

Using OMICs Approaches to Investigate Venomic Insights into the Spider Web Silk

Authors : Franciele G. Esteves, Jose R. A. dos Santos-Pinto, Caroline L. de Souza, Mario S. Palma

Abstract : Orb-weaving spiders use a very strong, stickiness, and elastic web to catch the prey. These web properties would be enough for the entrapment of prey; however, these spiders may be hiding venomous secrets on the web, which are being revealed now. Here we provide strong proteome, peptidome, and transcriptomic evidence for the presence of toxic components on the web silk from *Nephila clavipes*. Our scientific outcomes revealed, both in the web silk and in the silk-producing glands, a wide diversity of toxins/neurotoxins, defensins, and proteolytic enzymes. These toxins/neurotoxins are similar to toxins isolated from animal venoms, such as Sphigomyelinase D, Latrotoxins, Zodatoxins, Ctenitoxin Pn and Pk, Agatoxins and Theraphotoxin. Moreover, the insect-toxicity results with the web silk crude extract demonstrated that these toxic components can be lethal and/or cause paralytic effects to the prey. Therefore, through OMICs approaches, the results presented until now may contribute to a better understanding of the chemical and ecological interaction of these compounds in insect-prey capture by spider web *N. clavipes*, demonstrating that the web is not only a simple mechanical tool but has a chemical-active involvement in prey capture. Moreover, the results can also contribute to future studies of possible development of a selective insecticide or even in possible pharmacological applications.

Keywords : web silk toxins, silk-producing glands, de novo transcriptome assembly, LCMS-based proteomics

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