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Testing the habitat selectivity of bdelloid rotifers in a restricted area

Murat KAYA[1,2,*], **Sevil ERDOĞAN**[2,3]
[1]Department of Biotechnology and Molecular Biology, Faculty of Science and Letters, Aksaray University, Aksaray, Turkey
[2]Science and Technology Application and Research Center, Aksaray University, Aksaray, Turkey
[3]Fisheries Programme, Keşan Vocational College, Trakya University, Keşan, Edirne, Turkey

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Abstract: The biodiversity of microorganisms is still not understood exactly because they are very small and diverse and it requires an intensive effort to examine them. In this study, we tested whether there were differences in species richness and species composition among six sampled habitats to understand the biodiversity pattern of bdelloid rotifers. To test habitat preferences of bdelloid rotifers, 90 samples were collected from six different habitats (soil, tree bark, one species of lichen (*Lecanora muralis*), and three species of moss (*Grimmia pulvinata*, *Homalothecium lutescens*, and *Tortula ruralis*)) in the village of Taşçı in December 2008. We performed an analysis of variance (ANOVA) followed by a Tukey honestly significant difference (HSD) test to understand whether species richness was significantly different among the six habitats. Analysis of similarity (ANOSIM) was used to test whether differences in species composition between habitats were higher than those between samples within each habitat. The results showed that species richness in each sample was significantly different among habitats (ANOVA: $F_{5,84} = 19.3$, $P < 0.0001$) according to the Tukey HSD test. Differences in species composition between samples between habitats were significantly higher than differences in species composition between samples within each habitat (ANOSIM: $R = 0.40$, $P = 0.001$).

Key words: Bdelloid, habitat preference, species richness, species composition, ANOVA, ANOSIM

1. Introduction

Microorganisms are more abundant and more diverse than macroorganisms on earth. However, we have little knowledge about their ecology and distribution. Chaffron et al. (2010) stated that this situation stems from the laborious molecular surveys required at diverse sampling sites to understand microbial biodiversity. So far, many studies have been performed to understand the biodiversity patterns of microorganisms and to find an answer to the question "Do microorganisms have biogeography?" (Fenchel, 1993; Fenchel and Finlay, 2004; Martiny et al., 2006; Fierer, 2008; Bryant et al., 2008; Fontaneto, 2011; Fontaneto et al., 2011). Some studies suggested that small organisms have a tendency to be common and cosmopolite; they are distributed almost everywhere and exhibit low endemism (Fenchel, 1993; Finlay, 2002; Fenchel and Finlay, 2004). On the other hand, in other studies it was stated that free-living microbial taxa exhibit biogeographic patterns (Fierer, 2008) and may show weak habitat specialization (Fontaneto et al., 2011). Researchers have continued their studies with different microorganism groups such as bacteria (Horner-Devine et al., 2004), protozoa (Petz et al., 2007; Mazei, 2008), and diatoms (Zakharova et al., 2013) to find an answer to that question. Bdelloid rotifers, which are a group of microorganisms, are suitable model organisms to determine the biodiversity pattern of microorganisms because they show worldwide distribution on earth, can adapt to almost any environmental condition, and can be easily cultured (Segers and Shiel, 2005).

Bdelloid rotifers are organisms that are on average 150–700 µm in length. In addition to being asexual for a long time, they can protect themselves at any stage of their life by entering dormancy against environmental stress (Ricci, 1987, 2001). When conditions return to normal, these organisms are easily able to continue their lives. Bdelloid rotifers live both in benthic regions of streams, lakes, and ponds and in terrestrial habitats such as moss, lichen, bark, and soil (Donner, 1965).

Some studies have been carried out to understand the biodiversity of bdelloid rotifers. Pejler and Berzins (1993) analyzed the bdelloid rotifer species from different water bodies to reveal their relationships to substrate and habitat. Örstan (1998) grouped three types of microhabitat

* Correspondence: muratkaya3806@yahoo.com

for bdelloid rotifers according to their likelihood of drying. A study was carried out by Kaya et al. (2010b) to determine habitat selection and diversity and estimate the species richness of rotifers in samples collected from diverse habitats in two ponds located in Central Anatolia. Fontaneto et al. (2011) studied the effects of spatial distance and substrate on the diversity of bdelloid rotifers living in a large geographic area in Sweden. Lastly, Kaya (2013) examined the habitat selectivity, and alpha, beta, and gamma diversity of bdelloid rotifers on moss and lichen samples collected from different substrates in Erzurum. However, we need more detailed faunistic and ecologic surveys at diverse sampling sites to reveal the habitat preference of bdelloid rotifers.

In the present study, we aimed to test whether there were differences in species richness and species composition due to differences among six sampled habitats to understand the habitat preferences of bdelloid rotifers.

2. Materials and methods

2.1. Sampling

A total of 90 samples were collected from the village of Taşcı in Central Anatolia (Develi, Kayseri, Turkey). The samples were collected from six different habitats: soil, tree bark, one species of lichen (*Lecanora muralis*), and three species of moss (*Grimmia pulvinata*, *Homalothecium lutescens*, and *Tortula ruralis*) in December 2008 (Table 1). The sampling area has an elevation ranging between 1255 and 1271 m. The sampled area was rather small, with a maximum linear distance of 1 m. Samples from each habitat were collected in order to avoid problems of potential spatial autocorrelation, and samples from each habitat covered the whole area (Figure 1).

For each habitat, 15 samples were collected. An area of about 10 cm^2 of dry sample was taken from the substrate using a knife for each sample. Samples were then kept in paper envelopes, brought to the lab, and stored in a dry room. Within a maximum of a couple of weeks from the sampling, a subsample of about 2 cm^2 for each sample was hydrated in a petri dish using distilled water. Given the long-term survival of bdelloid rotifers to desiccation, which can be counted in several months if not years (Fontaneto et al., 2012), the maximum of 2 weeks between sampling and sorting of animals does not bias the estimates of bdelloid species composition (Fontaneto et al., 2011).

