



# Spider Coenoses in Strict Forest Reserves in Hesse (Germany)

Theo Blick • Forschungsinstitut Senckenberg

Projekt Hessische Naturwaldreservate\* • Senckenbergsanlage 25 • 60325 Frankfurt am Main • Germany • theo.blick@senckenberg.de

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## What are Strict Forest Reserves?

Strict Forest Reserves are forest areas where all forestry operations have been stopped. Research into these "primeval forests of tomorrow" is an important basis for nature-oriented forestry and nature conservation.

In Hesse Strict Forest Reserves were established from 1988. At present there are 31 reserves in Hesse which cover a total area of about 1,200 ha (average size is 40 ha). The common beech (*Fagus sylvatica*) dominates most of them. 22 reserves have a reference area (average size of 33 ha), where forestry is continued. This allows direct examination of the influence of the forestry on the fauna.

## Methods

Spiders (and six other standard groups) are analysed completely to species level. A broad set of methods is used in each reserve over two whole years (incl. winter). Most important for the spiders are: pitfall traps and different types of electors.

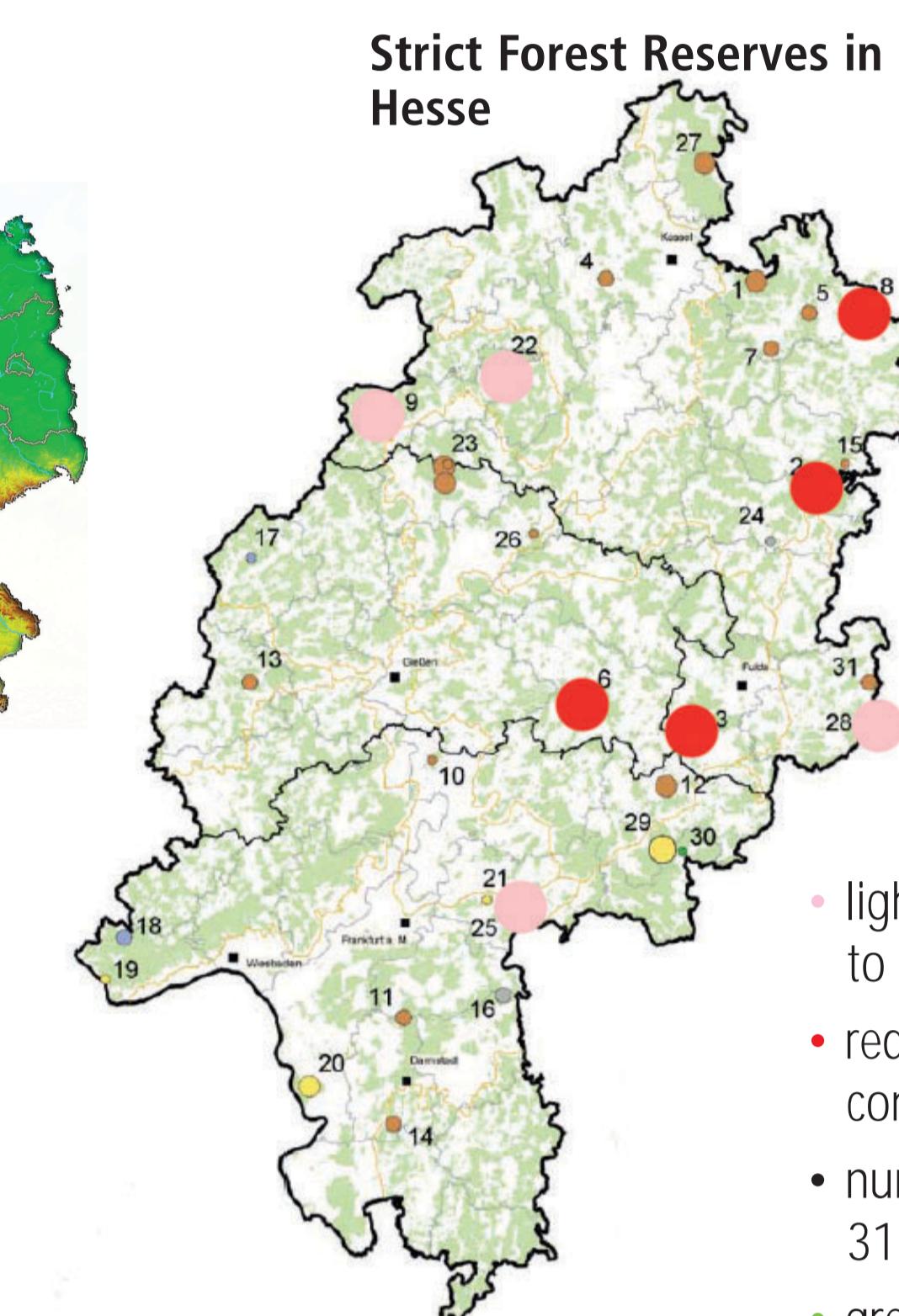


Pitfall trap

## Where are they situated?



Hesse in Germany



- light red: first recording to be analysed (4 sites)
- red: first recording completed (4 sites)
- numbers and dots: 31 Strict Forest Reserves
- green: forest

## Sites

The spiders of four reserves, all at a height of 300 to 600 m a.s.l., were identified thus far. Age of the beeches: 80-200 years; mean temperature 6,7°-8° C; mean precipitation per year 748-776 mm (one exception: 1175 mm).



Trunk elector on a dead beech tree



Trunk elector on laying dead beech

## Analysis

The spider fauna has been analysed in different aspects: **frequency** of occurrence in Germany, **distribution** types, **habitat** types and others like preference of strata, height (a.s.l.), phenology, size groups and the status of endangerment in Germany.

