A BOLAS-THROWING SPIDER.

BY CHARLES E. HUTCHINSON.

The spider known as *Ordgarius cornigerus Hentz** is spread widely over the United States, but, strange to say, its habits have never been described. It seems to exhibit little choice in its selection of a permanent site, though I have found it less rarely on low-branching cypress trees. It remains secreted during the day, always in the same place, curled up beneath a leaf, limb, or fence rail. For this reason it is almost impossible to find it until it reaches maturity, when its conspicuous egg cocoons tell of its proximity. These, three to five in number, are hung within a few inches of one another, fully exposed to the sun. They are made one at a time at intervals of ten or fifteen days. At night-fall, the spider crawls out to one of the outermost branchlets and there engages in a most wonderful operation.

THE SUBJECT.

The branchlet selected is always one that retains a clear space of at least two or three inches below it when depressed by the spider's weight. A few short threads are first placed irregularly about the extreme tip of the branchlet and along its under side for a distance of several inches, while additional threads are carried out to adjacent branches to lend stability to the part.

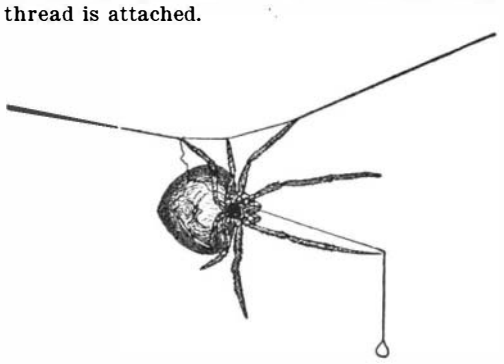
The spider now hangs back downward by its legs to the lower threads stretched along the under side of the branchlet. Attaching a new thread to one of the others near one end, it crawls along the horizontally inclined threads below the branchlet, drawing out the new thread the while from its spinning organ to the length of about two inches. The thread naturally falls below the others, the spider taking care that it shall remain free from entanglement.

The spider with its newly drawn thread still attached now exudes a very small quantity of viscid matter upon the thread at its juncture with the spinnerets. No other part of this thread bears any viscid matter nor is any subsequently added.

Pressing the tips of its hind legs firmly upon the thread it pushes each leg backward, alternately, allowing the thread to slip between the short, stiff hairs which clothe them. With each extension a small quantity of viscid matter is pushed outward and away from the abdomen as far as the leg will reach. At the end of about twenty seconds, during which time each leg is extended eight or ten times, there results a globule averaging about 3-32 inch in diameter.

This finished, the spider undertakes to release itself by severing the line between its body and the globule. Obviously to release the ball suddenly, fastened as it is to a nearly horizontal line, would be to allow an oscillation which might readily result in some sort of entanglement and the consequent destruction of the pendulum. To guard against such an occurrence the spider first lengthens the line by playing it out hand over hand, as it were, precisely as a human might perform a like operation, save that legs were used in the place of arms, the foot being well fitted to grasp and hold a thread.

The ball having been carefully lowered until its supporting line hangs vertically, or nearly so, the thread running to the spider is severed by a dexterous movement of the clawed foot, the free end losing itself in the globule. As soon as the thread is cut the spider turns about and approaching the pendulum thread siezes it from above with its legs. In this act the performer hangs by two or more of the legs of one side to the horizontally inclined thread to which the pendulum thread is attached.



WAITING FOR A MOTH.

Reaching well down with one of its long, arm-like fore legs it grasps the pendulum thread between the claws with which the leg is tipped, about half an inch above the ball. By a few well directed movements of the other limbs the upper part of the thread is quickly passed under one of the short palps or mouth appendages from which the thread continues to its point of attachment to the main line, the upper portion more often remaining slack. The two fore legs extend horizontally to their full length like the shafts of a wagon save that one is above the other.

