

secretary and editor. "Success" to him has meant not only scientific achievement but also the making and keeping of personal contacts between Members and the encouragement of all sorts of joint social ventures. That he has decided that the time has now come for him to seek a well earned rest we must regret, but we may be assured that he will not cease to be a very active Member and to contribute for many a year to the continuing success of the enterprise he started ten years ago.

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#### A PRELIMINARY STUDY OF

#### THE LIFE HISTORY OF SITPICUS FLORICOLA (C.L.KOCH).

by A.M.WILD.

Introduction. In 1957 (1) I published a small note on an observed case of longevity of spermatozoa in Sitticus floricola (C.L.Koch). This phenomenon was noted during an attempt to make a study of the life history of this species (which was recorded in diary form). There are gaps in the story but twelve years have now passed and I see little chance of completing the work myself. I have therefore reported my preliminary findings in this article. The whole account is set down more or less as it appeared in my spider diary, quite informally and in a verbose manner. To have made a formal paper of it would have necessitated rehashing my notes, attempting to identify the spider's food, etc. For this, I could not find the time and I therefore ask for the reader's tolerance. I have to thank Mr. Mackie for much help in getting these notes ready for publication.

On 27th May 1956 an adult male and a sub-adult female of Sitticus floricola (C.L.Koch) were collected at the Nunsmere area of Delamere Forest, Cheshire. These were placed in separate 2" x  $\frac{1}{2}$ " glass tubes along with a little moss and a cottongrass head (Eriophorum sp.). The tubes were closed by a moist cotton wool plug. On the 26th June the female became adult and she accepted small house flies and also fruit flies.

On 27th June the male was introduced into the tube with the female. The male could not at first see the female because of the grass and moss being in the way, but he became immediately aware of her presence. He vibrated the legs and abdomen violently, 'drummed' with his palps and kept turning around, presumably not wishing to be taken unawares by the female. As soon as he sighted her, he reared up slightly and extended his front pair of legs stiffly upwards and outwards, quickly lowering them and raising them again. Then he began walking about with jerky vibrating steps, gradually approaching closer to her. Once, when she appeared to be frightened and began to back away, he reassured her by signalling again with his front legs and violently vibrating his abdomen. When he was about an inch and a half away she moved a little towards him, with her own front legs stretched out but much less noticeably than in the case of the male. Without hesitation, the male advanced and touched her with extended front legs, and then 'tickled' her. He mounted her (via the side of the abdomen) facing in the opposite direction and vibrated his abdomen violently from time to time. He applied his palps

over one side of the abdomen. They remained together for 45 minutes before the male moved quickly away. The male was then removed from the tube and separated from the female. The female, who before courtship, was decidedly lethargic became much more lively after the mating.

On the 22nd July as the female had laid no eggs, the pair were mated a second time. This time there was very little courtship, the female showing no fear or aggression. The male mounted the female three times but altogether they were not in copulation longer than 22 minutes. The pair were then separated and on the 29th July the male died, presumably of old age.

By the 9th August the female was now visibly larger, and her appetite was enormous after the second intercourse. She now constructed a spherical silk nursery, nearly half an inch in diameter, above the grass and moss placed in the tube, and retired within it. By the 10th August she could with difficulty be observed through the wall of the nursery and appeared to be holding a pinkish coloured cocoon.

On the 12th August I cautiously made a small hole in the tough silk forming the nursery. The mother vigorously attacked the mounted needles which I was using, lunging forward each time I gently prodded. Through the hole I could see her holding a cocoon of white silk and a faintly pink colouration due to the eggs within could be made out. The hole was repaired over the next day or so.

On the 11th September the mother emerged from the nursery having been there for a whole month. Presumably the eggs hatched on this date and this period was verified on a later batch of eggs. The 20th September was a sunny day and on this day the entire brood of young spiders emerged from the nursery. A total of 19 young were counted.

For purposes of identification this adult female, its first brood of young and a subsequent second brood were given identification letters as follows:

Mother = ♀ G1  
1st Brood = ♀ G2A or ♂ G2A  
2nd Brood = ♀ G2B or ♂ G2B

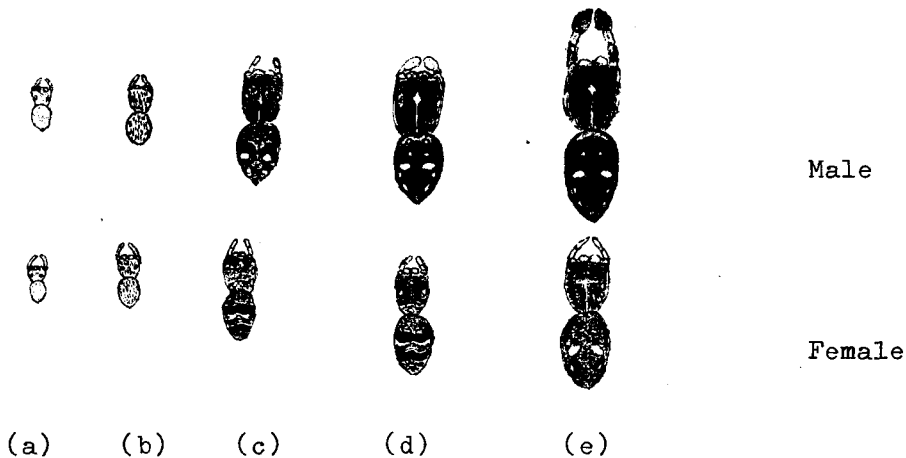
The following notes on their subsequent history are given in 'diary' form using the above coding and dates on which observations were made.

