The use of faunistical data for biomonitoring

par
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1. INTRODUCTION

A great diversity of biotopes is a characteristic feature of the Bohemian landscape. Two biotopes with quite different microclimates can be found only a few hundred metres apart. For example, a habitat of the boreal species *Acantholycosa norvegica* is situated not very far from habitats of thermophilic species such as *Zelotes villicus*, *Xysticus robustus*, *Thanatus vulgaris* and others (BUCHAR 1979). This diverse fauna survives even near industrial centres and large farms. Therefore, it is not surprising that many Czechoslovak biologists try to define these relationships and use them in the biomonitoring of the general natural situation.

One of the means of utilising faunistical and floristical data for biomonitoring is the well-known method of square mapping of the occurrence of organisms. Each square has its characteristic faunistical/floristical value expressed by the number of species present (SLAVIK 1980). Long-term studies usually reveal changes indicating anthropogenic influences (MERRETT 1979), and because of this I have focused on species whose occurrence alone is an evidence of high environmental values of their habitats (with a minimal human impact).

References to many papers pointing out the bioindicatory value of spiders can be found e.g. in MULHAUSER's (1990) study.

2. METHODS

The grid was based on geographic coordinates, with the squares 6' high and 10' wide, approximate area 130 km2. There are almost 400 such squares in Bohemia (443 including very incomplete ones along the borders). Together with a group of arachnologists associated with the Zoological Institute of the Charles University in Prague we investigated 213 squares (figure 1) and their values were assessed according to the:

1) occurrence of rare spiders (figure 2) and
2) occurrence of rare lycosids (figure 3).

The rare spiders were a set of 62 species always found only in one square (and making up less than 10% of species occurring in Bohemia at the present time). Synanthropic species were not included.

The rare lycosids were a set of 17 species found exclusively in 1 - 12 squares in 1951-1985 (BUCHAR 1986). Presumably, the two groups of species would occur primarily in squares with high socioecological values. The criterion was the proportion of these species in squares situated in large protected landscape areas (figure 4). Twenty five per cent of the investigated squares were in the large protected landscape areas (table I), and therefore the two groups of spiders could be expected to occur there in much larger numbers than in squares situated outside of them, but many of these species were also collected in small state nature reserves in otherwise unprotected landscape.

Table 1.- The proportion of squares situated in protected landscape areas in Bohemia

Category of squares	I	II	III	IV	V	Total
by the number of species found in them	200+	101-200	51-100	6-50	1-5	
Total number of squares investigated in Bohemia	8	18	23	119	45	213
Squares in protected areas	7 88%	5 28%	4 17%	32 27%	5 11%	53 25%

Number of species recorded
from each square by 1985

■ 200+
● 101 - 200
○ 51 - 100
▨ 6 - 50
· 1 - 5

0   50 km

Fig. 1.

Fig. 2.

Occurrence of rare species
of spiders in Bohemia

• - one species

■ - 6-7 species

0   50 km

Occurrence of 17 rare
species of lycosids in
Bohemia

○ 1 – 2 species

● 3   species

■ 4 – 5 species

0   50 km

Fig. 3.