Living animals were sorted under a dissecting microscope at magnification ranging from 4 to 40×. In order to obtain standardized estimates of species richness and composition (Kaya et al., 2010a), for species identification we haphazardly collected 100 animals from all the ones sorted from each sample. These 100 animals were identified using a compound microscope at magnification ranging between 400 and 1000×, according to the current taxonomic knowledge on morphological features (Donner, 1965).

2.2. Statistical analyses

We tested whether there were differences in species richness and species composition due to differences among the six sampled habitats.

Species richness was calculated as the number of species identified from the 100 randomly selected individuals from each sample. To test whether species richness was significantly different among the six habitats, we performed an analysis of variance (ANOVA) followed by a Tukey honestly significant difference (HSD) test with richness as the response variable and habitat type as the explanatory variable. We used a square root transformation of the data on species richness in order to fulfil the assumptions of normality in the response variable for ANOVA and HSD tests. Both tests were performed in R 3.0.0 (R Development Core Team, 2013)

Data on species composition were summarized as a matrix of species presence and absence in the 90 samples. We used analysis of similarity (ANOSIM) to test whether differences in species composition between habitats were higher than those between samples within each habitat (Clarke, 1993). The analysis used a matrix of distances in species composition between samples, and we calculated such a matrix according to the Jaccard index on the matrix of presence/absence using the *vegan*2.0-7 package (Oksanen et al., 2013) in R. In order to assess the importance of habitat type in explaining the differences between samples we used the *adonis* function of the *vegan* package, which provides the proportion of explained variance by the explanatory variables. As an input for this analysis we used the same matrix of distances in species composition between samples used for ANOSIM.

In order to estimate the potential richness of bdelloid rotifers of the area and of the different habitats, we calculated the expected number of species given the observed number of species and the number of species found only in one or two samples (Chao estimator: Chao, 1987). We calculated such a number with the *specpool* function of the *vegan* R package.

3. Results

Forty-five species belonging to 9 genera were found from the 9000 individuals analyzed in the 90 samples (Table 2; Supplementary Table, on the journal's website). Ten of these species (*Habrotrocha fusca*, *Habrotrocha ligula*, *Macrotrachela insolita*, *Mniobia bdelloidea*, *Mniobia lamellata*, *Mniobia obtusicalcar*, *Mniobia scabrosa*, *Mniobia tarda*, *Mniobia vargai*, *Otostephanos monteti*) were new for Turkish bdelloid fauna. The genus with the highest diversity was *Mniobia* (12 species), followed by *Macrotrachela* (10 species), *Habrotrocha* (9 species), *Philodina* (5 species),

Table 1. The list of the samples collected from six habitats and the coordinates where they were found.

Code of the samples	Samples	Coordinates
TR1	Moss on ground (*Tortula ruralis*)	38°12′54.41″N, 35°47′20.55″E
TR2	Moss on ground (*Tortula ruralis*)	38°12′54.41″N, 35°47′20.26″E
TR3	Moss on ground (*Tortula ruralis*)	38°12′47.78″N, 35°47′10.42″E
TR4	Moss on ground (*Tortula ruralis*)	38°12′53.30″N, 35°47′16.10″E
TR5	Moss on ground (*Tortula ruralis*)	38°12′46.63″N, 35°47′12.01″E
TR6	Moss on ground (*Tortula ruralis*)	38°12′46.72″N, 35°47′12.47″E
TR7	Moss on ground (*Tortula ruralis*)	38°12′54.24″N, 35°47′19.45″E
TR8	Moss on ground (*Tortula ruralis*)	38°12′54.31″N, 35°47′21.46″E
TR9	Moss on ground (*Tortula ruralis*)	38°12′45.75″N, 35°47′11.93″E
TR10	Moss on ground (*Tortula ruralis*)	38°12′45.15″N, 35°47′11.92″E
TR11	Moss on ground (*Tortula ruralis*)	38°12′46.79″N, 35°47′12.93″E
TR12	Moss on ground (*Tortula ruralis*)	38°12′46.56″N, 35°47′11.68″E
TR13	Moss on ground (*Tortula ruralis*)	38°12′46.67″N, 35°47′11.10″E
TR14	Moss on ground (*Tortula ruralis*)	38°12′44.62″N, 35°47′11.59″E
TR15	Moss on ground (*Tortula ruralis*)	38°12′46.31″N, 35°47′11.95″E
GP1	Moss on rock (*Grimmia pulvinata*)	38°12′53.85″N, 35°47′22.85″E
GP2	Moss on rock (*Grimmia pulvinata*)	38°12′53.37″N, 35°47′23.52″E
GP3	Moss on rock (*Grimmia pulvinata*)	38°12′54.16″N, 35°47′20.49″E
GP4	Moss on rock (*Grimmia pulvinata*)	38°12′54.03″N, 35°47′20.80″E
GP5	Moss on rock (*Grimmia pulvinata*)	38°12′53.73″N, 35°47′21.17″E
GP6	Moss on rock (*Grimmia pulvinata*)	38°12′47.07″N, 35°47′12.85″E
GP7	Moss on rock (*Grimmia pulvinata*)	38°12′46.75″N, 35°47′12.79″E
GP8	Moss on rock (*Grimmia pulvinata*)	38°12′47.72″N, 35°47′11.28″E
GP9	Moss on rock (*Grimmia pulvinata*)	38°12′54.04″N, 35°47′21.61″E
GP10	Moss on rock (*Grimmia pulvinata*)	38°12′52.14″N, 35°47′15.88″E
GP11	Moss on rock (*Grimmia pulvinata*)	38°12′51.30″N, 35°47′15.89″E
GP12	Moss on rock (*Grimmia pulvinata*)	38°12′46.89″N, 35°47′12.07″E
GP13	Moss on rock (*Grimmia pulvinata*)	38°12′46.56″N, 35°47′12.05″E
GP14	Moss on rock (*Grimmia pulvinata*)	38°12′44.77″N, 35°47′11.39″E
GP15	Moss on rock (*Grimmia pulvinata*)	38°12′44.27″N, 35°47′12.30″E
HL1	Moss on rock (*Homalothecium lutescens*)	38°12′46.95″N, 35°47′13.51″E
HL2	Moss on rock (*Homalothecium lutescens*)	38°12′46.89″N, 35°47′13.10″E
HL3	Moss on rock (*Homalothecium lutescens*)	38°12′47.02″N, 35°47′14.67″E
HL4	Moss on rock (*Homalothecium lutescens*)	38°12′46.83″N, 35°47′12.92″E
HL5	Moss on rock (*Homalothecium lutescens*)	38°12′48.17″N, 35°47′11.87″E
HL6	Moss on rock (*Homalothecium lutescens*)	38°12′48.49″N, 35°47′12.80″E
HL7	Moss on rock (*Homalothecium lutescens*)	38°12′47.23″N, 35°47′14.27″E
HL8	Moss on rock (*Homalothecium lutescens*)	38°12′54.48″N, 35°47′21.26″E
HL9	Moss on rock (*Homalothecium lutescens*)	38°12′46.84″N, 35°47′13.51″E
HL10	Moss on rock (*Homalothecium lutescens*)	38°12′47.97″N, 35°47′13.98″E
HL11	Moss on rock (*Homalothecium lutescens*)	38°12′54.09″N, 35°47′21.76″E
HL12	Moss on rock (*Homalothecium lutescens*)	38°12′47.02″N, 35°47′14.84″E
HL13	Moss on rock (*Homalothecium lutescens*)	38°12′47.02″N, 35°47′14.77″E
HL14	Moss on rock (*Homalothecium lutescens*)	38°12′53.50″N, 35°47′22.45″E