If the writer's description is clear the reader now perceives the spider holding in its hand, as it were, a line to the lower end of which is attached a globule; the whole forming a most singular and ingenious contrivance designed for a useful purpose. In this position the spider may remain by the half-hour scarcely moving except to lower its weighted leg for a brief interval from time to time, presumably to rest it. Should the spider remain in this attitude for thirty or forty minutes the verdant observer may be astonished to see the ball carefully transferred to the spider's mouth and disappear forthwith. I have tried to find a reason for this action and think one may be found in the impaired viscidity of the globule due to exposure, as this, transferred to a piece of glass, seems to show deterioration at the end of an hour. Should the ball be swallowed a new one is made, usually within a few minutes, and hung out as was the other.

If now the observer is to be rewarded he will see, by the light of the moon, a large moth approaching, flying slowly along as though searching for something. As the marked victim draws near the spider gathers itself for a supreme effort. The ball-supporting leg points straight down. The body swings about, if necessary, to assume a favorable position with reference to the moth. As the insect comes within the carefully measured limit the spider draws back the bolas supporting leg and with a pendulum-like movement swings it rapidly forward in the direction of the moth. The ball is directed with almost unerring aim and finds lodgment on some portion of the victim. In nearly every instance it strikes a wing, a part to which it is probably particularly directed. Its violent contact with that rapidly moving member insures a wide and firm attachment.

The moth finding itself fast flutters violently in an attempt to free itself, but the assailant drops quickly down from its trapeze and sinks its fangs into a vital part. In its descent it follows along the bolas line, but is supported by a new thread which it spins as it goes—an admirable provision against a fall. By reason of the poison injected the moth is soon paralyzed, after which it is carefully enswathed in bands of silk.

Even the light of a full moon is not sufficient to disclose this wonderful operation satisfactorily and an artificial light is a disturbing element to the moth. To avoid these objectionable conditions and the annoyance of waiting indefinitely it is only necessary for the observer to catch a moth and, seizing it by the wings of one side, between the thumb and finger, move it within striking distance of the spider. A common lamp may be held quite near without affecting the spider in the least. The free wings of the moth must be in rapid vibration or the spider will not notice it. As soon as the strike is made the moth may be freed from the hand with the assurance that it cannot escape. The moth selected should be one whose wing expanse does not much exceed two inches, otherwise the spider will be likely to refuse it, although the snare is strong enough to hold a much larger one.

The globule is whitish or watery in appearance, apparently odorless, and may be tasteless, though I fancied that I detected a slight peppery taste. If an object be placed in contact with it and drawn back the globule will cling to the object and a prolongation of the supporting thread will be drawn out of the mass, which becomes correspondingly reduced. This addition to the original thread will prove markedly elastic and there will exist a tendency in the remainder of the mass to recover the thread or part drawn out. However, should the thread be drawn beyond a certain point its reversion will not be complete.

It would seem that this elasticity of the thread should be of considerable importance in mimimizing the strains put upon it by the struggling captive. However, one might at first thought overestimate the importance of this property, for the insect selected for the sacrifice is seldom strong enough to affect it greatly. Moreover, the viscid matter spreads considerably when it strikes and cannot, therefore, be drawn out save to a small extent.

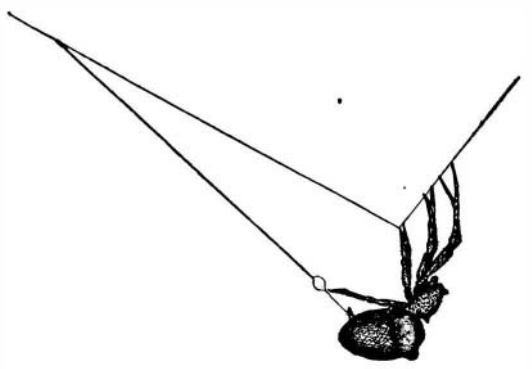
Some effort has been made to learn what means the spider employs to bring its prey within reach. Whether it is some agreeable odor emitted by the arachnid or from its weapon, or whether the prey comes accidentally within reach is a problem of some interest. While the evidence gathered is wholly negative it seems to support the conclusion that the spider does emit such an odor. None, however, is perceptible to human nostrils except when the arachnid is roughly handled, when a very noticeable sour-bitter odor is encountered. This arises from an amber-colored emission from the mouth. Small pieces of cloth scented with this failed to attract a single moth, though several passed by at no great distance.