The data of four Strict Forest Reserves in Hesse (nos. 2, 3, 6, 8 in the figures) are compared with selected personal projects in Germany with comparable species numbers (i.e. 156-205 species, 3,250-23,000 adult spiders): **ForBav**/forests in S-Bavaria, **ForBrb**/forests in Brandenburg, **ForDry**/dry forest in N-Bavaria with adjacent open land, **ForArt**/artificial forest (poplar) and adjacent forest and arable land in N-Bavaria, **Border**/former border between Bavaria and Saxony, mostly open land, **BogsBav**/Bogs in NE-Bavaria, **Castle**/walls of 4 castles in N-Bavaria.

**Frequency** throughout Germany is divided into 6 groups (compiled after the frequency of records at <http://spiderling.de/arages>): **very common**, **common**, **moderately common**, **rare**, **very rare**, extremely rare (here not relevant).

**Distribution** types (compiled based on Platnick's catalogue and European/Russian checklists and catalogues): **E--**/Europe in part, explicitly less than half of the area of Europe, **E-**/Europe in part, without western, northern, southern or eastern parts, **E**/Europe, whole Europe or large parts of it, **E+**/Europe and adjacent parts (e.g. N-Africa, Caucasus, W-Siberia), **P**/Palaearctic, **H**/Holarctic (incl. Cosmopolitan).

**Habitat** types are summarised as: **forests**, **wop**/wooded and open habitats, **ose**/open habitats (selected), **oeu**/open habitats (eurytopic), **synanthropic** (s.lat., incl. cellars, caves, walls).

All analysis shown are based upon the percentages of the adult specimens – % of the species numbers would show similar tendencies, but less clearly visible.

## Numerical Results

A total of **278 spider species** has been found in the reserves until now, 40% of the spider species known from Hesse. 162 to 202 spider species were recorded in each reserve (30,000 to 49,000 spiders incl. juveniles, 12,500 to 18,000 adults). 19 species were new records for Hesse.

There is as yet no significant difference between the unmanaged and managed forest patches – due to the short time since forestry ceased.

