Temporal species serie of web-spiders (Arachnida: Araneae) as a result of pine tree bark-structure

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Temporal species serie of web-spiders (Arachnida: Araneae) as a result of pine tree bark-structure

par
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Summary: In 1987, one group of 40 years old pine-trees (*Pinus silvestris* L.) and another group of 120 years old pines were investigated with arboreal photo-eclectors and arboreal pitfall-traps, 2 meters above ground.
Species with a high number of individuals showed a close serie of peaks on the old stems. On the young pines, peaks appear at a different time and the number of species living there is lower.
This is discussed as a result of the well structured bark of old pines offering its inhabitants, conditions that even ground living spiders can use.

1. INTRODUCTION

There is a lot of research concerning the fauna of tree stems (e. g. FUNKE 1977b, FUNKE & SAMMER 1980, ALBERT 1976 and 1982). But only a few of them are concerned with functional aspects of the bark (NICOLAI 1986). For spiders habitat-structure is one of the most important abiotic factors: to fix the net, to be hidden from predators, because of microclimatical conditions, etc.
In this work the influences of *Pinus silvestris* L. age and of its bark structure on species composition and the activity of spiders during the year on the bark are to be shown.

2. MATERIAL AND METHODS

The investigation was carried out with arboreal photo-eclectors (after FUNKE 1971) and arboreal pitfall traps at two groups of pines each of three trees (Pinus silvestris L.). The sampling period did last from May 7, 1987 to December 10, 1987.
The trees of the first group were about 120 years old, the ones of the second about 40 years old. At a height of 2 meters, two, three or four of each traps were installed as a sleeve around the stem. The spiders were captured in saturated picric acid. Every week all traps were emptied, the animals were put into ethanol (70%) and determined. Spiders were determined using GRIMM 1985, LOCKET & MILLIDGE 1951/53, LOCKET, MILLIDGE & MERRET 1974, ROBERTS 1987, WIEHLE 1956.

3. RESULTS

One can see two seasons of spider-activity on pine trees stems, one in late spring and early summer, and one in autumn. Both of them last the same time, about 10 weeks (figure 1).
In the first season, the number of species with a proportion of more than 1% of all sampled adult spiders, is higher (15 species) than in the second season (4 species)(table 1).
The series of species in both seasons are different comparing the old stems (figure 1a) with the young ones (figure 1b). The individual-rich species in spring and early summer show a very close serie of maxima in contrast to the species in autumn. As a result there is a peak every week for at least one of the species occuring on the stems of old pines in the first season. Since in autumn there are only a few species on the bark of pines the maxima of abundance are only every two weeks (figures 1a and b) or more.
On the young pines the serie of species in spring is not similar and species have another row of appearance (figure 1b).

4. DISCUSSION

The results show the existence of limiting factors for the activity of spiders on pine-tree bark. Already known factors are temperature, climate and radiation (NICOLAI 1986). The two investigated stands possess only a few differences in temperature and atmospheric humidity. Global radiation is higher in the old stand (v. STÜLPNAGEL, pers. comm.).
Therefore the main factor for the observed difference in spider population must be the structure of the bark. Older pines possess a well structured bark with a lot of clefts and chinks. Spiders can use them to be hidden from predators (e. g. birds) or for the their microclimatical conditions (e. g. radiation may heat the bark and produce higher

