

The Tale of a Spider

...she wasn't feeling too well today.

She got used to that strange, blunt pressure around the top of his abdomen now.

But it was something else, that bothered her.

She wasn't really acting like herself lately. It was an undefinable feeling that somehow she was being manipulated. Manipulated to do things she didn't intend doing. She felt like being a puppet, or someone's marionette dummy. How could this be possible?

While her neighbours carried along doing normal spider- business,- spinning standard insect-catching webs-, she was creating something else. And she didn't know why..... all she knew that it was this urge inside, a sudden, weird and unstoppable need to go and start weaving....yes, a COCOON WEB!

Round and round, back and forth, back and forth. Is it strong enough now?

After 10 hours of relentless weaving the web is ready now. Beautiful, strong and purpose-built. But for whom?

She feels tired. She must rest. Let's just sit on this web for a while.... just for a little while...

Then- darkness.

.....

Fascinated by this behaviour? Welcome to the compelling world of host manipulation by parasitoids.

Allow me to introduce you to a koinobiont spider ectoparasitoid – an Ichneumon wasp (in this case our wasp is from the Genus- *Acrodactyla*), which specialises in using spiders as the food source for their larvae.

The story above describes the last day of the spider host parasitised by a larvae of such wasp.

The female Ichneumon skillfully chooses its spider-host, then temporarily paralyzes it. After laying a single egg onto the dorsal surface of the spider's abdomen the host recovers and resumes its activities while the

larva grows. The host is eventually destroyed and consumed by the growing larva- the expression parasitoid is used to describe this phenomenon. Koinobiont parasitoids allow the host to continue on living, feeding and developing until the larva ready to pupate.



Web-building *Tetragnatha* sp. being parasitised by *Acrodactyla* larvae (K.Fekete, 2016)

But that is not the whole story!

This tiny larva has evolved mind-blowing strategies,- still not fully understood,- which are used to re-programme the spider's web making process. The reason for this is cunningly obvious- SURVIVAL! The cocoon web is simpler, stronger and provides better chance for the pupa to survive inside it against the challenging weather conditions and enemies. The parasitoid pupa is surprisingly vulnerable to heavy rain!

The cocoon web construction contains few reinforced elements such as extra strong central hub and frame but on the other hand some of the components are reduced e.g. web spiral.

The three different web types (normal orb, resting web and cocoon web) are not surprisingly showing differences between the breaking force of their radial and frame threads. If it was a competition for the title: Most Durable Web,- the cocoon web would be a clear winner. The tougher structured cocoon webs provide better resilience and therefore better protection for the pupa.

The exact mechanism of manipulation is thought to be chemically- rather than physically induced. Even if the larva is removed before its pupating time the spider will still proceed to construct a cocoon web.

Still, there is so much to learn about these host manipulative mechanisms. What is clear from this example that these parasitoids possess an extremely sophisticated mechanism whereby they are able to control the

behaviour of a much bigger organism they entirely rely on for their survival.

I think we can agree on that host manipulation is nothing short of being an ingenious phenomenon.

So, I m afraid, our spider did not stand much of a chance from the moment the female Ichenumon wasp laid an eye (and an egg) on her.....

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