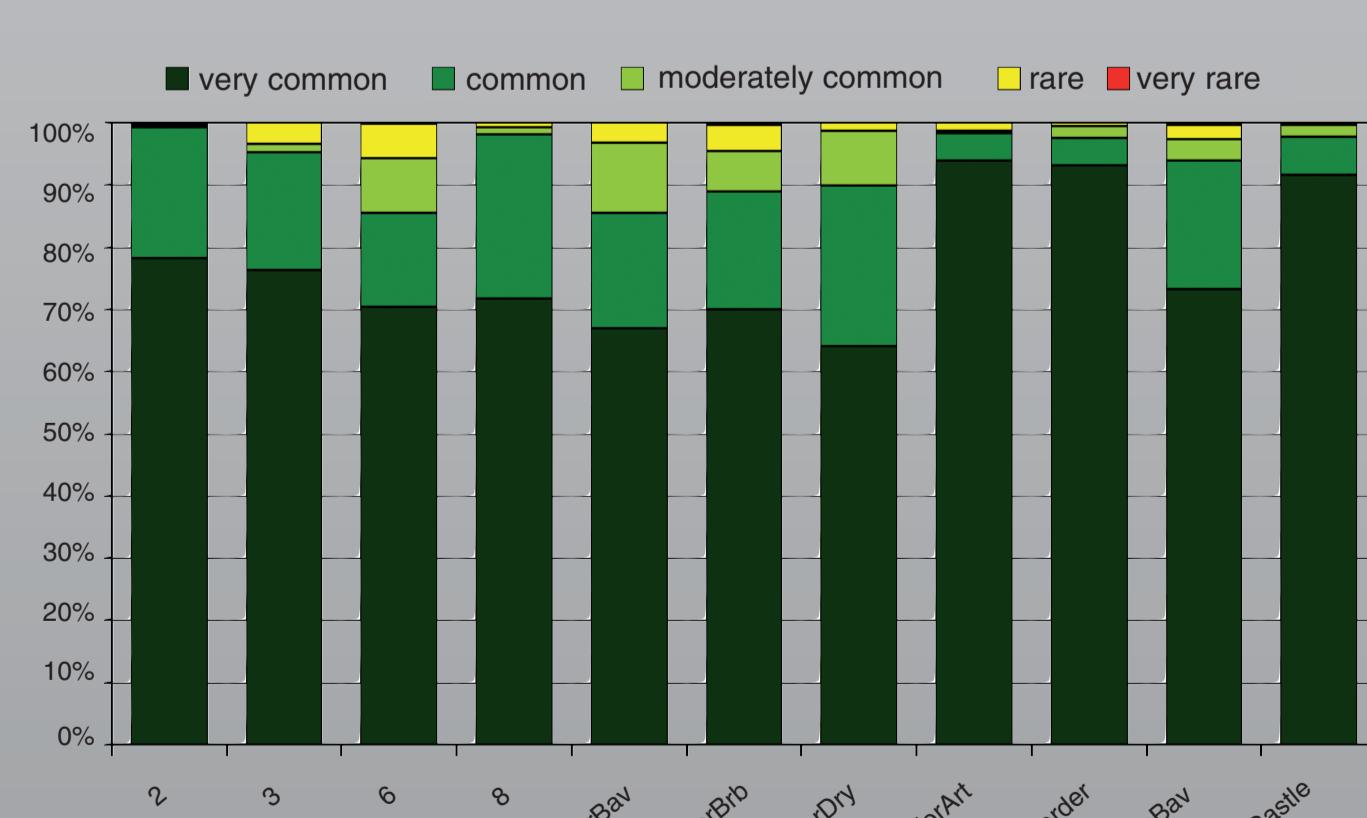
Most important for the spider diversity are:  
[species (no. of the reserve)]

- trunk electors at standing trees: 151 (3), 144 (6), 117 (8), 105 (2).
- pitfall traps: 126 (3), 119 (6), 107 (8), 100 (2).
- ➔ **Diversity on the trunk is higher than on the floor.**