Table 1. (Continued).

Code of the samples	Samples	Coordinates
HL15	Moss on rock (*Homalothecium lutescens*)	38°12′48.19″N, 35°47′13.23″E
L1	Lichen on rock	38°12′54.15″N, 35°47′21.94″E
L2	Lichen on rock	38°12′54.20″N, 35°47′21.54″E
L3	Lichen on rock	38°12′54.33″N, 35°47′20.31″E
L4	Lichen on rock	38°12′53.68″N, 35°47′22.56″E
L5	Lichen on rock	38°12′53.44″N, 35°47′23.06″E
L6	Lichen on rock	38°12′52.70″N, 35°47′23.35″E
L7	Lichen on rock	38°12′52.80″N, 35°47′24.28″E
L8	Lichen on rock	38°12′52.07″N, 35°47′24.32″E
L9	Lichen on rock	38°12′52.17″N, 35°47′25.34″E
L10	Lichen on rock	38°12′52.01″N, 35°47′26.27″E
L11	Lichen on rock	38°12′47.14″N, 35°47′12.85″E
L12	Lichen on rock	38°12′46.48″N, 35°47′11.76″E
L13	Lichen on rock	38°12′45.56″N, 35°47′12.04″E
L14	Lichen on rock	38°12′43.73″N, 35°47′12.58″E
L15	Lichen on rock	38°12′43.61″N, 35°47′12.62″E
S1	Soil	38°12′54.02″N, 35°47′21.36″E
S2	Soil	38°12′54.08″N, 35°47′21.67″E
S3	Soil	38°12′53.67″N, 35°47′21.98″E
S4	Soil	38°12′47.86″N, 35°47′11.66″E
S5	Soil	38°12′47.72″N, 35°47′12.03″E
S6	Soil	38°12′47.06″N, 35°47′12.99″E
S7	Soil	38°12′45.48″N, 35°47′11.37″E
S8	Soil	38°12′53.89″N, 35°47′22.79″E
S9	Soil	38°12′50.19″N, 35°47′17.16″E
S10	Soil	38°12′47.52″N, 35°47′16.17″E
S11	Soil	38°12′44.63″N, 35°47′12.26″E
S12	Soil	38°12′53.03″N, 35°47′23.66″E
S13	Soil	38°12′53.48″N, 35°47′23.27″E
S14	Soil	38°12′52.64″N, 35°47′23.57″E
S15	Soil	38°12′47.10″N, 35°47′12.81″E
B1	Bark	38°12′54.07″N, 35°47′20.79″E
B2	Bark	38°12′52.82″N, 35°47′16.48″E
B3	Bark	38°12′47.35″N, 35°47′12.70″E
B4	Bark	38°12′53.97″N, 35°47′21.13″E
B5	Bark	38°12′52.96″N, 35°47′22.33″E
B6	Bark	38°12′52.82″N, 35°47′22.17″E
B7	Bark	38°12′52.73″N, 35°47′22.36″E
B8	Bark	38°12′52.70″N, 35°47′21.75″E
B9	Bark	38°12′47.00″N, 35°47′12.82″E
B10	Bark	38°12′53.74″N, 35°47′20.81″E
B11	Bark	38°12′47.22″N, 35°47′11.99″E
B12	Bark	38°12′49.97″N, 35°47′15.72″E
B13	Bark	38°12′47.60″N, 35°47′11.48″E
B14	Bark	38°12′52.20″N, 35°47′16.26″E
B15	Bark	38°12′47.84″N, 35°47′12.92″E

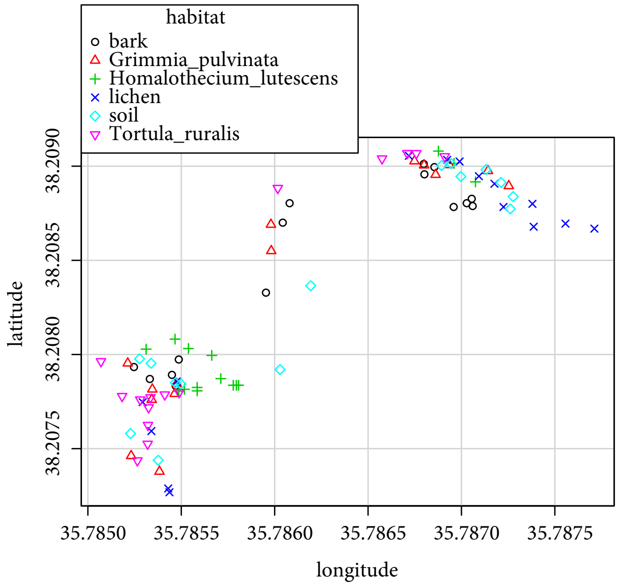

Figure 1. Geographic localisation of the 90 samples in the six habitats. Coordinates are expressed as latitude and longitude in decimal degrees.

