

# Methods of recording and faunistical research of spring habitats in Poland

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Abstract

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## Abstract

Fauna of Polish springs are rather poorly known. Only some groups (e.g. *Trichoptera*, *Coleoptera*, *Hydracarina*) were investigated in detail. It seems that spring fauna is characterized by a relatively great regional variance and habitat individuality which in turn is shaped by migration of specimen living in the water bodies adjoining the springs. There is a small share of the crenobionts associated with springs. So the spring fauna is mainly composed of crenophiles and crenoxenes coming from rhitral, potamal or limnal.

## Zusammenfassung

Die Fauna polnischer Quellen ist nur wenig bekannt. Nur einige Gruppen (z.B. *Trichoptera*, *Coleoptera*, *Hydracarina*) wurden genauer untersucht. Es scheint so, als wäre die Quellfauna durch eine relativ große regionale Varianz und Habitatindividualität charakterisiert, welche wiederum durch die Zuwanderung von Exemplaren aus Gewässern nahe der Quellen beeinflusst wird. Es gibt nur eine geringe Übereinstimmung mit den Crenobionten, die mit Quellen in Verbindung gebracht werden. So ist die Quellfauna hauptsächlich aus Crenophilen und Crenoxenen zusammengesetzt, die aus dem Rhitral, Potamal oder Limnal stammen.

## 1. Introduction

Up to the present, studies on invertebrates living in Polish springs encompassed areas of Mazurian and Pomeranian Lakelands and Lodz Lowland. More intensive investigations were carried through in springs of Krakow-Czestochowa Upland, Roztocze, Sudetes

and Carpathian Mountains. Hydrological papers were used to find the springs. However, they were more often found by chance along with the studies of fauna of rivers and lakes. These are the reasons why a list of Polish springs as well as knowledge about their fauna and flora are not satisfying and far away from the needs and expectations.

## 2. Methods of recording

Apart from a location of springs also the hydrological type, capacity, physical and chemical parameters of the spring water (temperature, pH, etc.), the type of a bottom, vegetation, anthropogenic changes and spring surroundings were considered. Up to now, studies on invertebrates occurring in Polish springs were not so complex, besides a few exceptions. Specimen of invertebrates were collected by means of a hydrobiological sampler, pincers - for collecting larvae from stones and occasionally by means of different kinds of traps. In the close vicinity of springs an entomological net was used for catching adults. Each sampling causes a partial destruction of spring fauna. This refers not only to the reduction of the spring fauna populations but also to the mechanical changes of the ground.

Taking into account the fact, that populations of crenobionts usually are not so numerous (only some springs have wide areas) and their isolated distribution (especially in the lowlands where springs are rare and located far away from each other - like islands) sampling may easily be the reason for the eradication of populations. This was the reason why faunal samples were taken only once or twice a year. Samples representing all seasons have been collected within a few years.

## 3. Invertebrate fauna of Polish springs

The fauna of Polish springs is rather poorly known. Only some groups (e.g. *Trichoptera*, *Coleoptera*, *Hydracarina*) were investigated better (e.g. BIESIADKA 1979; BIESIADKA & KOWALIK 1978; BIESIADKA ET AL. 1990; CZACHOROWSKI 1990, 1993; KORDYLAS

1994; RIEDEL 1966, 1972; SZCZESNY 1986, TOMASZEWSKI 1972).

The faunal diversity of the studied springs has to be stressed. The fauna from lowland springs differ from upland and mountainous springs. There is a weak differentiation of the hydrological types of springs but influence of the spring surrounding seems to have a stronger impact on the faunal structure. There is a small share of the crenobiont species, which are strongly associated with springs (average 6 - 15 %) (BIESIADKA ET AL. 1990; CZACHOROWSKI 1990, 1993; KORDYLAS 1994). More numerous are the crenophilic species and species occurring occasionally. The stream zone (rhitral) species are also abundant. Some species may be considered as postglacial epoch survivors occupying cold water.