But in view of the limited number of moths ordinarily about in this region and the almost unfailing success of the spider in making a capture during a night, the odor theory is given weight. Were the spider not dependent upon its individual resources we should expect to find it hanging from a moth-attracting flower, or at least upon a plant bearing such flowers.

* For the name of this spider I am indebted to Nathan Banks, Washington, D. C.

Artificial Pumice.

While emery is used for sharpening tools, sand for polishing stones and glass, oxide of iron for fine glass, and chalk and felt for metal ware, pumice is most frequently used for sharpening soft materials. Pumice stone is unreliable, both in grain and hardness.



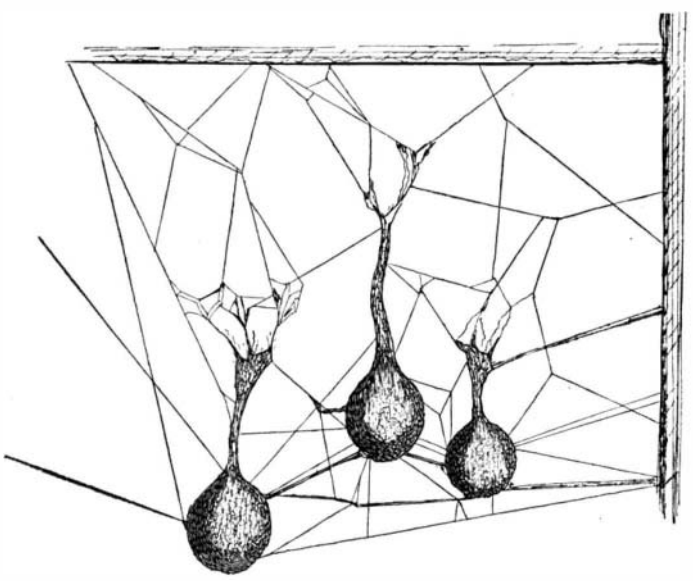
MAKING THE GLOBULE.

Variations have been noted even in the same piece. This has suggested the idea of replacing it with artificial pumice.

The factory of Schumacher, at Bietigheim, in the valley of the Enz, has been manufacturing an artificial pumice stone out of ground sandstone and clay for some time, and it is interesting to note to what extent this manufacturer has tried to adapt his products to the various purposes for which they are required. There are on the whole ten kinds, differing from each other in regard to hardness and grain, viz.: There is (1) a hard and a soft kind with coarse grain, particularly useful in the leather, wax-cloth, felt, and wood industries; (2) a hard and a soft kind with medium coarse grain, suited to stucco-workers and sculptors and particularly useful for polishing wood before it is painted; (3) a soft, fine-grained stone for the white and dry polish of wood and for tin goods; (4) one of medium hardness with fine grain, for giving the wood a surface for an oil polish; (5) a hard, fine-grained one for working metals and stones, especially lithographic stones; and finally pumice stones with a very fine grain. These artificial stones are used in pretty much the same way as those of volcanic origin. For giving a smooth surface to wood, a dry stone is applied, but to give it a fine polish the stone is dipped in oil. For fine work no coarse-grained and for coarse work no fine-grained stones are used.

Robespierre and Franklin.

The library of the University of Pennsylvania has acquired about five hundred manuscripts, once the property of Benjamin Franklin, which are of considerable historical value. Among them is an original letter from Maximilien Robespierre, the leader of the revolutionary period during the Reign of Terror in 1794.



A CLUSTER OF EGG COCOONS.

The letter was written in 1783 from Arras, France, Robespierre's native town, where he was then practising law as an advocate. In it he says that he is sending to Franklin a brief of a case in which he had defended, before the council of Artois, the use of Franklin's invention—lightning rods. Another company had secured a judgment preventing their use, but Robespierre was successful in inducing his fellow citizens to avail themselves of the discovery.