Table 2. Summary of the species found in each habitat (TR: *Tortula ruralis*, GP: *Grimmia pulvinata*, HL: *Homalothecium lutescens*, L: Lichen, S: Soil, B: Bark, * = new record for Turkey).

Species	Habitats
Adineta sp1	GP
Adineta vaga (Davis, 1873)	TR, GP, HL, L, S, B
Ceratotrocha cornigera (Bryce, 1893)	TR, GP, HL, S
Ceratotrocha velata Donner, 1949	TR
Habrotrocha bidens (Gosse, 1851)	TR, GP, HL, L, S
Habrotrocha constricta (Dujardin, 1841)	TR, GP, HL, S
**Habrotrocha fusca* (Bryce, 1894)	HL
Habrotrocha gracilis Montet, 1915	B
**Habrotrocha ligula* Bryce, 1913	L
Habrotrocha solitaria Donner, 1949	TR, GP
Habrotrocha sp1	HL
Habrotrocha sp2	L
Habrotrocha sp3	S
Macrotrachela aculeata Milne, 1886	TR
Macrotrachela ehrenbergi (Janson, 1893)	HL, S, B
Macrotrachela habita (Bryce, 1894)	HL, S
**Macrotrachela insolita* De Koning, 1947	GP
Macrotrachela latior Donner, 1951	S
Macrotrachela musculosa (Milne, 1886)	TR

Table 2. (Continued).

Species	Habitats
Macrotrachela nana (Bryce, 1912)	L
Macrotrachela papillosa Thompson, 1892	S
Macrotrachela plicata (Bryce, 1892)	TR, GP, HL
Macrotrachela sp1	TR
**Mniobia bdelloidea* Donner, 1951	TR, GP, L, S, B
Mniobia bredensis De Koning, 1947	TR
**Mniobia lamellata* Donner, 1950	L
Mniobia magna (Plate, 1889)	TR, GP, L, S, B
**Mniobia obtusicalcar* De Koning, 1947	L
Mniobia obtusicornis Murray, 1911	L
Mniobia russeola (Zelinka, 1891)	TR, GP, HL, L, S
**Mniobia scabrosa* Murray, 1911	L
Mniobia scarlatina (Ehrenberg, 1853)	B
Mniobia sp1	L
**Mniobia tarda* Donner, 1949	L
**Mniobia vargai* Donner, 1962	GP
**Otostephanos monteti* Milne, 1916	GP
Philodina parvicalcar De Koning, 1947	HL
Philodina plena (Bryce, 1894)	GP, HL, S
Philodina rapida Milne, 1916	B
Philodina sp1	L
Philodina vorax (Janson, 1893)	TR
Pleuretra brycei (Weber, 1898)	S
Pleuretra lineata Donner, 1962	TR, HL, S
Rotaria sordida (Western, 1893)	TR, HL, S
Rotaria tardigrada (Ehrenberg, 1830)	S

Adineta, *Ceratotrocha*, *Pleuretra*, *Rotaria* (2 species), and *Otostephanos* (1 species). Using the Chao estimator the expected number of species in the system is 75.1 ± 19.3 (mean ± standard error).

In terms of abundance, the genus *Adineta* was dominant, with 3512 individuals (39% of the total), followed by *Macrotrachela* (1783 individuals, 20%), *Mniobia* (1661, 18%), *Habrotrocha* (1313, 15%), *Philodina* (282, 3%), *Rotaria* (173, 2%), *Ceratotrocha* (150, 2%), *Pleuretra* (125, 1%), and *Otostephanos* (1, 0.01%).

Species richness for each sample ranged from 1 to 7 (mean = 3.4, median = 3, Figure 2). Species richness in each sample was significantly different among habitats (ANOVA: $F_{5,84} = 19.3$, $P < 0.0001$): according to the Tukey HSD test, it was significantly lower in bark samples, compared to all the other habitats, and significantly higher in the moss *H. lutescens*, whereas no significant differences were found between the other four habitats (Figure 2; Table 3).

Overall, a larger number of species was found in *T. ruralis* (18 species, Chao estimates: 58.5 ± 49.1 SE), followed by soil (17 species, Chao 18.6 ± 1.9), *L. muralis* (15, 65.0 ± 59.6), *G. pulvinata* (14, 26.2 ± 13.1), *H. lutescens* (14, 18.5 ± 7.2), and bark (7, 7.0 ± 0.0). Thirty of 45 species (67%) were found only in one habitat, but 19 of these 30 species (42% of the total) were recorded from only one sample.

