

## **SPIDER'S WEB-BUILDING AS AN EXAMPLE OF AN INNATE BEHAVIOR PATTERN**

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### **Background:**

There are many different behavior patterns in the animal kingdom, many of them innate. They are executed in a standard way again and again. They are independent of the personal experience of an individual organism. Even man reacts to challenging stimuli in his surroundings in a way which shows a characteristic sequence of movements and body changes.

Web-building by spiders can be regarded as a pattern that shows many characteristics of innate behavior. It is more standardized and easier to study than behavior patterns of higher animals and man, and it can be photographed. In investigating the specific factors that influence web-building, we deepen our understanding of behavior patterns in general.

There are many different patterns of webs. All these are built by spiders in order to catch their food, which

consists mainly of running and flying insects. Each web pattern is characteristic for one or several species of spiders. It is built by the same individual over and over again. A specialized type of web is the geometrical orb. This can be executed in different patterns, depending on the species and a number of known and unknown factors.

### **Suggested Approach:**

It is advantageous to start work in the summer so that the most difficult part of the work, getting spiders through the winter, will come when some experience has been obtained. Wooden frames 20×20 inches are built, 3–4 inches deep, with sliding glass doors in the front and in the back. Spiders are caught outdoors in their webs. The species should be identified with the help of a book or a museum of natural history. Each individual spider is housed in one frame. Water and live flies are supplied regularly. As soon as a web has been built in the frame, the glass doors are taken from the box. The web is sprayed with Krylon white glossy spray paint. Photographs of the now visible web, together with a scale, can be taken on high contrast copy film against a dark background. In this way a permanent record of the behavior pattern is obtained. Depending on the special line of interest and the species of spider which the student is able to obtain, several problems can be attacked with the above method.

1. There is obviously some change from day to day in an individual's web pattern. How much of this can be explained on the basis of changes in hunger (controlled feeding experiments); thirst (water is given in drops directly to the spider); age (changes can be traced in the webs of an individual during several months or years); body weight; leg length (determined

from the shed skins of spiders); and other possible factors?

2. There is a difference in the webs of different species or of the same species in different regions. Such differences have never been defined clearly. It would be valuable to get figures for web-size (with a planimeter on the photograph), number of radii, number of spiral turns, and relate these to the species.

3. Certain laws underlying web-building and repair of webs can be observed by trying to disturb the spider during the building process. A hot needle is used to destroy threads which are just finished. The replacement of destroyed threads is observed. In addition, the spider may be introduced onto a simple artificial "web" of thread. The pattern of this artificial web may be varied by the experimenter.

4. A spider can be put into another spider's web after the original spinner has been taken out. The reaction of the spider to a strange web of similar pattern to its own may be studied. In this connection, the spider may be put into a foreign web which is not as yet completed. Does the introduced spider take any "cues" from the partly finished web?

Keep records of all observations; make photographs of webs; and evaluate the results of web-measurements. These data and records have to be evaluated according to the special question asked by the experimenter. The interpretation leads to a more thorough understanding of the behavior pattern of web-building. General conclusions on behavior patterns and specific rules on web-building and a knowledge of factors that modify the basic pattern can be derived from such observations.

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