## Results

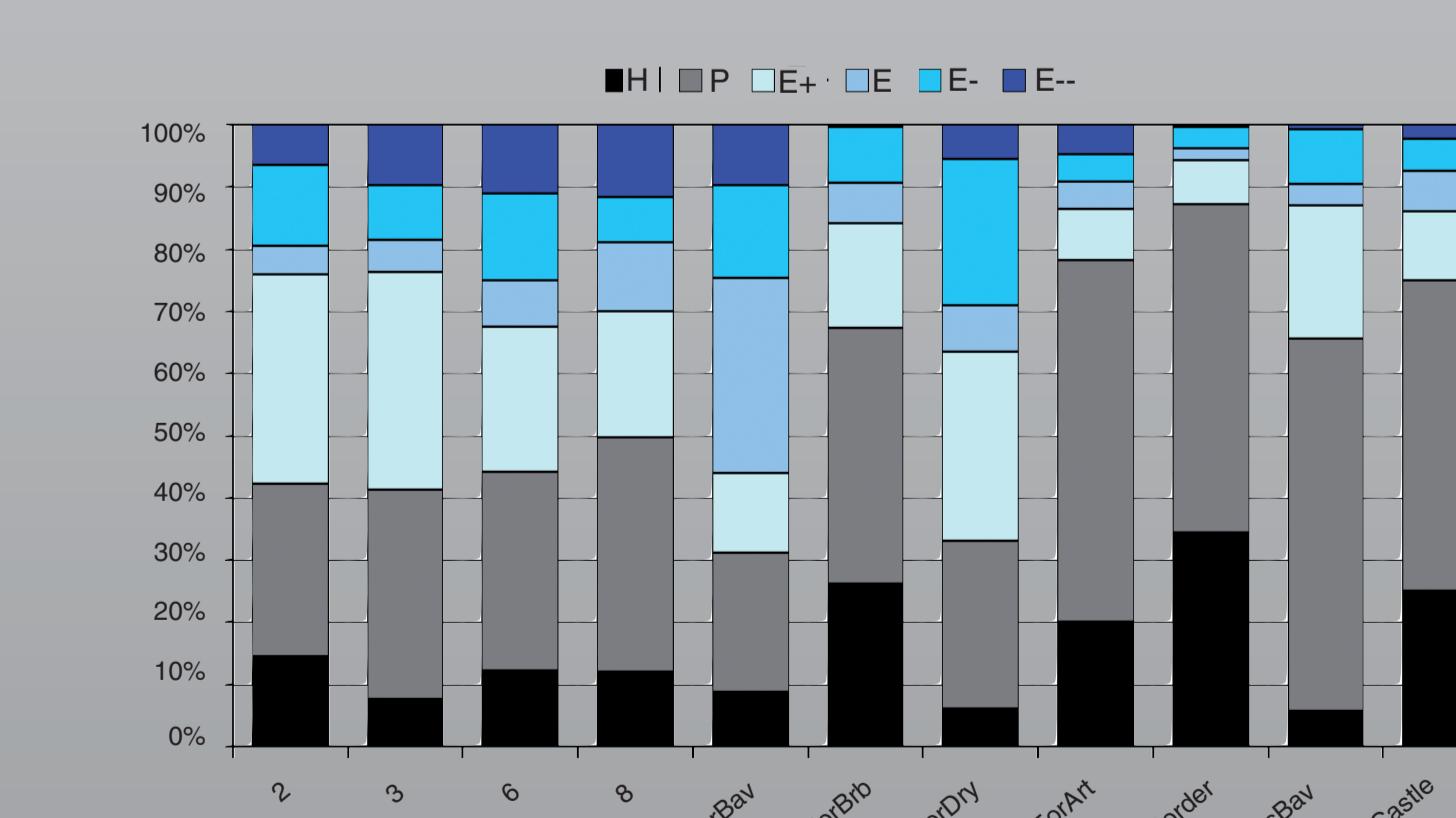
### Frequency

- very common spiders have the highest proportion (>90%) in open habitats ('Castle', 'Border', even in 'ForArt').
- rare and very rare spiders have the highest contingent (3-6%) in some forests and in the bogs.