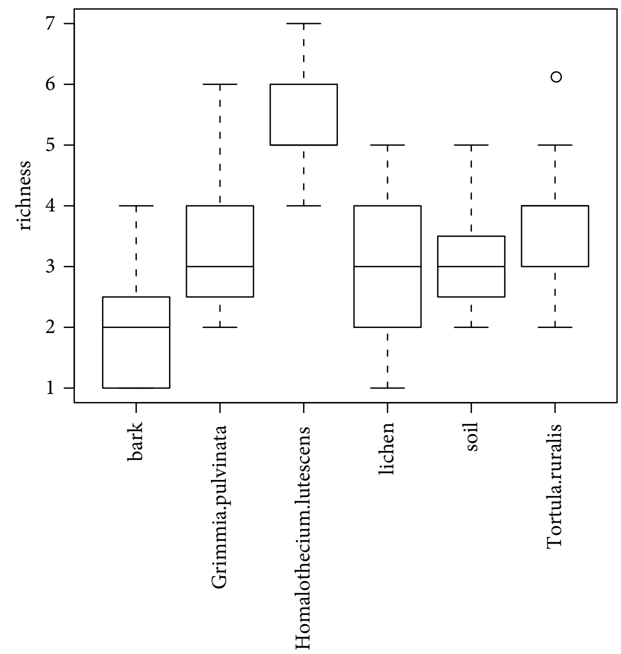

Figure 2. Boxplot of the distribution of species richness in the six habitats. For each habitat, the thick horizontal line represents the median of the distribution, the box includes 50% of the data, and the whiskers reach the highest and lowest value within 95% of the distribution. Open circles represent single values outside 95% of the distribution.

Table 3. Results of the Tukey HSD test on differences in species richness between the six habitats. P-values are reported for all the pairwise comparisons. Lower P-values mean significant differences in species richness between habitats.

	Bark	Soil	Lichen – *L. muralis*	Moss – *T. ruralis*	Moss –*G. pulvinata*
Soil	0.00231				
Lichen – *L. muralis*	0.00614	0.99968			
Moss – *T. ruralis*	<0.00001	0.39717	0.24131		
Moss – *G. pulvinata*	0.00013	0.97033	0.88989	0.86263	
Moss – *H. lutescens*	<0.00001	<0.00001	<0.00001	0.00577	0.00009

Differences in species composition between samples between habitats were significantly higher than differences in species composition between samples within each habitat (ANOSIM: R = 0.40, P = 0.001). The proportion of variance in species composition explained by the differences between habitats accounted for 28% (adonis test). Analyzing the distribution of the differences in species composition between samples within and between habitat, differences within bark are high (Figure 3A) and may create problems in the analyses. Thus, we repeated the analyses with only the other five habitats, but the results are qualitatively confirmed (ANOSIM: R = 0.038, P = 0.001; adonis: 25%; Figure 3B).

4. Discussion

Alpha diversity (species richness for each sample) of bdelloid rotifers was tested in different habitats and different regions in some studies. Alpha diversity was on average 2.45 (± 0.29 SE) for moss and 1.60 (± 0.15 SE) for lichen in the Italian Alps (Fontoneto and Ricci, 2006). Kaya et al. (2009) reported that alpha diversity in moss samples from Turkey and the UK varied from 3 to 9 per moss sample. The results of a study carried out in Svalbard by Kaya et al. (2010a) showed that alpha diversity ranged from 2 to 9 (mean ± SD = 4.6 ± 2.0). Species richness of bdelloids in four lichen samples from Sweden was analyzed by Fontaneto et al. (2011). Alpha diversity was lower for *X.*

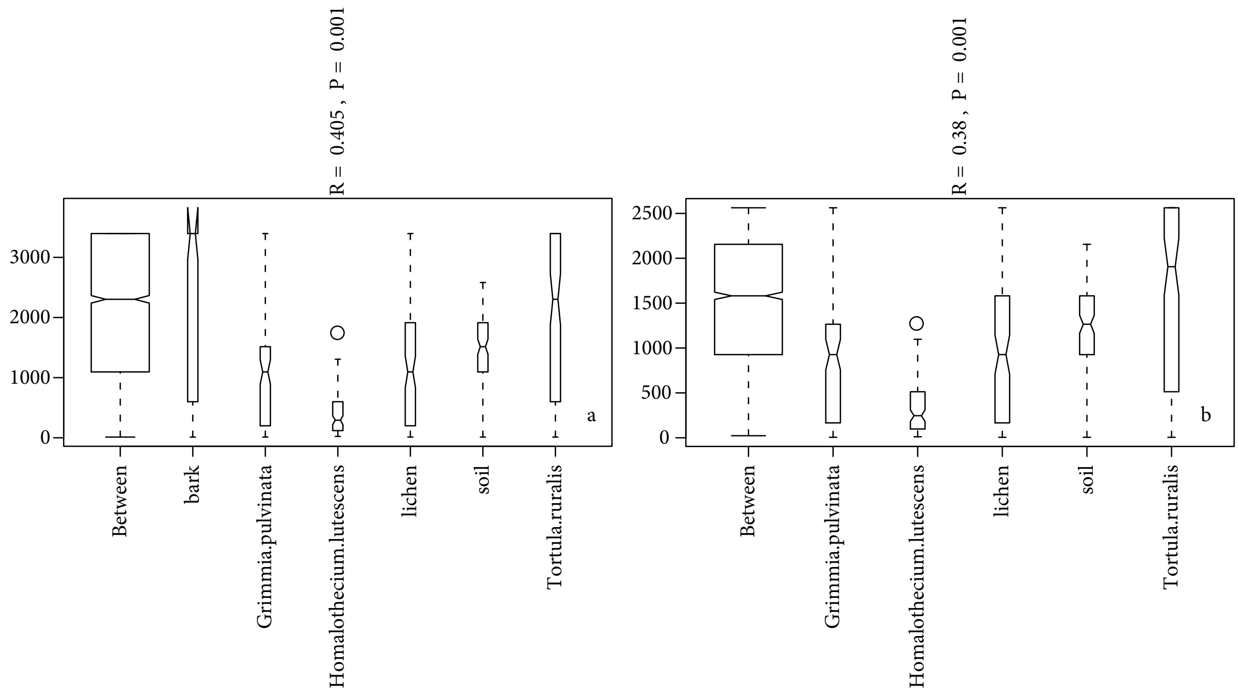

Figure 3. Boxplot of the distribution of the differences in species composition between samples, (A) including all the six habitats and (B) excluding bark. The thick horizontal line represents the median of the distribution, the box includes 50% of the data, and the whiskers reach the highest and lowest value within 95% of the distribution. Open circles represent single values outside 95% of the distribution.

