

Film Formation and Structural Characterization of Silk of the Hornet *Vespa simillima xanthoptera* Cameron

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We extracted silk produced by the larva of the hornet *Vespa simillima xanthoptera* Cameron from its nest. Sodium dodecyl sulfate-polyacrylamide gel electrophoresis (SDS-PAGE) analysis of the extracted hornet silk showed four major components with molecular weights between 35 and 60 kDa. The main amino acid components of the hornet silk protein were Ala (33.5%), Ser (16.9%), Asp (8.5%) and Glu (8.1%). The hornet silk could be dissolved in hexafluoroisopropyl alcohol (HFIP) at 25 °C without incurring molecular degradation. A transparent film of hornet silk was obtained readily by the formation of a cast upon drying of the hornet silk in the HFIP solution. Residual HFIP solvent was removed from the film by extraction with pure water. Solid-state ¹³C NMR and FT-IR measurements revealed that the secondary structures of hornet silk proteins in the native state consisted of coexisting α -helix and β -sheet conformations. The β -sheet to α -helix ratio, which was changed by processing, was mainly responsible for the silk's thermostability.

Key words: Wasp Cocoon Protein, Amino Acid Composition, Molecular Conformation