Structure and ecology of invertebrates communities of stony debris in Czech Republic : research project

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Structure and ecology of invertebrates communities of stony debris in Czech Republic. Research project

par
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Summary: The stony ecosystems represent ideal objects of biogeographical and ecological research, owing to their special microclimate, owing to the role of the territory of Czech Republic in migrations of fauna during quaternary and owing to the minimal degree of man-made disturbance. 1922 stony localities, which total area is about 150 km^2, have been registered. The faunistic division of Czech Republic was used for the selection of the set of model localities.

1. INTRODUCTION

The middle-sized and small forms of relief play a very important role in ecosystems. As relatively small terrain barriers, they are responsible for minute deviations in microclimatic conditions, which represent a characteristic component of every ecotope. These microclimatic deviations cause the different composition of flora and fauna in the specific site (RUBIN et al. 1986). Among relief mesoforms are boulder accumulations arising as products of cryogenic weathering of some rocks. Boulder accumulations occur at favourable sites in mid- and high mountains around the world. Under favourable conditions, deep boulder layers with free interspaces emerge (block fields, debris fields, taluses, debris cones).

The Czech countries assume a biogeographically crucial position. During glacials they lay in a narrow corridor between the Northern and Alpine glaciation regions. During interglacial periods, the forming stony debris constituted forest-free islands in the forest-covered mid-European landscape.

The inaccessibility and economic unexploitability of stony debris make it a biotope that

has been affected (and investigated) by man to a very low degree. Owing to these facts, stony debris formations are ideal objects of biogeographical and ecological research (MOLENDA 1991).

2. HYPOTHESES

In the mid-European landscape, stony debris form island biotopes which isolation is analogous to the isolation of peat bogs. In some parts of stony debris, temperature is constantly near the freezing point all year round, whereas other parts never freeze. Some invertebrate species are specifically adapted to life in debris. Populations of some of them can exhibit morphological adaptations to life in superficial underground compartments. The internal layers of bare as well as afforested debris can host so far unidentified species of psychrophilous invertebrates, whereas the surface of bare debris can harbour so far unidentified species of thermophilous invertebrates. The species composition and structure of communities of invertebrates have developed in accordingß to the kind and way of weathering of the rock,to exposure, and to the vegetation cover if any is present. The species location varies depending on depth, according to gradients of the basic ecological factors. A specific community of species is hosted by the "bottom" (the underground surface of the soil cover) of the debris.

3. AIMS OF THE WORK

To obtain taxonomic-morphological and ecological data on invertebrates inhabiting accessible compartments in the depth profile of stony debris. To obtain data on the stony debris microclimate. To describe the structure of invertebrate communities of these unexplored extreme biotopes. To find (i) how the structure of the communities is affected by the kind and way of decomposition of the rock, by the boulder size, by the exposure and by the regime of air streaming through the debris; (ii) how the structure of the communities varies in dependence on the degree of coverage by soil and on the degree of the succession of plant communities; (iii) how the insland effect manifests itself in the stony debris; and (iv) what are the morphological (bionomical) adaptations of invertebrates of stony debris. To contribute in gaining insight of the extent of migration of Northern (or Alpine) faunistic elements in the periglacial zone and/or of Southern faunistic elements in the interglacial periods and in the Holocene. To establish whether in polluted regions, communities of invertebrates in stony debris are disturbed and if so, whether this effect can be employed in long-term monitoring of changes of the environment.

4. WORKING PLAN

Here we present our working plan for the coming years

(1) Gaining a complex idea of the occurrence of stony biotopes in the Czech Republic.
(2) Developing an efficient method of material collection and microclimate measurements inside the debris formations.
(3) Selecting a representative set of localities.
(4) Gaining and determining material of invertebrates.
(5) Performing microclimate measurements in the debris.
(6) Evaluating data of the stony debris, of the microclimate and of invertebrates communities inhabiting them, with allowance for their interrelations.

5. CONCRETE PROVISIONS AND PLAN DESIGN

(1) A complete set of common topographic maps of the Czech Republic on the 1:10 000 scale was treated. This set involves five types of boulder accumulations, viz. stony surface, stony and gravel debris, block stream, moraine, and boulder group. In terms of the density of marks, the areas of the individual localities were converted to the fully stone area. 1922 localities with area larger than 1 ha and whose total area is about 150 km^2, have been so registered (fig. 1). Stony debris occur at any altitude from 150 to 1 600 m. 42 % localities involve isolated rocks or rock massifs. Forest-free parts are mapped for 8 % localities (according to field experience, this proportion is actually higher).

