Role of Xenorhabdus symbionts in the production and regulation of Steinernema Venom Proteins

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Numerous studies have demonstrated that *Xenorhabdus* symbionts play a key role in aiding *Steinernema* IJs invade insect host by producing toxins, virulence factors and secondary metabolites. When IJs invade an insect host, they need to escape to host's encapsulation and melanization. Furthermore, it has demonstrated venom proteins are released when IJs initiate active parasitism. This venom proteins display toxicity in several insect hosts even when harvested from aposymbiotic nematodes. Our team recently conducted a transcriptomic analysis of two *Steinernema-Xenorhabdus* symbiotic pairs: *Steinernema carpocapsae-Xenorhabdus nematophila* and *Steinernema puntauvense-Xenorhabdus bovienii*. Results from this study showed a strong differential expression of transcripts homologous to venom proteins in IJs depleted of *Xenorhabdus*. Specifically, a general down-regulation of the ubiquitin family was denoted for both species, in IJs reared in the absence of their symbiont. Additionally, an up-regulation of trypsin-like serine protease (TrypSPc) and the trypsin inhibitor (TIL) in aposymbiotic *S. carpocapsae* IJs, whereas a down-regulation of the TIL protein was denoted in *S. puntauvense*. The observed contrasting variation in the expression of venom proteins in the two tested *Steinernema* species suggests the mechanisms involved in the production and regulation of venom proteins may be species-specific. It can also be inferred it is an adaptation by the nematodes to compensate for the absence of their symbiotic partners.