Protected Landscape Areas
in Bohemia

0   50 km
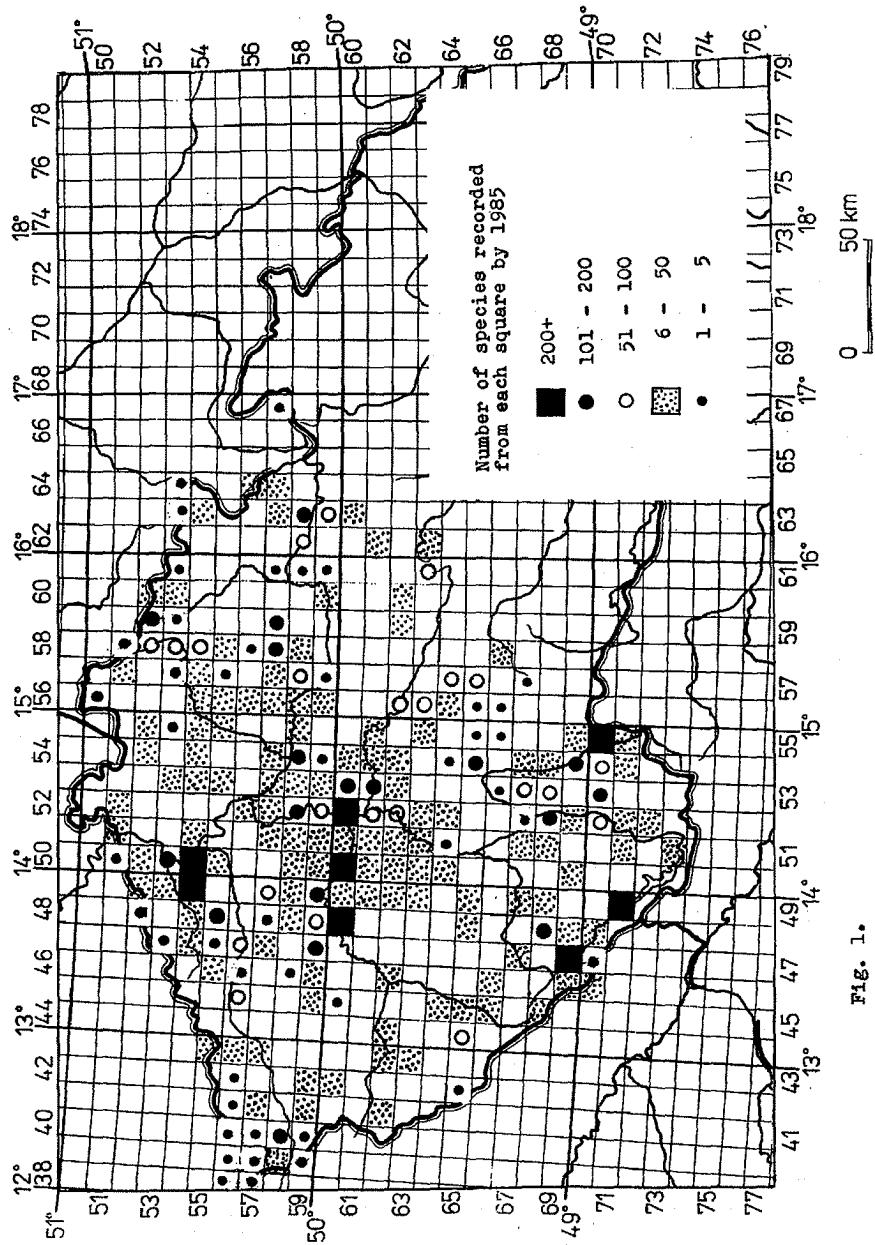