22-9-56. ♀♀ ♂♂ G2A were given some very small flies (? moss flies) and hymenoptera. The flies were attacked readily but the spiders backed away from the hymenoptera.

23-9-56. The nursery was opened up and contained the cast skins of the young. Some of the young were transferred to a second tube. Now, only 13 remained alive. The cephalothorax and abdomen are clothed with a uniform mixture of black and white hairs.

8-10-56. ♀ G1 (mother) built a spherical thick-walled retreat, much larger than a normal resting cell and retired within it. This is presumably her winter quarters.

21-10-56. Only about 10 of the G2A (1st brood) spiders are now alive but these are still taking food. (Note, this represents a 50% mortality after six weeks.)



(a) On hatching, (b) after first moult, (c) after second moult, (d) after third moult, (e) after fourth moult (male adult, female not adult).

Fig. 1. Stages in the development of Sitticus floricola (C.L.Koch)

3-3-57. ♀ G1 emerged from her winter quarters and accepted a gnat (or mosquito) very readily. Only two of the G2A spiders are now alive. One of these, like the rest of those which perished, came out of their cells during mild winter weather. The other is still in its winter cell and has been there since last October.

7-3-57. Only one of the G2A spiders is still alive and still in its cell. The mild damp weather may have been responsible for the death of the others which, having left their cell, could have been attacked by fungal growth.

12-3-57. G2A (the sole remaining young spider) emerged from its winter cell and accepted (with some hesitation) a tiny species of gnat. There may be a slight chance of rearing it if it will continue to feed.

13-3-57. G2A retired to its cell. I drove it out and got it to take another gnat, and it now seems more active. ♀ G1 is also well and active. On 17-3-57 G2A accepted a moss fly.

12-4-57. G2A has been feeding well, mostly on tiny gnats. Today it has retired to its cell and may moult shortly. By 16-4-57 G2A has moulted and the cast skin can be seen through the cell wall.

18-4-57. I coaxed G2A out of its cell (this was probably unwise). He is very lively and much more handsome after the moult. The pattern and colouring are very like those of the adult male i.e. predominantly black with a white arrow down the centre of the cephalothorax and typical pattern of white spots on the abdomen. (Later work confirmed that he was a male.)

- 27-4-57. ♀ G1 (mother) has built what appears to be a new nursery.
- 29-4-57. G2A has died of heat stroke having been left in an office over the weekend. The sun was shining through the windows and a leaking steam valve must have finished him off.
- 2-5-57. ♀ G1 has laid a fresh batch of eggs, visible through the nursery wall. These may be sterile unless sperms from last July can survive in her spermathecae over the winter.
- 25-5-57. ♀ G1 has emerged from the nursery (after 28 days) and accepted a small house fly. She returned to the nursery but I drove her out and placed her in a separate tube. I made a hole in the nursery wall and with a lens observed a number of apparently recently hatched spiderlings (of the second brood = G2B). This means that sperms have remained fertile for 9½ months. The young spiders are 'naked' and of a pale yellowish-brown colour, with the eyes very noticeable. They seem very feeble on their legs. I have plugged up the hole in the cell with cotton wool and this will be removed when necessary for observation.
- 1-6-57. G2B emerged from the nursery, 13 in all and they must have cast their skins within the last 24 hours because, (1) no skins could be observed in the nursery the previous day but were present today and, (2) they have developed a covering of black and white hairs within 24 hours.
- 15-6-57. I have found little food for the G2B spiderlings and have therefore permitted cannibalism. Unfortunately, only two are now left. These I have placed in separate tubes and am now getting enough small flies, green aphids, etc. to satisfy their appetites. They do not like the aphids but will accept them if really hungry.
- 17-6-57. ♀ G1 has made another nursery, much smaller than previously and has laid a fresh batch of eggs. Sperms presumably still fertile after 11 months.
- 20-6-57. ♀ G1 emerged from her nursery but later returned to it. On 29-6-57 she emerged again. A little later she was found dead. This gives a life span, for a female, of about two years (perhaps more). She has been kept 13 months in captivity.
- 4-7-57. One of the young spiders (G2B/1) has retired to its cell, having refused food. On 9-7-57 the other young spider (G2B/2) also retired to its cell.
- 10-7-57. G2B/1 has cast its second skin and is now resting in its cell; on 12-7-57 G2B/2 has also cast its second skin.
- 13-7-57. G2B/1 emerged from its cell and took a fruit fly. A pattern very like that of the adult male is clearly visible.
- 14-7-57. I opened up the nursery of the third brood of spiderlings (to be called G2C) 27 days after laying. Embryos are visible but appear to have dried up. Separate abdomen and cephalothorax can be made out, and limbs also, but these are not separated from the body wall.
- G2B/2 emerged from its cell and as the colour of the cephalothorax is predominantly brown and the abdomen much more brown than G2B/1, I imagine that G2B/1 is a male and G2B/2 a female. The markings on both are beautiful.