parietina (median 4, range 0–8) than for the other lichen species (medians 5–6, ranges 3–11). In another study, alpha diversity in moss was reported to be low (4.44 ± 1.97; mean ± SD) (Iakovenko et al., 2012). In the present study, the alpha diversity in samples in 6 different habitats ranged from 1 to 7 (mean = 3.4, median = 3). These values were in the middle of those given in previous studies. In addition, species richness significantly differed (ANOVA: $F_{5,84} = 19.3$, $P < 0.0001$) depending on the habitat type and the Tukey HSD test showed that species richness was significantly lower in bark and significantly higher in the moss *H. lutescens* in comparison to other habitats. Ricci (1987) stated that the presence of bdelloid rotifers in a habitat is mostly affected by humidity, food quantity, and composition and age of the moss. It was reported by Fontaneto et al. (2012) that temperature, relative humidity, and the substrate influence the survival of bdelloid rotifers. Considering these conditions, we can conclude that the moss *H. lutescens* provides a more suitable habitat than bark for bdelloid rotifers in the sampled area.

The expected number of species (75.1 ± 19.3 = mean ± SE) in the system was higher than the number of identified species (45 species) in this study according to the Chao estimator. Chao estimates provide very wide confidence intervals in several cases: it means that diversity for those habitats may be much higher and more samples should be collected or more than 100 animals analyzed for them. In this study, we observed that the expected numbers of bdelloid species in the moss *T. ruralis* (58.5 ± 49.1 SE) and the lichen *L. muralis* (65.0 ± 59.6) are much higher than the identified species numbers (18 species for *T. ruralis* and 15 species for *L. muralis*). This shows that a detailed survey is needed to determine the bdelloid fauna of *T. ruralis* and *L. muralis* in the sampled area.

The results of this study showed that species composition between habitats significantly differed from each other (ANOSIM: R = 0.40, P = 0.001). Moreover, in some other studies, differences in bdelloid species composition of samples were found to be quite high (Fontaneto and Ricci, 2006; Fontaneto et al., 2006; Kaya et al., 2009; Kaya et al., 2010b). Fontaneto and Ricci (2006) remarked that a small variation in factors such as temperature and dryness in habitat could cause a big difference in the bdelloid community. In other studies, it was stated that habitat may be a strong factor in colonization by microscopic pluricellular organisms such as bdelloids, in contrast to unicellular organisms of the same size (Fenchel and Finlay, 2004; Fontaneto et al., 2006). Örstan (1998) explained that habitat types may affect the colonization of bdelloids and classified three types of microhabitats for bdelloid rotifers according to their frequency of drying. It was suggested by Pejler and Berzins (1993) although some bdelloid species have a broad ecological distribution, it is possible to distinguish a pattern of preference and avoidance for them all. In addition, it was suggested in some other previous studies that rotifers had a lower degree of habitat specialization and high substrate selection (Kaya et al., 2010b; Fontaneto et al., 2011). In our study, 42% of the species were recorded from only one sample, and thus cannot be considered evidence of habitat specialization, only of rarity. Still, differences in species composition between habitats were evident (see ANOSIM and adonis results).

In conclusion, species richness and species composition between samples were significantly different among habitats. The differences in species richness and species composition between habitats were evidence of habitat specialization. This shows that microorganisms may have biodiversity.

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Supplementary Table. List of the 90 samples and the bdelloid species found in them. (TR: *Tortula ruralis*, GP: *Grimmia pulvinata*, HL: *Homalothecium lutescens*, L: Lichen, S: Soil, B: Bark).