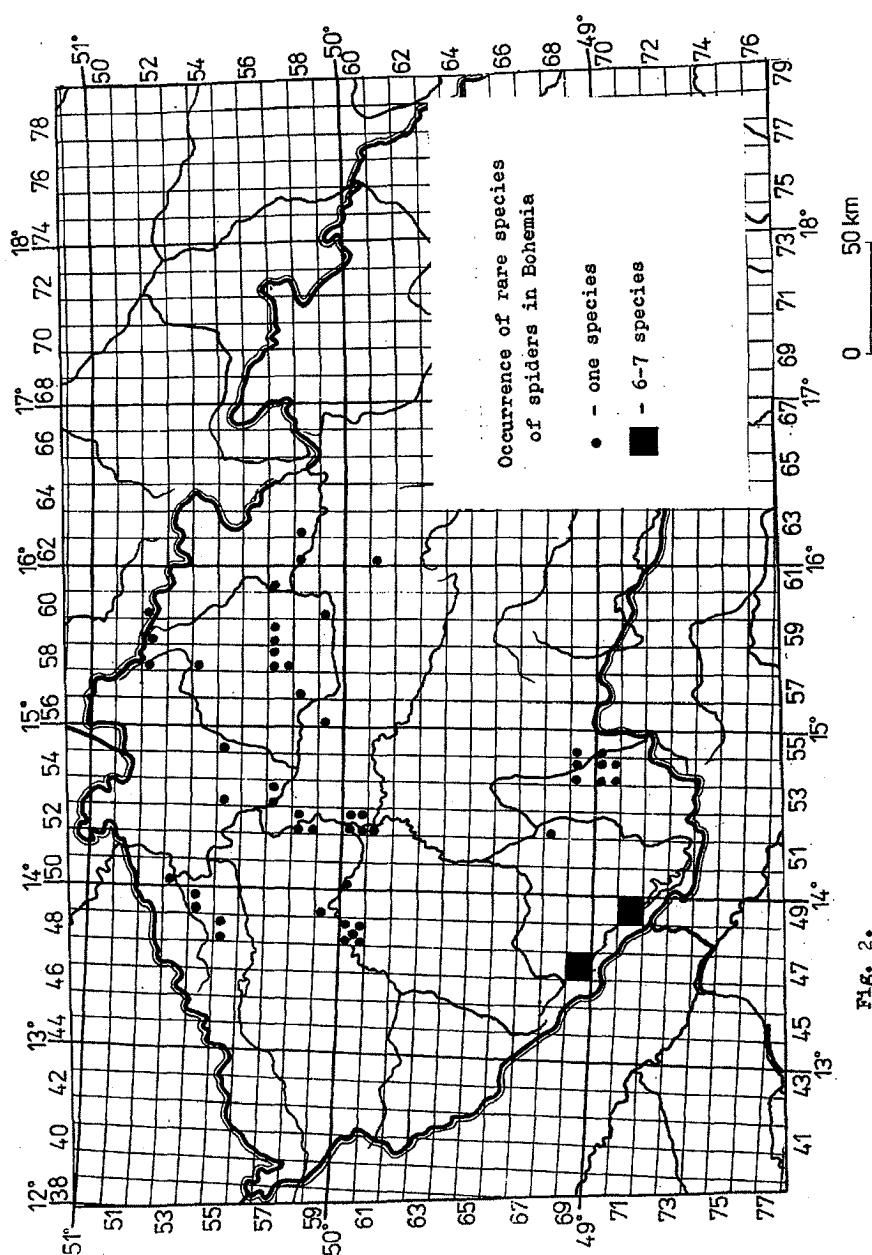