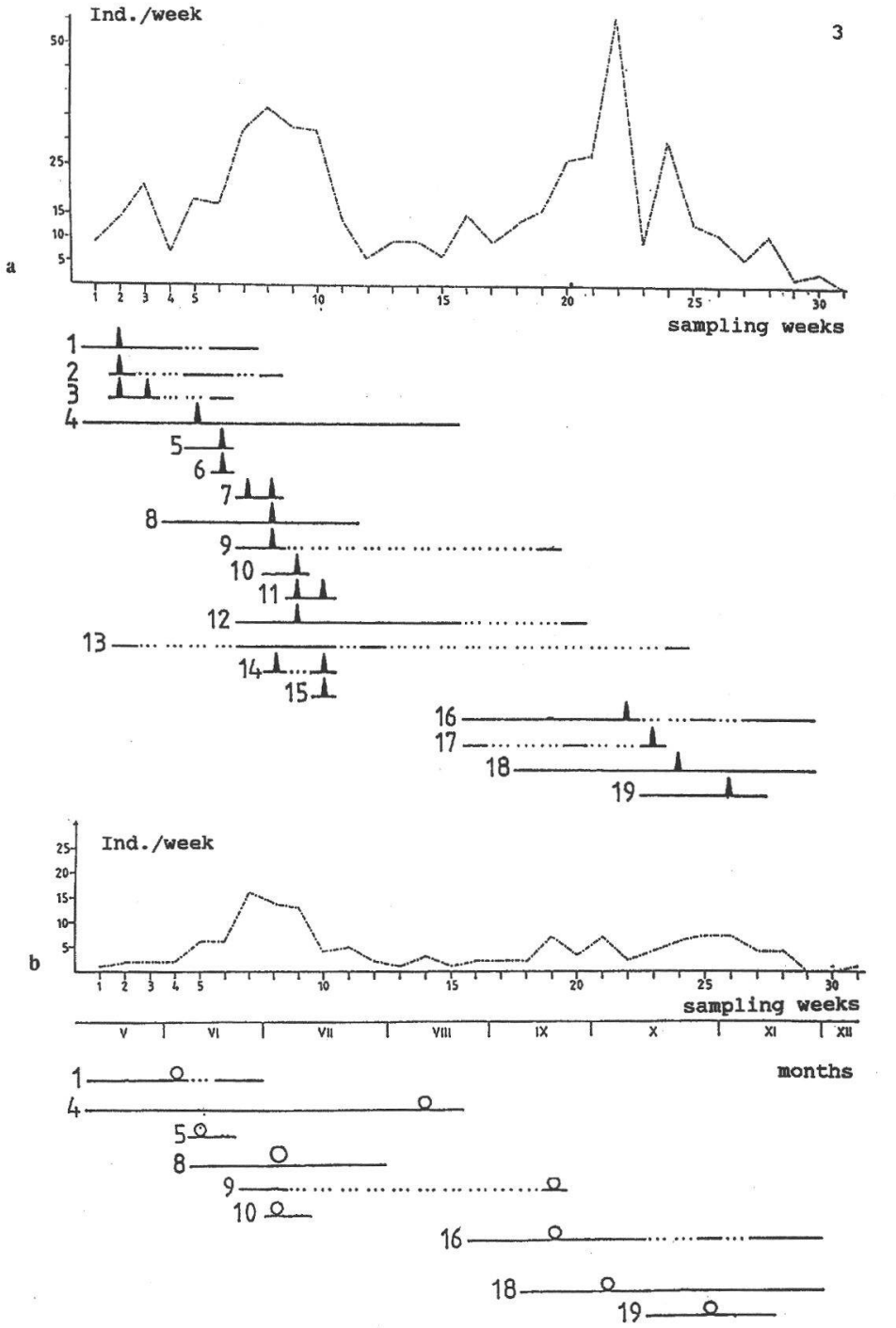

Fig. 1 - The occurence of adults spider on the stems of old pine trees (a) and young pines (b). Lines mean the appearance of the species during sampling period; triangles = maximum of species activity on the old pines - circles = maximum of species activity on the young pines.

Table I

Species found on bark of pines (more than 5 individuals), separated into the two seasons and the two aged tree-groups

name of the species	prefered habitat	old trees	young trees
appearing in spring			
Theridion mystaceum	trees	yes	yes
Xysticus audax	trees	yes	no
Xysticus lanio	tree/ground	yes	no
Lepthyphantes flavipes	ground	yes	yes
Moebelia penicillata	trees	no	yes
Entelecara acuminata	tree/ground	yes	no
Meioneta innotabilis	trees	yes	yes
Textrix denticulata	tree/ground	yes	no
Coriarachne depressa	trees	yes	yes
Diaea dorsata	tree/ground	yes	yes
Theridion tinctum	trees	yes	no
Enoplognatha ovata	ground	yes	no
Philodromus aureolus	trees	yes	no
Clubiona brevipes	trees	yes	no
Trematocephalus cristatus	trees	yes	no
appearing in autumn			
Drapetisca socialis	trees	yes	yes
Steatoda bipunctata	trees	yes	no
Lepthyphantes minutus	ground	yes	yes
Centromerus sylvaticus	ground	yes	yes

temperatures, but in the clefts humidity may be very high as well). This may lead to an addition of two positive factors for spiders!
Owing to this a high number of ground-living spiders (PLATEN 1984) are able to enter this habitat and add to the bark-living spiders (e. g. *Lepthyphantes flavipes*, *Centromerus sylvaticus*). The result is the described close serie of abundance's maxima. Further investigations will show until which level ground-living spiders can use bark as that supposed "supplementary habitat".

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