Samples and species	TR1	TR2	TR3	TR4	TR5	TR6	TR7	TR8	TR9	TR10	TR11	TR12	TR13	TR14	TR15
Adineta sp1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Adineta vaga	24	23	0	0	0	0	0	0	80	44	26	0	0	34	0
Ceratotrocha cornigera	6	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Ceratotrocha velata	0	0	0	0	17	0	0	0	0	0	0	0	0	0	0
Habrotrocha bidens	34	19	21	0	18	0	10	0	0	0	0	13	17	0	46
Habrotrocha constricta	0	0	18	0	31	24	0	0	7	0	18	49	31	38	0
Habrotrocha fusca	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Habrotrocha gracilis	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Habrotrocha ligula	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Habrotrocha solitaria	0	16	23	0	0	3	0	0	0	43	0	22	42	0	0
Habrotrocha sp1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Habrotrocha sp2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Habrotrocha sp3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Macrotrachela aculeata	0	0	0	0	0	0	0	58	0	0	0	0	0	0	0
Macrotrachela ehrenbergi	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Macrotrachela habita	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Macrotrachela insolita	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Macrotrachela latior	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Macrotrachela musculosa	0	0	0	0	0	0	0	9	4	0	0	0	0	0	0
Macrotrachela nana	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Macrotrachela papillosa	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Macrotrachela plicata	0	42	38	0	0	58	53	0	0	13	32	0	10	0	36
Macrotrachela sp1	0	0	0	15	0	0	0	0	0	0	0	0	0	0	0
Mniobia bdelloidea	0	0	0	85	0	0	0	0	0	0	0	0	0	0	0
Mniobia bredensis	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0
Mniobia lamellata	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Mniobia magna	8	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Mniobia obtusicalcar	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Mniobia obtusicornis	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Mniobia russeola	0	0	0	0	0	15	37	0	0	0	0	16	0	27	0
Mniobia scabrosa	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Mniobia scarlatina	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Mniobia sp1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Mniobia tarda	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Mniobia vargai	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Otostephanos montei	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Philodina parvicalcar	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Philodina plena	0	0	0	0	0	0	0	0	9	0	23	0	0	0	18
Philodina rapida	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Philodina sp1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Philodina vorax	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0
Pleuretra brycei	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Pleuretra lineata	17	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Rotaria sordida	11	0	0	0	34	0	0	33	0	0	0	0	0	0	0
Rotaria tardigrada	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Samples and species	GP1	GP2	GP3	GP4	GP5	GP6	GP7	GP8	GP9	GP10	GP11	GP12	GP13	GP14	GP15
Adineta sp1	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0
Adineta vaga	21	66	0	0	39	25	64	54	65	26	76	43	48	24	87
Ceratotrocha cornigera	0	0	0	76	0	0	0	0	0	0	0	0	0	0	0
Ceratotrocha velata	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Habrotrocha bidens	16	9	5	10	18	16	0	0	0	15	0	0	0	64	0
Habrotrocha constricta	0	0	0	0	0	0	0	0	0	19	0	6	4	0	1
Habrotrocha fusca	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Habrotrocha gracilis	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Habrotrocha ligula	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Habrotrocha solitaria	0	5	0	0	0	0	0	0	0	0	0	0	0	0	0
Habrotrocha sp1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Habrotrocha sp2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Habrotrocha sp3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Macrotrachela aculeata	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Macrotrachela ehrenbergi	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Macrotrachela habita	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Macrotrachela insolita	17	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Macrotrachela latior	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Macrotrachela musculosa	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Macrotrachela nana	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Macrotrachela papillosa	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Macrotrachela plicata	0	0	91	14	0	3	36	46	35	22	24	27	48	0	0
Macrotrachela sp1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Mniobia bdelloidea	0	0	0	0	4	0	0	0	0	0	0	0	0	0	0
Mniobia bredensis	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Mniobia lamellata	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Mniobia magna	0	0	4	0	0	0	0	0	0	0	0	0	0	0	0
Mniobia obtusicalcar	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Mniobia obtusicornis	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Mniobia russeola	0	0	0	0	38	56	0	0	0	18	0	24	0	0	12
Mniobia scabrosa	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Mniobia scarlatina	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Mniobia sp1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Mniobia tarda	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Mniobia vargai	5	20	0	0	0	0	0	0	0	0	0	0	0	0	0
Otostephanos montei	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Philodina parvicalcar	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Philodina plena	40	0	0	0	0	0	0	0	0	0	0	0	0	12	0
Philodina rapida	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Philodina sp1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Philodina vorax	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Pleuretra brycei	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Pleuretra lineata	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Rotaria sordida	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Rotaria tardigrada	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Samples and species	HL1	HL2	HL3	HL4	HL5	HL6	HL7	HL8	HL9	HL10	HL11	HL12	HL13	HL14	HL15
Adineta sp1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Adineta vaga	17	73	35	44	21	36	14	48	41	16	55	10	66	74	32
Ceratotrocha cornigera	0	0	0	0	0	4	0	0	0	0	0	0	0	0	0
Ceratotrocha velata	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Habrotrocha bidens	33	6	6	23	12	0	14	7	3	5	14	27	18	5	8
Habrotrocha constricta	8	0	42	8	0	15	8	0	0	1	7	0	0	0	7
Habrotrocha fusca	0	0	0	0	0	0	0	29	0	0	20	0	0	17	0
Habrotrocha gracilis	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Habrotrocha ligula	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Habrotrocha solitaria	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Habrotrocha sp1	0	0	3	6	1	15	7	10	0	0	4	13	2	0	8
Habrotrocha sp2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Habrotrocha sp3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Macrotrachela aculeata	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Macrotrachela ehrenbergi	0	0	6	0	2	21	15	6	7	0	0	8	14	4	5
Macrotrachela habita	0	0	0	0	38	5	0	0	0	77	0	0	0	0	40
Macrotrachela insolita	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Macrotrachela latior	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Macrotrachela musculosa	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Macrotrachela nana	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Macrotrachela papillosa	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Macrotrachela plicata	0	0	8	0	0	0	0	0	0	0	0	0	0	0	0
Macrotrachela sp1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Mniobia bdelloidea	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Mniobia bredensis	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Mniobia lamellata	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Mniobia magna	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Mniobia obtusicalcar	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Mniobia obtusicornis	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Mniobia russeola	0	0	0	0	0	0	42	0	7	0	0	42	0	0	0
Mniobia scabrosa	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Mniobia scarlatina	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Mniobia sp1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Mniobia tarda	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Mniobia vargai	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Otostephanos montei	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Philodina parvicalcar	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0
Philodina plena	0	0	0	17	26	0	0	0	0	0	0	0	0	0	0
Philodina rapida	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Philodina sp1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Philodina vorax	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Pleuretra brycei	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Pleuretra lineata	29	11	0	0	0	0	0	0	40	0	0	0	0	0	0
Rotaria sordida	13	8	0	2	0	4	0	0	2	1	0	0	0	0	0
Rotaria tardigrada	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Samples and species	L1	L2	L3	L4	L5	L6	L7	L8	L9	L10	L11	L12	L13	L14	L15
Adineta sp1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Adineta vaga	0	0	43	64	96	91	23	79	100	22	77	49	36	60	64
Ceratotrocha cornigera	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Ceratotrocha velata	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Habrotrocha bidens	0	0	18	0	0	0	0	0	0	0	0	0	0	0	0
Habrotrocha constricta	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Habrotrocha fusca	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Habrotrocha gracilis	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Habrotrocha ligula	0	0	7	0	0	0	0	0	0	0	0	0	0	0	0
Habrotrocha solitaria	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Habrotrocha sp1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Habrotrocha sp2	0	0	0	0	0	0	0	0	0	14	0	0	0	0	0
Habrotrocha sp3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Macrotrachela aculeata	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Macrotrachela ehrenbergi	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Macrotrachela habita	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Macrotrachela insolita	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Macrotrachela latior	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Macrotrachela musculosa	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Macrotrachela nana	20	0	0	0	0	0	0	0	0	0	23	14	19	26	21
Macrotrachela papillosa	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Macrotrachela plicata	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Macrotrachela sp1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Mniobia bdelloidea	0	0	0	6	1		11	21	0	54	0	0	0	0	0
Mniobia bredensis	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Mniobia lamellata	0	0	24	0	0	0	0	0	0	0	0	0	0	0	0
Mniobia magna	0	0	8	0	0	0	0	0	0	0	0	0	0	0	0
Mniobia obtusicalcar	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Mniobia obtusicornis	47	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Mniobia russeola	32	56	0	30	3	9	65	0	0	10	0	37	45	0	0
Mniobia scabrosa	0	0	0	0	0	0	0	0	0	0	0	0	0	4	15
Mniobia scarlatina	0	0	0	0	0	0	0	0	0	0	0	0	0		0
Mniobia sp1	0	0	0	0	0	0	0	0	0	0	0	0	0	10	0
Mniobia tarda	0	44	0	0	0	0	0	0	0	0	0	0	0	0	0
Mniobia vargai	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Otostephanos montei	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Philodina parvicalcar	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Philodina plena	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Philodina rapida	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Philodina sp1	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0
Philodina vorax	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Pleuretra brycei	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Pleuretra lineata	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Rotaria sordida	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Rotaria tardigrada	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Samples and species	S1	S2	S3	S4	S5	S6	S7	S8	S9	S10	S11	S12	S13	S14	S15
Adineta sp1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Adineta vaga	83	25	55	39	33	68	96	67	48	82	45	74	61	78	63
Ceratotrocha cornigera	0	0	45	0	0	0	0	0	0	0	0	2	0	0	0
Ceratotrocha velata	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Habrotrocha bidens	0	0	0	9	11	0	0	0	0	0	0	0	0	0	0
Habrotrocha constricta	9	37	0	0	0	0	0	0	0	0	0	24	14	0	0
Habrotrocha fusca	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Habrotrocha gracilis	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Habrotrocha ligula	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Habrotrocha solitaria	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Habrotrocha sp1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Habrotrocha sp2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Habrotrocha sp3	0	0	0	6	0	0	0	0	0	0	1	0	0	0	0
Macrotrachela aculeata	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Macrotrachela ehrenbergi	0	0	0	0	0	0	0	33	0	0	0	0	25	0	0
Macrotrachela habita	0	0	0	0	0	0	0	0	0	18	0	0	0	0	0
Macrotrachela insolita	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Macrotrachela latior	0	0	0	0	0	0	0	0	0	0	11	0	0	0	0
Macrotrachela musculosa	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Macrotrachela nana	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Macrotrachela papillosa	0	0	0	0	0	0	0	0	5	0	0	0	0	0	0
Macrotrachela plicata	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Macrotrachela sp1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Mniobia bdelloidea	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0
Mniobia bredensis	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Mniobia lamellata	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Mniobia magna	0	0	0	24	56	0	0	0	0	0	0	0	0	0	0
Mniobia obtusicalcar	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Mniobia obtusicornis	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Mniobia russeola	0	0	0	22	0	0	0	0	0	0	43	0	0	2	0
Mniobia scabrosa	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Mniobia scarlatina	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Mniobia sp1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Mniobia tarda	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Mniobia vargai	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Otostephanos montei	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Philodina parvicalcar	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Philodina plena	8	38	0	0	0	0	0	0	46	0	0	0	0	0	0
Philodina rapida	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Philodina sp1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Philodina vorax	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Pleuretra brycei	0	0	0	0	0	4	0	0	0	0	0	0	0	20	0
Pleuretra lineata	0	0	0	0	0	0	4	0	0	0	0	0	0	0	0
Rotaria sordida	0	0	0	0	0	12	0	0	0	0	0	0	0	0	21
Rotaria tardigrada	0	0	0	0	0	16	0	0	0	0	0	0	0	0	16

