

Notes on the behaviour of Spiders in the genus *Zygiella*

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These observations on some of our commonest spiders were made from time to time over a number of years. Though anything but conclusive, they do serve to show how many lines of enquiry are open without the necessity of leaving the house and garden.

The genus *Zygiella* contains two widespread species, *Z. atrica* (C. L. Koch) and *Z. x-notata* (Clk). The first commonly makes its web on vegetation, the second is usually found on, or in, buildings. The species, however, are not strictly confined to these preferred habitats, and so, as in dealing with the behaviour of considerable numbers of individuals it is inconvenient to examine every one, the results given here apply to both. Where distinction was made, no difference in behaviour was observed. These spiders are well known for building a sectorial web, that is to say one in which the sticky spiral is put on with a pendulum motion, so as to leave one of the radii free in a vacant sector of the web. This free radius is a stout thread leading to a tubular retreat in which the spider sits. It is usually stated that the function of this thread is to transmit to the spider the vibrations produced in the web when prey is captured, indeed it is referred to as the "telegraph line". Tilquin (1942), however, discussed the matter and concluded that neither the free radius, to act as a telegraph line, nor the empty sector of the web on each side of it, to facilitate travel along it, were of any functional significance.

The sectorial web is not invariably constructed by adult spiders. Very young ones often make complete webs, and females surviving during the winter after laying their eggs often make irregular ones. If the retreat is away from the plane of the web, the telegraph line runs towards it at an angle and the sticky spirals of the web are not interrupted. In a garden in Hampshire 330 webs were observed on hedges and shrubs; 71.2% of them were of the sectorial type, the remainder being complete orbs. It was noticed that on a holly hedge the webs tended to

be fixed between the tips of the stiff leaves, while the retreat was deeper in the hedge. Of 107 webs in this habitat only 59.8% were sectorial. Of the 223 webs placed on soft-leaved shrubs and herbs, where the retreat did not need to be away from the plane of the web, 82.5% were sectorial. Webs on buildings, in the angles of windows and similar places, are almost invariably sectorial.

In webs on buildings the telegraph line usually runs steeply upwards from the centre of the web to the retreat. This was observed also by Tilquin (1942) and Le Guelte (1962) who cultivated their spiders on rectangular frameworks in the laboratory. To see what happened in webs constructed on shrubs and herbs, where the geometry of the surroundings did not dictate the position of the telegraph line, 330 webs were examined. A circle was divided into 8 equal sectors in which the position of each telegraph line was scored, and the numbers in the equivalent right and left sectors were then added. We thus have numbers for 4 sectors, A, B, C and D, as it were on a clock face A from 0 to 7½ minutes, B from 7½ to 15 minutes, and so on. The positions of the telegraph lines in the 330 webs were found to be in the following proportions in the different sectors: A, 76.0%; B, 18.8%; C, 3.3%; D, 1.9%. It will be noticed that three quarters of the telegraph lines were in the uppermost quarter of the web.

Zygiella usually spends the day in its retreat, coming out on to the web at night. To study this behaviour an area of approximately 10 square yards was marked out on a holly hedge and found to contain 127 webs. These were kept under observation, and the number of spiders out on the web noted every hour between 15.00 on 12th July and 22.00 on the following day. It was at once clear what a very striking and abrupt change there was from day to night, and from night to day. During the day no spiders were seen on the webs, or only a few from time to time. In the evening, between 21.00 and 22.00, almost all the spiders emerged and sat in the centres of the webs, most of them coming out during the last half hour. In the morning at 4.00 most of them were out on the web, but by 5.00 hardly any of them remained. Spinning takes place most commonly, though not invariably, before dawn. On one occasion at 4.00 there were 101 spiders on the