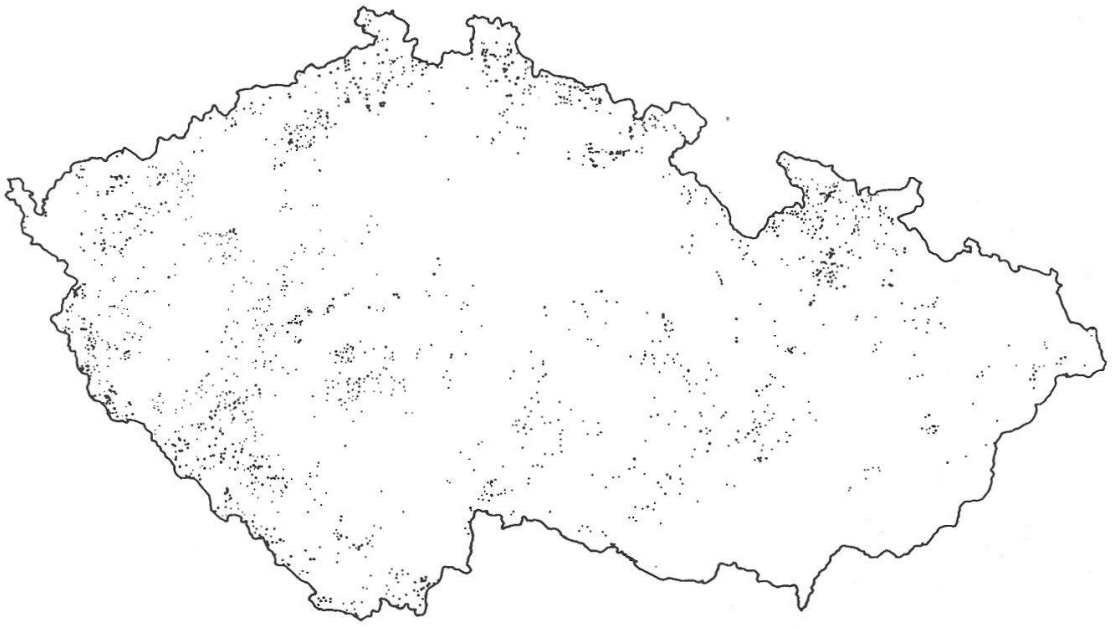

Fig. 1 - Boulder accumulations in Czech Republic. On the base of the maps 1:10 000. In area 4x enlarged.

Stony debris occurs in 97 small-area protected territories (fig. 2).
In the geobotanical map is mapped a unit of debris forest included in the Tilio-acerion KLIKA 1955 (fig. 3).