Samples and species	B1	B2	B3	B4	B5	B6	B7	B8	B9	B10	B11	B12	B13	B14	B15
Adineta sp1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Adineta vaga	0	0	0	0	48	84	62	74	0	0	0	71	0	0	0
Ceratotrocha cornigera	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Ceratotrocha velata	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Habrotrocha bidens	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Habrotrocha constricta	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Habrotrocha fusca	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Habrotrocha gracilis	17	0	0	0	0	0	0	0	0	2	0	0	0	1	0
Habrotrocha ligula	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Habrotrocha solitaria	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Habrotrocha sp1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Habrotrocha sp2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Habrotrocha sp3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Macrotrachela aculeata	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Macrotrachela ehrenbergi	0	0	100	0	30	16	17	18	100	0	100	0	100	0	100
Macrotrachela habita	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Macrotrachela insolita	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Macrotrachela latior	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Macrotrachela musculosa	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Macrotrachela nana	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Macrotrachela papillosa	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Macrotrachela plicata	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Macrotrachela sp1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Mniobia bdelloidea	0	0	0	0	22	0	17	0	0	0	0	0	0	21	0
Mniobia bredensis	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Mniobia lamellata	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Mniobia magna	0	100	0	0	0	0	0	0	0	0	0	0	0	78	0
Mniobia obtusicalcar	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Mniobia obtusicornis	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Mniobia russeola	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Mniobia scabrosa	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Mniobia scarlatina	83	0	0	100	0	0	0	0	0	98	0	0	0	0	0
Mniobia sp1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Mniobia tarda	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Mniobia vargai	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Otostephanos montei	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Philodina parvicalcar	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Philodina plena	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Philodina rapida	0	0	0	0	0	0	4	8	0	0	0	29	0	0	0
Philodina sp1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Philodina vorax	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Pleuretra brycei	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Pleuretra lineata	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Rotaria sordida	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Rotaria tardigrada	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0