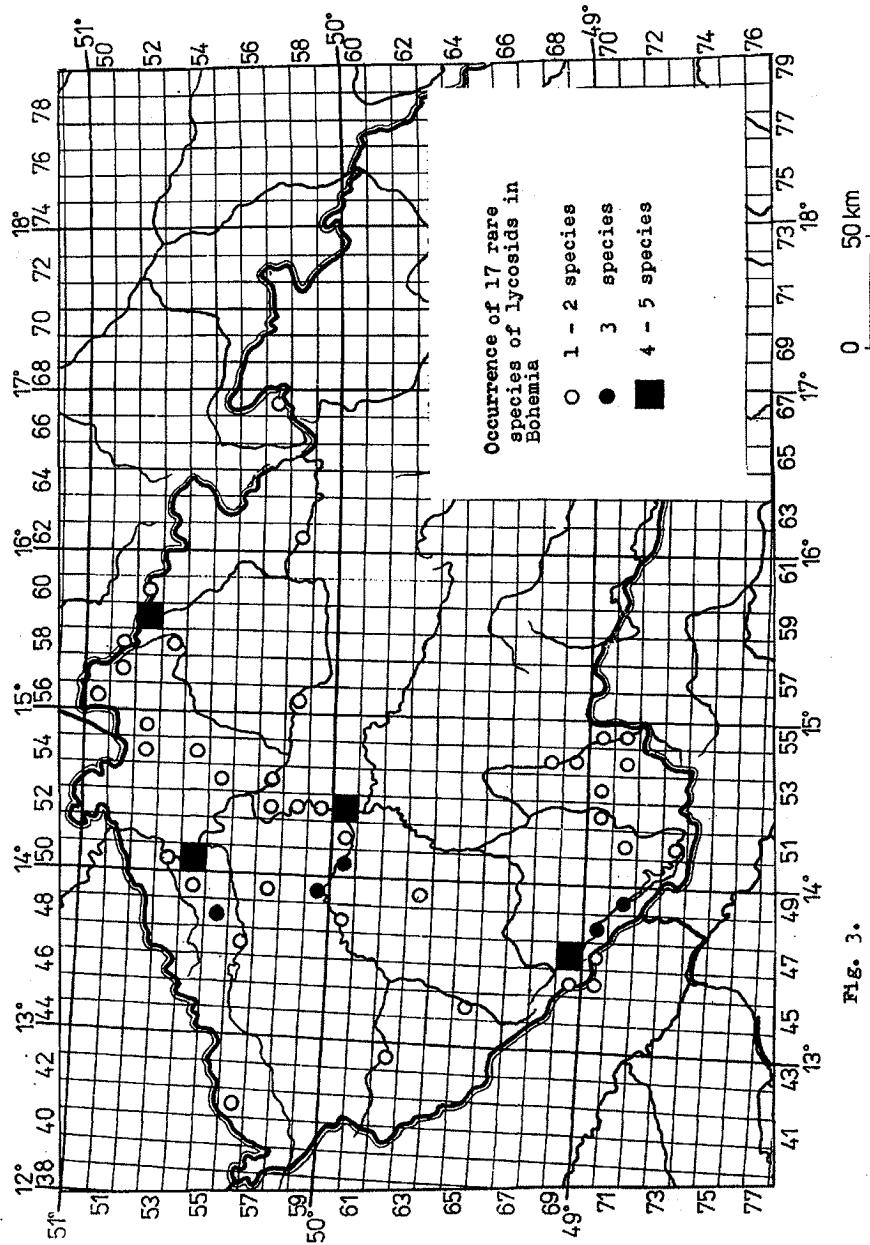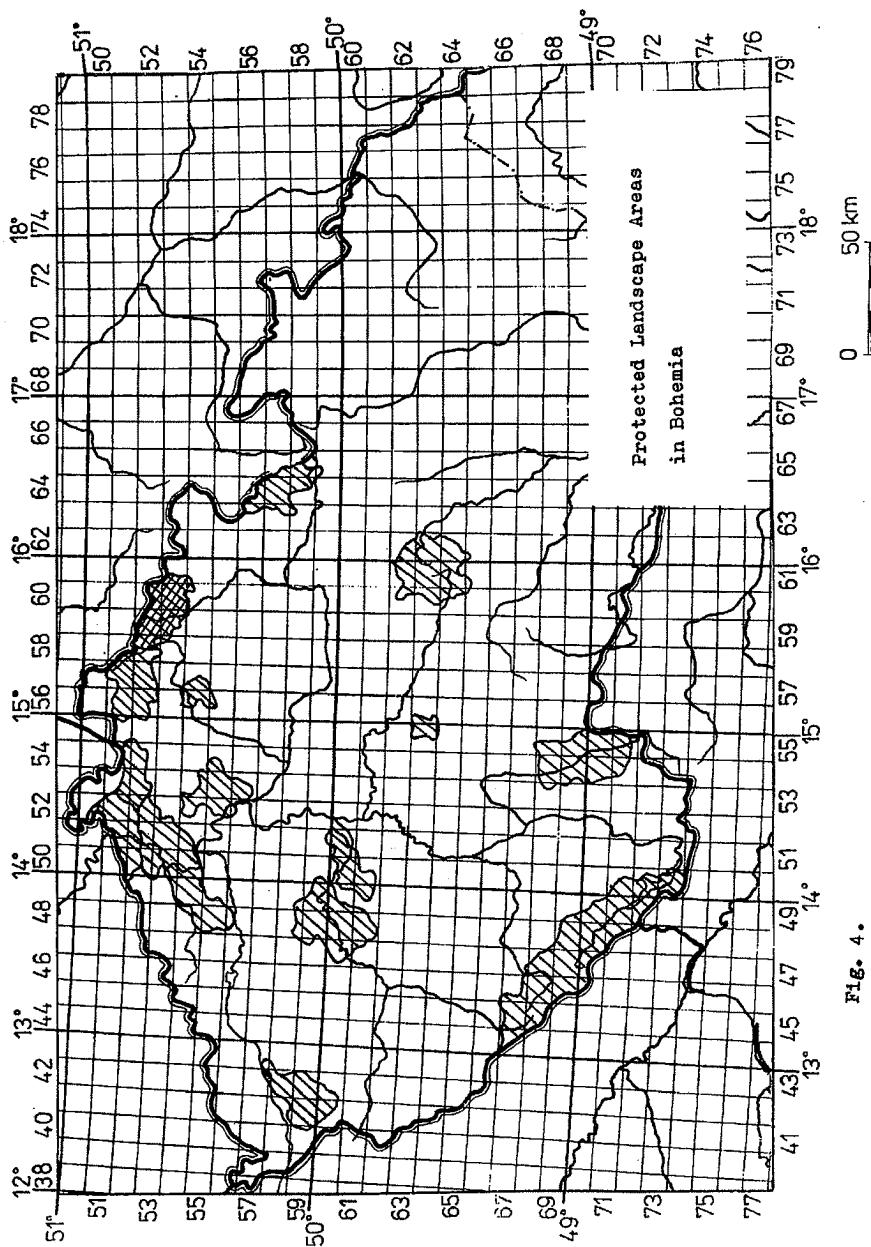
Fig. 4.

