The Legs That Rock the Cradle

Spider Mothers

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Spiders are excellent models to study behavioural diversity and evolutionary adaptations in the animal world. This article explores the strategies used by spiders to maximise the survival of their offspring.

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Children are the currency of evolution. Some may not agree. But the analogy goes like this: gene pool of the living world is a wealth accumulated over the aeons *via* trading processes of evolution through the currency of propagation namely spores, seeds, eggs, young ones, etc. Nature has really gone from rags to riches in terms of gene pool during the past 4 billion years. This would have been hardly possible without propagation, i.e., the ability of organisms to reproduce their own kind. Additionally, Nature has devised numerous ways to safeguard this currency; the underlying theme, however, is unique – 'parental care'.

From the canny pine trees that have evolved empty cones to distract the troubling squirrels, parental care has advanced to murky courtroom battles over custody of children. But in between, parents have been caring for their offspring in numerous different ways and at varying degrees. Spiders serve as an excellent model to take a glimpse at this extraordinary spectrum.

The 113 families of spiders, so far described throughout the world, exhibit a wide range of parental care behaviour. As described by Preston–Mafhams in *Spiders of the World*, this range of parental care behaviour varies from low investment like just laying the eggs as in the genus *Oonops* (Oonopidae), to the mother spider offering her corpse to her young ones to feed as in the social spider *Stegodyphus* (Eresidae).

It is indeed, 'maternal care' rather than parental care in spiders as there are so far no reports of males playing any role in car-

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ing for the offspring. Nevertheless, recently, Harvestman (Daddy longlegs) – a close relative of spiders – were found to exhibit exclusive 'paternal care'. So one might look out for a spider-man singing jingles to his tiny babies. Interestingly, my observations on *Tylorida ventralis* (Tetragnathidae) indicate that males of this species remain with females long after egg-laying.

We can ignore spiders that just lay eggs and leave them to their fate as our emphasis is on parental care. This may well be evolution's own way of setting exceptions to its own rules. There is evidence that presence of mother spider is responsible for the survival of more number of spiderlings. But again, as Preston–Mafhams have pointed out, the ultimate product of fecundity and parental care is not biased towards intensively caring spiders. A spider pair is often succeeded by only a pair of mature spiders irrespective of number of eggs or number of hatchlings or number of early survivors. Thus, the differential intensity of parental care could have evolved as a response to disparate environmental resistance experienced by different species.

The eggs are laid inside an egg-sac. The structure of the egg-sac also ranges from mere tangle of threads as in Pholcidae, to a very tough leathery envelope (*Figures* 1, 2). The sacs come in numerous shapes, with some like a minute ball as in *Ariamnes* (Theridiidae), like a beaded chain in *Cyrtophora* (Araneidae), like a kettledrum in *Argiope* (Araneidae), and so on. Many are covered with floss like silk in colours of green, yellow, golden, brown, etc. The spider first spins a small tough sheet of silk; lays eggs on it; then proceeds to cover it with another piece of leathery sheet. A spider may lay all its eggs in a single sac or make several sacs over a period of time in one breeding season.

Apart from the silken sacs that they weave to store their eggs, mother spiders have devised two strategies to protect the eggs – either babysit them or carry them along. In a way, the strategy depends on the way the spider obtains its food. The web-weaving spiders – Araneidae, Tetragnathidae, Theridiidae, Eresidae, etc., are comfortable sitting in or near their web waiting for the prey and watching the eggs simultaneously (*Figure* 3). Their egg-sacs

Figure 1. *Crossopriza lyoni* (Pholcidae) carrying egg mass in its jaws.

Figure 2. Tough leathery pear shaped egg-sac of *Argiope* sp. (Araneidae).

are hung inside their webs or are placed near the web. The wandering spiders (Lycosidae), on the other hand, must carry their egg-sacs along as they lead a gypsy life. However, babysitters are also common in the wandering spider families of Hersiliidae, Oxyopidae, Salticidae, Thomisidae, etc (*Figures* 4, 5). Pholcids – the tangle-web spinners, carry their egg-sac in their jaws. Like for many other tasks, spiders are known to rely on chemical cues for recognising their own egg-sacs. This is especially important for the spiders who carry their egg-sacs along.

The structure of spider egg-sacs shows wide variations, and some spiders even make their egg-sacs into tiny cradles crafted out of dry leaves and sticks.

Such babysitting is believed to be either dangerous or beneficial to the mother spiders by different scientists. The sedentary nature of this job is supposed to help the mother spider save her energy and minimise chances of encountering predators. But the usually prominent presence of egg-sacs can also jeopardise mothers' position. Albeit, many species have developed ingenious ways to

Figure 3. *Tetragnatha* sp. (Tetragnathidae) seldom moves away from its egg-sac.

Figure 4. *Cocalus* sp. (Salticidae) spider guarding its egg-sac.

Figure 5. *Angaeus pentagonalis* (Thomisidae) has selected a dry leaf to build its egg-sac and then attached it under a karonda leaf.

overcome this disadvantage. They sit on the egg-sac in such a way that their body covers it entirely. Their bodies being cryptic, the position is not easily given away. Moreover, spiders have evolved many techniques to hide their egg-sacs in folds and rolls of leaves, under flaking barks, etc. Some egg-sacs amazingly resemble bird droppings on leaves! (*Figure* 6)

Figure 6. *Eriovixia laglaizei* (Araneidae) with its egg-sacs that resemble bird droppings.

Some spiders have gone ahead and have made their egg-sacs into tiny cradles crafted out of dry leaves and sticks. A very interesting cradle is made by *Hamadruas* sp. It takes a small leaf and attaches its egg-sac to its side that will become concave upon drying. This leaf is hung with some threads in a foot-long gap between tips of two branches of a shrub. Another friend of this spider from the same family makes its cradle on a short stick and hangs it by a single strong thread (*Figure* 8). Both of these species babysit.

A *Thomisid* spider was observed to have selected a dry *Acacia auriculiformis* leaf to build its egg-sac and then attach it under a green leaf of *Carissa congesta*. The mother spider had made room for herself between the egg-sac and the green leaf.

Once the spiderlings hatch out of the eggs, they remain inside the egg-sac for a few days. They once moult inside and then emerge from the sac. This is, perhaps, facilitated by the mother by tearing away the leathery sac. In many spiders, the spiderlings are

Figure 7. *Hamadruas* sp.(Oxyopidae) with its ingenious cradle-like egg-sac and spiderlings.

Figure 8. *Hamataliwa* sp. (Oxyopidae) with its egg-sac built over a stick that hangs from a single transverse thread.

exact replicas of their parents. But their true colours and patterns become evident only after a few more moults. Till then, the spiderlings live huddled together, close to their egg-sac and mother feeding on the remains of the eggs and egg-sac. Mother obtains and provides food to the kids. Once the spiderlings develop independent hunting abilities, they disperse away from their mother's lap and go exploring on their own. Only then, the mother is relieved of her caring duty and breaks her fast in the true sense.

But Nature's paradoxes are beyond human imagination. The greatest enemy of spiders – the wasp – forages on them in another beautiful act of parental care. Most wasps store juicy prey in brain-dead state inside chambers specially built for the development of their offspring from egg to adult. Some mud-dauber and potter wasps specialise on spiders for this purpose. We once extracted 104 spiders stored as food for a single larva of a certain mud-dauber wasp! Out of these, 92 belonged to a single species of spider!

Nevertheless, spiders have been successful at propagating their progenies irrespective of all such risks. Surely, there is a significant role of parental care in that.

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Suggested Reading

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