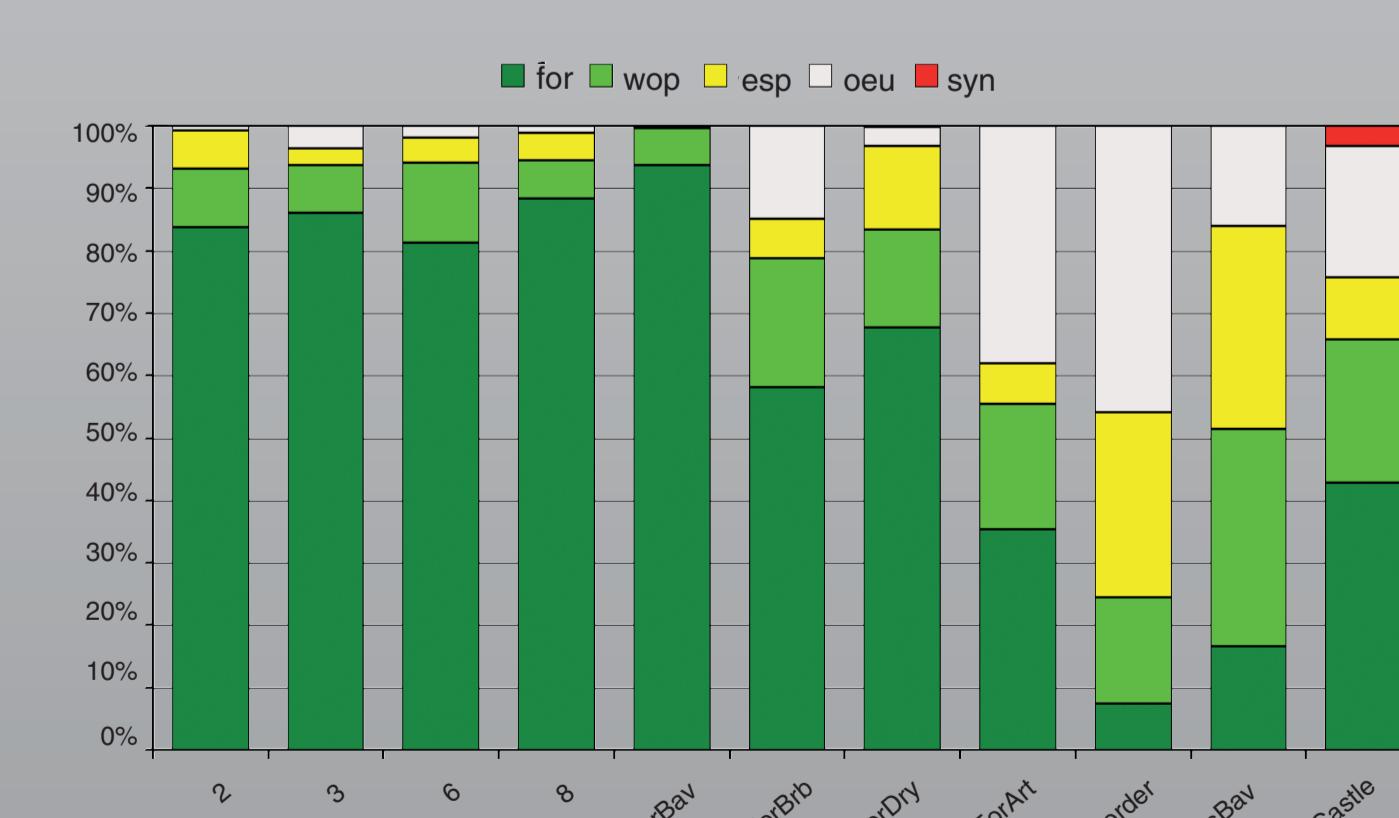
### Distribution

- the highest proportion (65-86%) of species with Holarctic and Palaearctic distribution is in the open habitats (see frequency) and in the bogs.
- species with the most restricted distribution (E--) were recorded mainly (5-12%) from forests in Hesse and Bavaria.



### Habitat

- forest species have the highest quotients (>80%) in forest habitats In Hesse and S-Bavaria.
- compared with the normally treated S-Bavarian forests, the four strict forest reserves have a remarkable part of specialised open land spiders (3-7%).
- remarkable is also the high part of forest species on the walls.



### Conclusions

It is not clear if the higher proportion of 'common' species in the forests compared with open land habitats just reflects the less disposable data of common forests in Germany compared to (more vulnerable) open habitats. In any case the spiders in the forests in the low mountain range (central and southern Germany) have more restricted distribution than in other forests and in open habitats (examples on species level: *Cinetata gradata*, *Formiphantes lephyphantiformis*, *Gongylidium edentatum*, *Lepthyphantes nodifer*, *Oreonetides quadridentatus*, *Pseudocarorita thaleri*). This method of analysis has to be tested with more sets of data, but it seems to produce valuable results.

**Finally:** The biodiversity of spider fauna even in (formerly) normally treated forests is unexpectedly high and it contains more rare and specialised spiders and such with restricted distributions than expected.

### Acknowledgements.

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