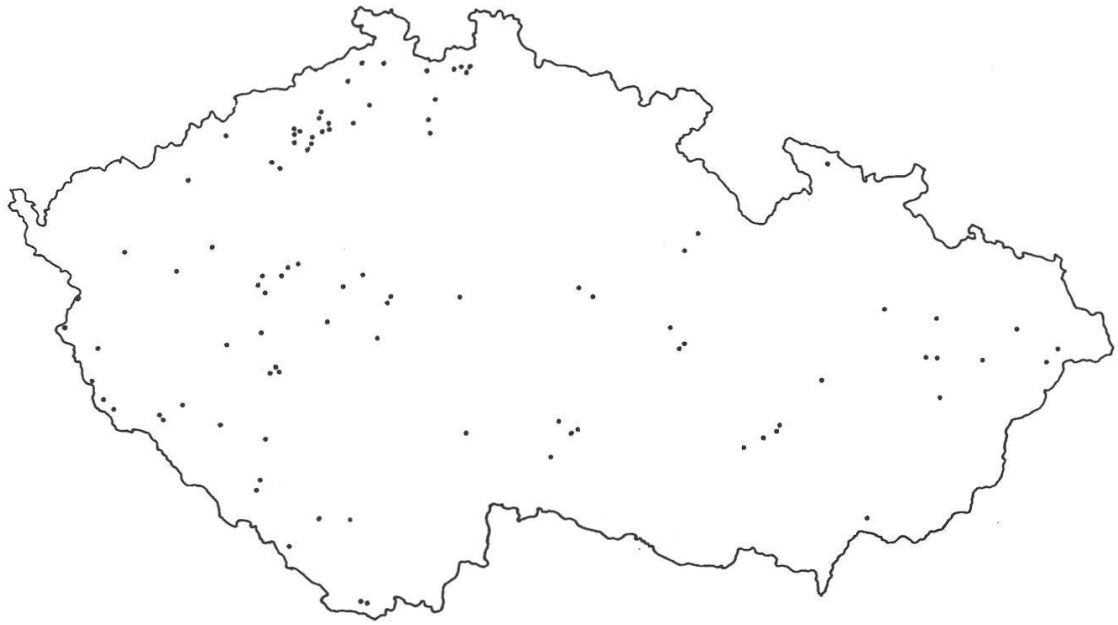

Fig. 2 - State Natural Reserves with protected debris ecosystems According to MARSAKOVA-NEMEJCOVA, MIHALIK et al. (1977), MARSAKOVA-NEMEJCOVA et al. (in press).

Fig. 3 - Debris forests - Tilio-acerion KLIKA 1955. According to MIKYSKA et al. (1972).

(**2**) A modified type of pitfall traps for collecting material in stony debris was developed (RUZICKA 1988).

(**3**) In each of faunistic district (ZELENY 1972), at least one locality was suggested for investigation by means of pitfall traps (fig. 4).

(**4**) V. RUZICKA will determine the spiders, M. ZACHARDA the mites from the family Rhagidiidae (Eupodoidea), J. BOHAC the beetles. To the maximum extent possible, determination of other invertebrates material will be secured by cooperation.

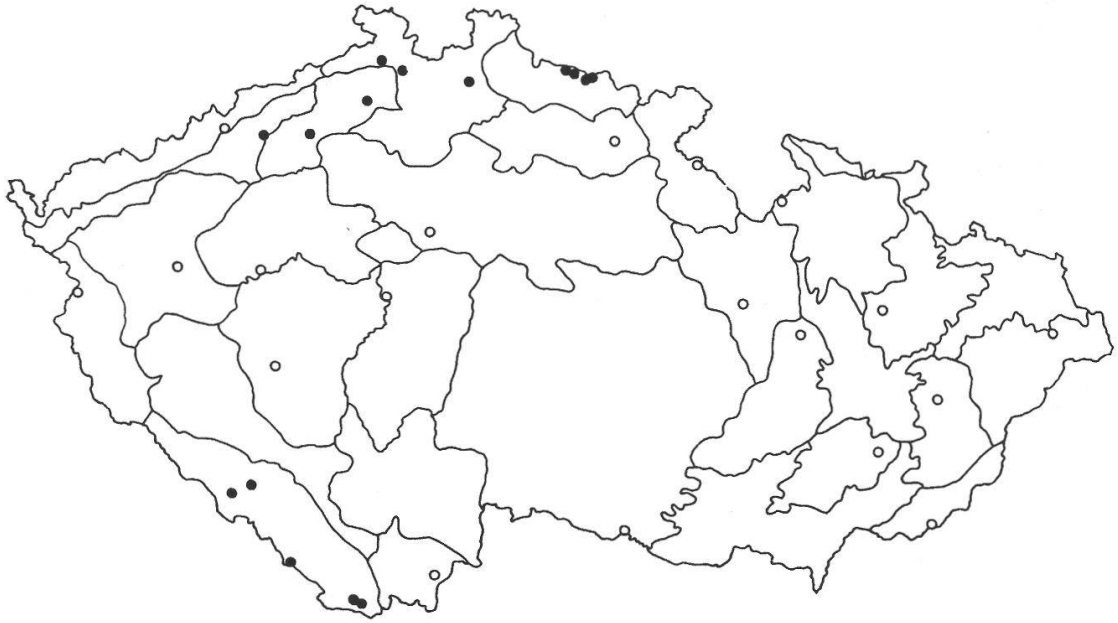

Fig. 4 - Modell localities for pitfall trapping in stony debris in faunistic districts of Czech Republic. ● - made, o - planed..

(**5**) The temperature measurement inside of debris with stuck-in perforated plastic tubes was realised (RUZICKA 1990). All-year temperature fluctuations will be examined.

(**6**) For the current results see RUZICKA (1990).

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