3. RESULTS

S ixty two rare spiders were found in 32 squares. Most of species (76%) were in the large protected landscape areas (table II). The minimum of the rare species was found in squares of the lowest category. The numbers gradually increased, so that half the species were found in 7 squares of the highest category (over 200 species).

Eighty four records of 17 rare lycosids were made in 47 squares, 1 - 5 species having been found in each. Over half these squares (53%) were situated in the large protected landscape areas, 62% of the records of the 17 rare lycosids were made in the protected areas and nature reserves (table III). The rare lycosids and the other rare spiders occurred together in 22 squares, 19 of which were in the large protected areas. Only in one case (square 5949) concerned these two aspects one and the same species, *Arctosa maculata*, and different species were involved in the other 18 cases.

Table 2.- The proportion of rare spiders found in protected areas in relation to the whole of Bohemia

Category of squares	I	II	III	IV	V	Total
Total number of squares where rare spiders occur in Bohemia	7	10	6	8	1	32
In protected areas only	6 86%	5 50%	2 33%	3 38%	0	16 50%
Total number of rare spiders in Bohemia	26	17	9	9	1	62
In protected areas only	22 85%	7 41%	5 55%	3 33%	0	47 76%

Table 3.- The occurrence of rare lycosids in protected areas compared with their occurrence in the whole of Bohemia

Category of squares	I	II	III	IV	V	Total
Total number of squares where rare lycosids occur in Bohemia	8	7	6	21	5	47
Category of squares	I	II	III	IV	V	Total
In protected areas only	7 88%	5 71%	0	11 52%	2 40%	25 53%
Records of rare lycosids in total	22	17	8	32	5	84
Records from protected areas	18 81%	14 82%	0	18 56%	2 40%	52 62%

4. CONCLUSION

It follows that the occurrence of rare spiders is a very useful criterion in biomonitoring.

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