

## Method for graphic representation of ecological types of spiders

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### INTRODUCTION

The classification of ecological types of spiders was originally published by Tretzel (1952). At present, the biotop has been more precisely defined and the quantitative aspect established (Martin, 1991). In addition, as a new factor, the degree of relictness has been associated (Buchar, 1992). The description of the character of a biotope according to Tretzel (for example “ombrophil-hygrobiont”) is not too exact. In quote marks numerical data according to Martin, a problem then arises, that always a series of numbers are given which don't make possible a general appreciation of their combination. For this reason, a system is proposed which makes it possible to express any combination. An attempt to make a graphical representation of the mentioned authors is demonstrated on the Figs 1 and 2.

### METHOD

As basic ecological factors, water and light can be considered, the combination of which is obtained by the multiplication of the quantitative values for the individual squares (axis X–Y) (Fig. 3). The problem is to determine the mean values and their variation. Considering that the values have not always a normal distribution, it is necessary to use a median, not the arithmetical mean and for the evaluation of variation it is then necessary, for the same reason, to use the quantils, not the standard deviation. As advantageous, the use of 50 percentils may be held, i.e. such a variation width, which includes 50 percent of the population (i.e. median—the centre of ellipse, and percentils—the diameter) (Fig.4). The third factor (temperature) can be demonstrated by the type of hatching of appropriate ellipse. The comparison of the ecological demands of related species shows the properties of the creation of the concrete graph (Fig. 5).

### RESULTS

On the figures, species with a high and a low adaptability to the character of the biotop are shown which are expressed by the size and shape of the ellipse. The presented results are created from several sources (Buchar, 1992; Martin, 1991; Platen et al., 1991; Tretzel, 1952). Their findings including the verbal quantificators were transformed into described, mostly four step scales and the values were then graphically expressed.

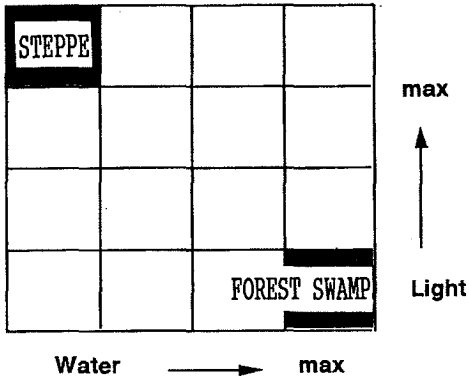
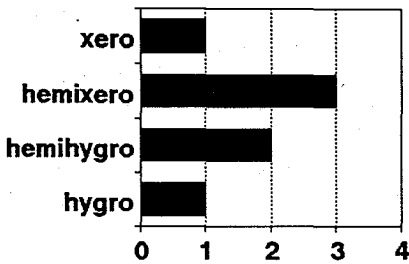


Fig. 1. Dimensions water and light. Steppe ("Xero-photobiont" by Tretzel). Forest swamp ("Hygro-ombrobiont" by Tretzel).

**Lepthyphantes pallidus**

Water



**Lepthyphantes pallidus**

Light

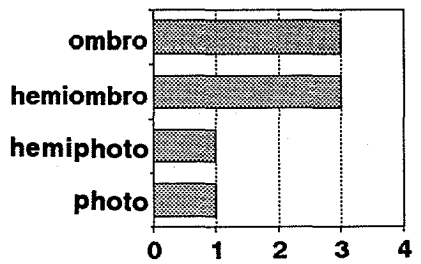
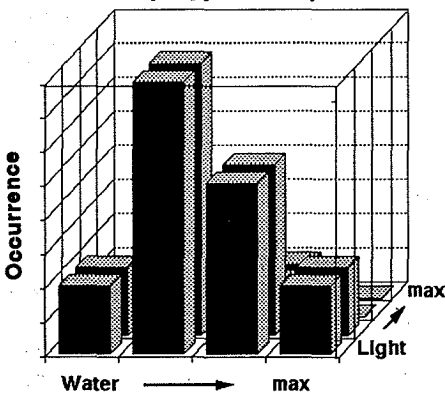


Fig. 2. Example of quantitative information by Martin (1991). *Lepthyphantes pallidus*: "Feuchtigkeitstyp" 1231, "Belichtungstyp" 1133.

**Lepthyphantes pallidus**



**Donacochara speciosa**

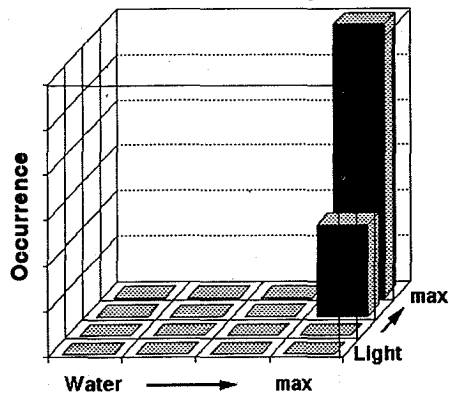


Fig. 3. Combination of two quantitative informations: multiplication of values "water" by "light."