Some species were present in all types of springs. Some species occur only in lowland springs, while others were restricted to mountainous outflows. For instance, *Rhyacophila fasciata* occurs in lowland only in springs (Tab. I) but it occurs in streams in the Polish mountains. Some of them were differentially related to springs depending on its hydrological type. For instance, *Chetopteryx polonica* occurred as a crenobiont in the springs located in mixed forests while in all other types of the studied springs it was characterized as a crenophilic species. *Rhyacophila philopotamoides* was crenoxen in springs located in mixed forest, but the same species was considered crenophilic in the springs located in the upper parts (especially in meadows). *Drusus monticola* was also a crenophilic species in the meadow springs but a crenoxen in the mixed forest springs. On the other hand, *Apatania* and *Crunoecia irrorata* behaved entirely contrary.

As I mentioned above, occasionally species and species loosely associated with springs are also numerous. These species migrate from adjoining water bodies e.g. from epirhitral, sometimes from rivers or lakes (Fig. 1) and constitute their share of the faunal composition.

The relation between some species and their spring habitat is not the same in all studied regions. Some of them are crenophilic only in lowlands (Tab. I, TOMASZEWSKI 1972) or upland areas and loosely associated with springs in the mountains. One can talk about an ecological vicariance (BOTOSANEANU 1960). It seems however, that water temperature (resp. altitude, latitude), water current velocity (the hydrological type of a spring) and rotten leaves as food are the

most important factors influencing the occurrence of water fauna invertebrates in springs. These environmental factors do have a definite effect on the occurrence of crenobiont and to some extent upon the crenophilic species.

#### 4. Conclusions

All disturbances and interference like seasonally drying springs (during dry years), littering of springs, lining (a timber lining of course) are dangerous mainly for the crenobionts. The occasionally occurring species, opportunists, generalists and the euryok species are able to find other suitable habitats. Facing up to a continuous landscape degradation and the phenomenon of devastation of many springs there is a need for monitoring and a scientific documentation of springs in Poland for conservation and protection of the most valuable objects.