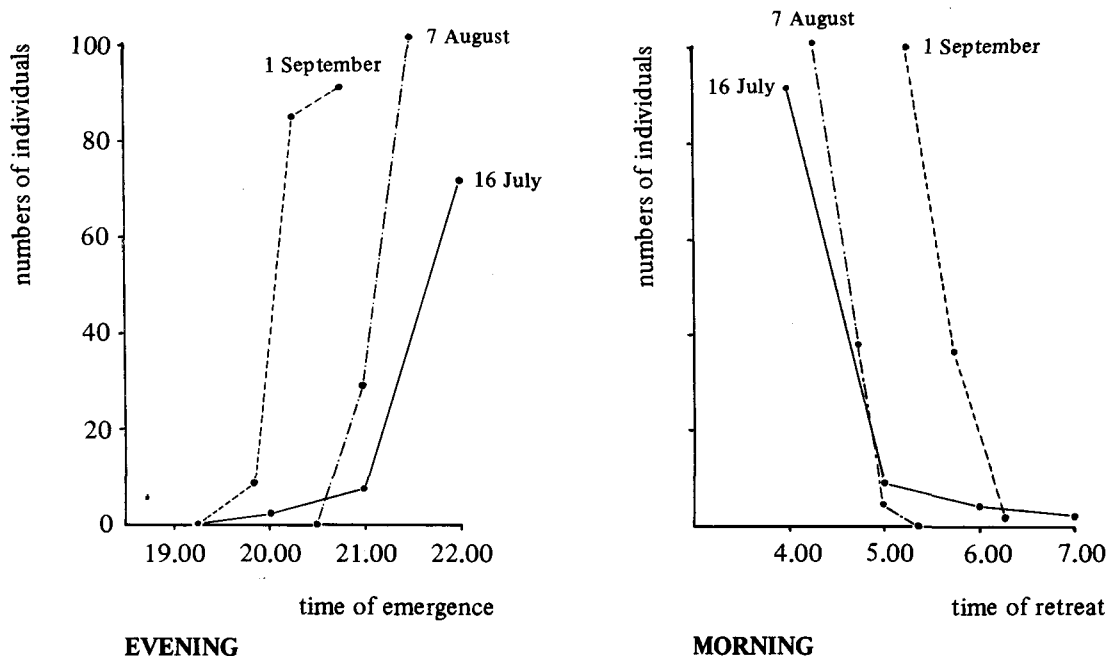


Fig 1: The emergence of *Zygiella* on to the web in the evening and the return to the retreat in the morning, on three different dates.

webs, mostly finishing their spinning; at 5.00 there were 5; at 5.10 there was only 1 still spinning. At 5.20 it finished, and by 5.21 had retired to its retreat. These observations were repeated on several occasions at other dates and localities, and similar results obtained. The graphs show three evening emergences and dawn retreats at different dates. It will be seen how they get earlier in the evening and later in the morning as the nights lengthen. Clearly this is a response to light intensity, and it seems that the effect is less abrupt in July, with a longer twilight, than it is later in the year. A few young *Zygiella* established indoors on a branch behaved in the same way. It was found that by darkening the room artificially they could be made to emerge on to their webs during the day.

The life history of *Zygiella* has most recently been studied by Le Guelte (1962). In nature, emergence from the egg cocoon takes place in April, and the mature spiders mate in September, soon after which the males die. The females make their egg cocoons in September-October, and some may survive until

about January. The cocoons are usually placed in crevices. In town gardens they are often placed under the overhanging coping of a wall below the shrub on which the webs are spun. On one occasion 10 cocoons were collected from such a situation in the suburbs of Manchester on 9th November. They contained 329 eggs, of which 36.1% were dead. On 16th December 10 more cocoons were collected from the same place and of 249 eggs, 57.0% were dead. This seems a heavy mortality, there being no sign of parasitism or other obvious cause of death. One wonders whether atmospheric pollution was responsible since this was in 1934. Things may be very different now; but although smoke pollution has been reduced pesticides have entered the picture.

References

- LE GUELTE, L. 1962: Sur l'élevage et la croissance de l'araignée *Zilla z-notata*. *Bull.Mus.hist.nat.* Paris (2) 34: 288-292
- TILQUIN, A. 1942: *La toile géométrique des Araignées*. Paris