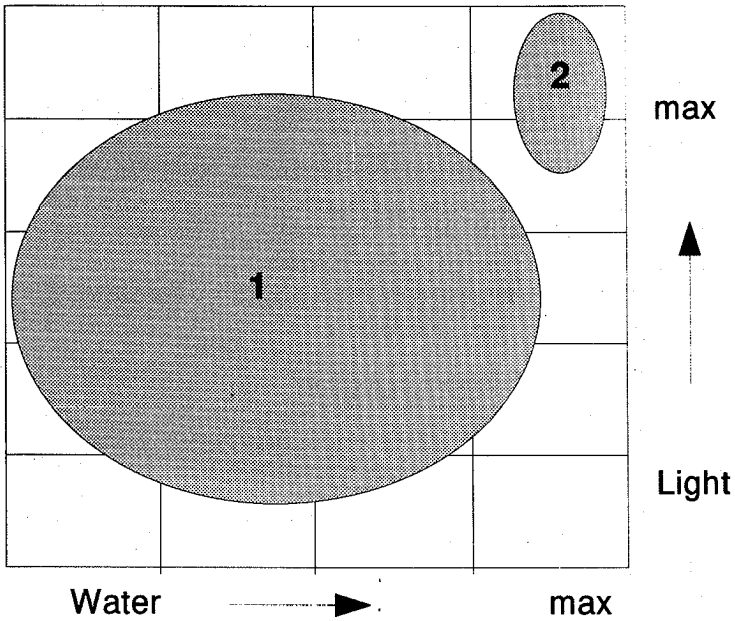


Fig. 4. Simplification into “bubble graph.” 1. *Lepthyphantes pallidus*, 2. *Donacochara speciosa*. Degree of expansion computed as distribution quantil. Centre of occurrence computed as two-dimensional median.

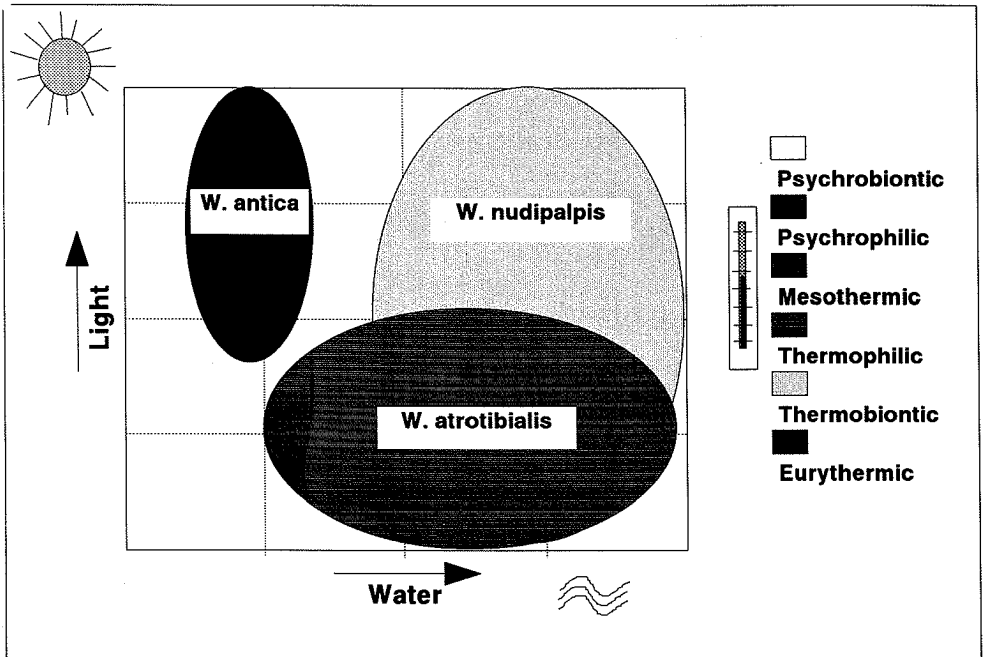


Fig. 5. Graphical expression of ecological demands of some species of the genus *Walckenaeria*. (For instance *W. antica*—every times in dry conditions mostly the light preference).

## CONCLUSIONS

On the base of the critical evaluation of the mentioned papers, the following results have been attained:

1. Creation of a unified system for the transformation of the ecological data published until now;
2. The method makes possible delimitation of any spiders, typical for a certain biotop. We used the family Linyphiidae as the only example;
3. Proposal of a graphical representation facilitating the imagination of a multi-dimensional combination of ecological factors.

## REFERENCES

- BUCHAR J. 1992: Kommentierte Artenliste der Spinnen Böhmens. *Acta Univ. Carol.-Biol.* **36**: 383-428.
- MARTIN D. 1991: Zur Autökologie der Spinnen. *Arachnol. Mitt.* **1**: 5-26.
- PLATEN R., MORITZ M. & BROEN B. VON 1991: Liste der Webspinnen- und Weberknechtarten (Arachn., Araneida, Opilionida) des Berliner Raumes und ihre Auswertung für Naturschutzzwecke (Rote Liste). *Landschaftsentwicklung und Umweltforschung* **6**: 169-205.
- TRETZEL E. 1952: Zur Ökologie der Spinnen. *Sber. Phys.-Med. Soc. Erlangen.* **75**: 36-131.