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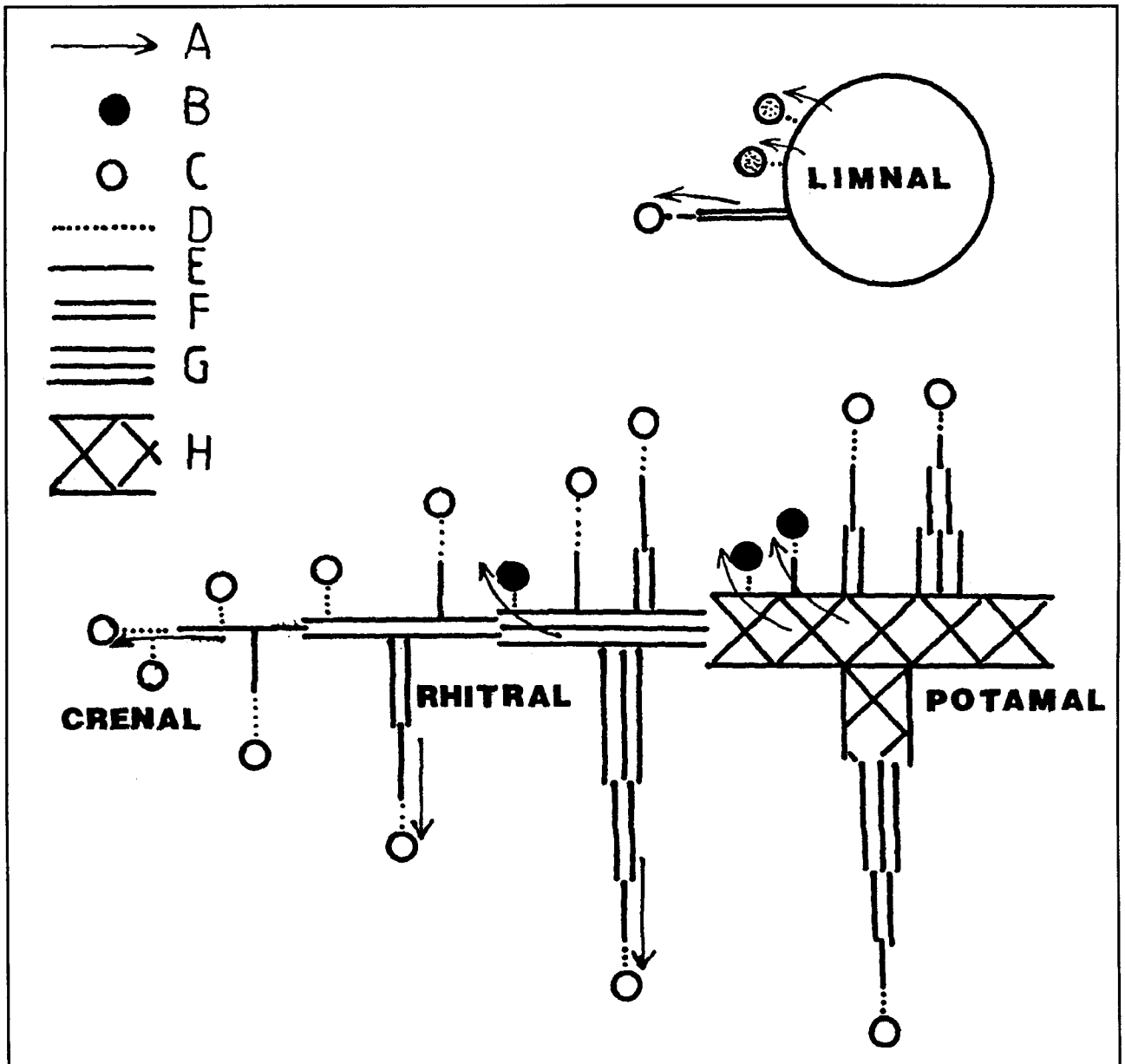


Fig. 1: Hydrological and faunal relations amongst springs and other water bodies

A - main directions of fauna migration; B - eucrenal with the species occurring in the lower parts of steams and torrents; C - eucrenal; D - hypocrenal; E - epirhital; F - mesorhital; G - hyporhital; H - epipotamal

Table I. Caddisfly larvae collected in some lowland springs

1 - springs of the Lyna River

2 - springs of the Drweca River

3 - springs of the Gizeta River

4 - a spring of Lake Zarnowieckie

Taxa	1	2	3	4
<i>Rhyacophila fasciata</i> Hagen	++			
<i>Orthotrichia spec.</i>				+
<i>Agraylea multipunctata</i> Curtis				+
<i>Plectrocnemia conspersa</i> Curtis	++	++		
<i>Lype phaeopa</i> Steph.				+
<i>Tinodes waeneri</i> L.				+
<i>Oligostomis reticulata</i> L.			+	
<i>Limnephilus auricula</i> Curt.	+	+		
<i>Limnephilus binotatus</i> (?) Curt.	+		+	
<i>Limnephilus bipunctatus</i> (?) Curt.	+			
<i>Limnephilus flavicornis</i> Fabr.	+			
<i>Limnephilus spec.</i>			+	
<i>Anabolia spec. (laevis?)</i>	+			
<i>Potamophylax latipennis</i> Curt.	+	+		
<i>Potamophylax nigricornis</i> Pict.	++	++		+
<i>Halesus spec.</i>	+			
<i>Prachiona picicornis</i> Pict.	+			
<i>Chaetopteryx villosa</i> Fabr.	++	+	+	+
<i>Chaetopterygopsis maclachlani</i> Stein.	+		+	
<i>Silo pallipes</i> Fabr.	++			
<i>Crunoecia irrorata</i> Curt.	+			