

A Serine-rich Fibrous Protein from the Cocoons of a Parasitic Wasp

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Although cocoon production is often observed in lepidopteran insects, there are considerable species making cocoons outside of this order. Hymenoptera including bee, wasp and ant is one of such groups, and many species are known to make cocoons. We examined the cocoon protein of a parasitic wasp and found that its fibrous protein consisted of mainly serine and aspartic acid.

Cocoons of *Apanteles glomeratus* were obtained from larvae of the cabbage white butterfly, *Pieris rapa*. Glue protein of the cocoon fibers was removed by Takasu's method: That is, the cocoon shells freed from pupae were kept in 30 times (v/w) of aqueous 8M urea at 80°C for 10 min. Sixteen % of degummed loss was observed, and the amino acid composition of the extracted protein revealed a similar profile as the sericin from the silkworm *Bombyx mori*. The remaining fibers showed a good orientation under polarizing microscope and were regarded as the core of the wasp cocoon fibers. The amino acid composition of the fibers indicated that they consisted of mainly serine and aspartic acid. This profile of amino acid composition is very unique one as insect fibrous protein, because insect fibrous proteins so far reported are rich in glycine and alanine. The cocoon fibers were dissolved with 100 times (v/w) of aqueous saturated (~9M) lithium thiocyanate at room temperature. The dissolved protein was analyzed by SDS-PAGE, and it was revealed to consist of a single polypeptide having molecular mass of ~500 kDa, which showed a little decrease of the value after 2-mercaptoethanol treatment. A size exclusion chromatography of the above sample also showed similar results.

Since serine-rich cocoon protein has been reported to be limited to glue protein such as sericin, the finding of serine-rich, but not glycine/alanine-rich, fibrous protein in the wasp cocoons is unexpected and interesting from evolutionary aspects of fiber-structure formation. Further characterization of the novel fibrous protein is under progress.