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# DEVELOPING A SUPER PRODUCER OF RECOMBINANT SPIDER SILK PROTEIN IN ESCHERICHIA COLI BL21 (DE3)

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**Introduction.** Spider Silk is one of nature's toughest materials. It is 5 times stronger than steel and has highly elastic properties. However, harvesting natural spider silk is not an efficient process due to the highly cannibalistic nature of spiders which doesn't allow farming them on a large scale. Moreover, spiders produce minimal amounts of silk that do not suffice on a commercial scale. Producing the spider silk protein in *Escherichia coli* can be achieved in relatively large quantities and with an economically reasonable cost.

**Main Part.** The genetic sequences of the spider silk protein-producing gene was collected, and the one with the easiest structure was selected to establish a primary production line. Further modifications were made, which are believed to result in silk fibers with several enhanced properties. Starting with strength, which can be significantly increased without much loss of yield by increasing the tRNA pool inside the bacteria to produce a native-sized protein [1]. Other methods manipulate the elasticity and or crystallinity of the resultant fiber to make it more elastic or more rigid. Moreover, recent articles elaborate on hybrid materials with spider silk as their basis to create materials with entirely new properties and added functionality [2]. In that regard, one of our main focuses is to surpass existing projects and enterprises that are researching spider silk applications. With resources such as the spider silk database (spider-silkome.org) and articles that study the collaboration between the silk protein genetic code and the resultant fiber features [3] we believe that we can effectively produce new materials that possess different, if not superior, qualities in comparison to the available products.

**Conclusions.** The current results we have are new genes which are expected to produce tougher and more elastic silks in comparison to the currently available variants. The gene development process is established and the protein production process is under development.

## References

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