24-7-57. G2B/1 has stopped feeding and returned to a cell, the wall of which was greatly thickened over the next few days.

27-7-57. G2B/1 emerged from its cell but returned to it the same day.

30-7-57. G2B/2 has retired to a cell. It has eaten much less than G2B/1 and is a good deal smaller.

1-8-57. G2B/1 has shed its third skin in cell and on 3-8-57 G2B/2 also shed its third skin in the cell.

4-8-57. On this date both spiders emerged from their cells. G2B/1 is clearly a male as the palpal organs are beginning to form as pale pink, nearly spherical, swellings. His colouration is exactly that of the adult male. The general ground colour is rich sooty black. The anterior border of the cephalothorax is brown and there is a thin white line down the centre of the cephalothorax ending near the caput and shaped at the end like a diamond. The eyes are fringed with white hairs. The abdomen has a fine border of white hairs anteriorly and a series of snowy white spots from the middle to the posterior end, as shown in Fig. 1.

The other spider (G2B/2) is evidently a female. There is no sign of palpal organs and the general colour and pattern is similar to that of the previous instar and to that of the adult female, except for the abdominal spots which are not quite the same.

8-8-57. The weight of G2B/2 (♀) is 2.6 milligrams and that of G2B/1 (♂) is 5.3 milligrams, a clear indication of the difference in growth rates.

14-8-57. Both G2B♂ and G2B♀ have retired to their cells. Since the previous moult (11 and 13 days respectively) the male has eaten 11 flies larger than itself, whilst the female would only take 3 of these flies (and 2 very small flies).

24-8-57. G2B♂ has now changed his fourth skin and is adult.

G2B♀ has also changed her fourth skin but is not adult.

The pattern of the male is the same as before the moult but the palps are much larger and clothed with white hairs and the palpal organs of course are fully developed. The female now has the typical adult pattern but appears far from fully grown.

12 & 13-10-57. After feeding quite well over the last six weeks, both male and female have built dense winter cells and retired within them.

6-11-57. Unfortunately my observations on these spiders came to a halt at this time as I took up a two year appointment abroad. The spiders were handed over to a competent person who looked after them during the winter and reported that all went well until, at the beginning of spring 1958, the female who seemed to have survived the winter hibernation all right, suddenly died.

The male survived the winter well and lived on until mid-April 1958, when it also died. Its death was probably due to natural causes (old age) and 10½ months is a fair age for a male Salticid.

The hope of bringing the female to maturity and mating the new generation was not therefore realised, but I am sure it could be done if fruit flies were bred as a source of food instead of having to rely on chance capture of various flies, gnats, etc. (I did not realise how simple it was, at the time, to breed fruit flies.)

Further notes on rearing the young.

When the young spiders were separated from each other, I put them in small tubes about 0.4" diameter and 1.25" long to make the capture of prey easy. The mouth of the tube was plugged with moist cotton wool which was never allowed to dry up completely. In warm weather this meant daily moistening.

When the spiderlings were too lethargic to pursue their prey, I would force the cotton wool plug inwards with forceps to confine both the spider and its prey within the small space. This is a useful dodge. Small greenfly (aphis) were accepted but black aphis were rejected after biting (or touching), or avoided. There was one exception to this - a young and very hungry male did eat one black aphis. Fruit flies were accepted and really small gnats and moss (?) flies. Small hymenoptera (from windows) were avoided, the spider backing away from them. Gnat nymphs were also ignored, despite their wriggling. One other species of fly (a little larger than fruit flies) found commonly on brick walls above grass roots and elsewhere on brick walls, were taken very readily when the spiders were a little larger.

Life Span.

The male from the late spring brood matured in three months and lived 10½ months in all. It moulted only four times. The female (of the same brood) matured much more slowly, although its moults matched those of the male perfectly (see summary below) until the male reached maturity. I would think that the female, had she not died, would have moulted twice more (on both a size and time basis). This would have meant she would be mature in early June, i.e., one year to maturity. Since her mother (G1) lived one year after attaining maturity, we can say that the female of this species can live at least two years in captivity.

Summary of important dates for the G2B brood of Sitticus floricola.

	<u>♂G2B</u>	<u>♀G2B</u>
Eggs laid	2-5-57	2-5-57
Eggs hatched	25-5-57	25-5-57
First moult	31-5-57	31-5-57
Emerged from nursery	1-6-57	1-6-57
Second moult	10-7-57	12-7-57
Third moult	1-8-57	3-8-57
Fourth moult	24-8-57	24-8-57
Male adult	24-8-57	-----
Retired to winter cells	12-10-57	13-10-57
Died	mid-April 1958	March 1958

References.

(1) Wild, A.M. 1957. Notes on the biology and distribution of some British Spiders. Ann.Mag.Nat.Hist. Ser.12, vol. x, p.851.

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