Table 2

Comparison between the mean number of *Paradiplozoon homoion* from both bronchial cavities of the fish host *Phoxinus phoxinus* (unpaired Student-*t* test)

Habitat	Mean	95% confidence interval for the mean	Standard deviation	Average absolute deviation from the mean	t value	Degrees of freedom	p (probability)
BD	1.52	(1.028-2.020)	1.44	1.10	-0.675	82	0.5
BS	1.76	(1.266-2.258)	1.78	1.33			

In order to indicate a possible symmetry of infection with *Paradiplozoon homoion*, we used the statistic Student-*t* test for **paired data**. Thus, we compared the parasite number from the two types of hemi branches (external and internal) from right bronchial cavity and from the left one, on each fish host specimen level.

Table 3

Mean differences for *Paradiplozoon homoion* on internal and external host hemibranch level (paired Student-*t* test)

Habitat	Mean	95% confidence interval for the mean	Standard deviation	Average absolute deviation from the mean	t value	Degrees of freedom	p (probability)
HI	1.48	(1.159-1.793)	1.02	0.857	9.40	41	0.000
HE							

The null hypothesis (the means for the two data sets are not significantly different) was accepted, because the comparison between variables series for each type of hemibranchs showed a non-significant "**p**" in both cases (table 1).

Thus, the infection of the two bronchial cavities is symmetrical. According to AIOANEI (1999), this symmetry is due to the equal chance of infection of both right and left bronchial cavities with eggs derived from the external aquatic environment.

Regarding the mean parasite number for each type of hemibranch level, the probability that the differences between the two data sets are due to an event is null (we also used the *t* test for paired data). Because in this case "**p**" is very significant, we can say that the parasite charge for the internal hemibranch is obviously higher that the external hemibranch charge (table 3) (table 5).

Noting the data into topographic worksheet made upon the three factors (a= bronchial arch position; b=type of hemibranch; c=hemibranchial zone) allowed another type of comparison for the *Paradiplozoon homoion* means number from the bronchial surface level (external and internal) in the left bronchial cavity (figure 2) with those from the right bronchial cavity (figure 3).

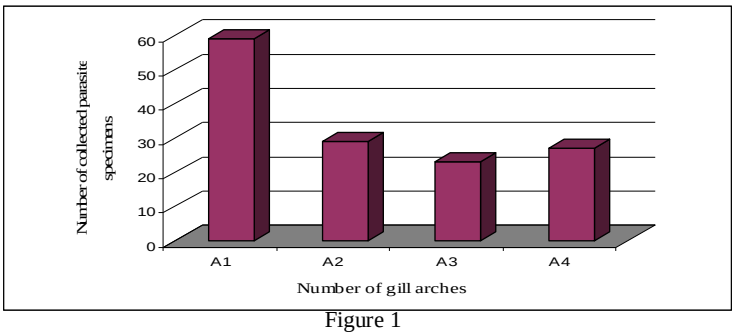

Figure 1
Spatial distribution of *Paradiplozoon homoion* adult stages, related to the gill arches position in *Phoxinus phoxinus*

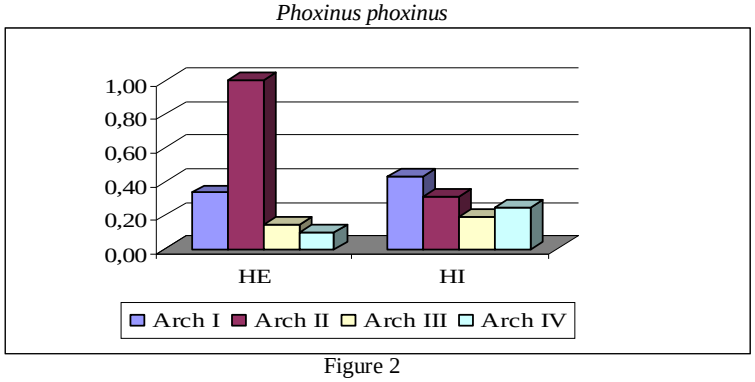

Figure 2
Spatial distribution for the mean number of *Paradiplozoon homoion* in the left bronchial cavity, related to the gill arch position and the two hemibranchs

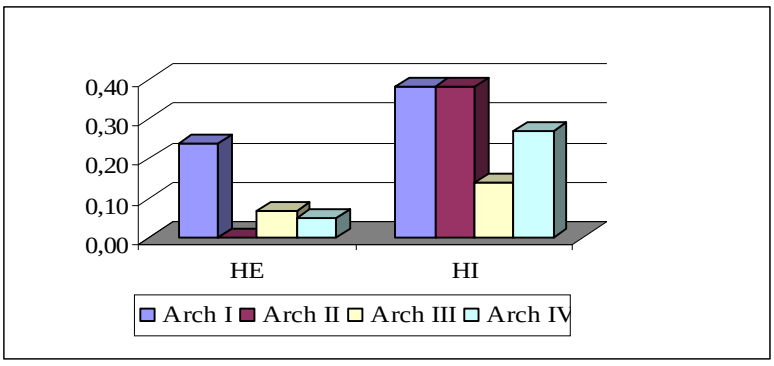

Figure 3
Spatial distribution for the mean number of *Paradiplozoon homoion* in the right bronchial cavity, related to the gill arch position and the two hemibranchs

Table 4

Infection parameters for host-fish *Phoxinus phoxinus* (n=42) with *Paradiplozoon homoion*

The parameter	Value
Prevalence (%)	90.48
Mean intensity	3. 63
Abundance	3. 29

Table 5

Spatial distribution for real effectives of *Paradiplozoon homoion* on *Phoxinus phoxinus* microhabitat level (H.I.= internal hemibranch; H.E.=external hemibranch; Z1, Z2, Z3=dorsal, median and ventral zones; A1-A4= bronchial arches)

	A1			A2			A3			A4			Total
	Z1	Z2	Z3	Z1	Z2	Z3	Z1	Z2	Z3	Z1	Z2	Z3	
H.I.	7	24	4	5	18	6	2	11	1	1	19	2	100
H.E.	8	12	4	0	0	0	2	6	1	0	5	0	38
Total	15	36	8	5	18	6	4	17	2	1	24	2	138

Figure 4
Phoxinus phoxinus (original)

CONCLUSIONS

The paper approaches the theme of the host-parasite system. We discussed the aspects of spatial distribution for the monogenean *Paradiplozoon homoion*, at bronchial microhabitat level on cyprinid *Phoxinus phoxinus*. On the other hand, the mathematic approach leads to a better understanding of the monogenean preferences for some fixing sites.

Paradiplozoon homoion is not harmful for human health, being a parasite with direct evolution cycle, which requests only fish host species for its development. Especially used not only as bait for anglers but also for its edible meat, even tasteful for many people, the minnow (figure 4) is an important part of the mountain river ecosystems, representing the main source of food for big trout.

LITERATURE

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