



Hiver 2013  
**Conférence**  
au Département de chimie  
présentée conjointement avec  
**PROTEO**

CONFÉRENCIER

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DATE

**Mercredi, 23 janvier 2013**

TITRE

## **Unraveling spider wrapping silk architecture**

RÉSUMÉ

The mechanical properties of spider silks surpass those of any current synthetic material. We have produced recombinant spider wrapping silk, the toughest of the silk materials produced by spiders. This class of silk has a unique makeup, composed of a series of sequential 200 amino acid repeat units rather than the much shorter repetitive motifs usually associated with spider silks. Recombinant wrapping silk produced in *E. coli* may be manually drawn into fibres with mechanical properties and morphology akin to those of the native form. Using solution-state NMR, we have determined the high-resolution structure and polypeptide backbone dynamics of the 20 kDa wrapping silk repeat unit both in isolation in 40 kDa paired repeat units. An exquisitely modular «bead-on-a-string» architecture is apparent, comprising structurally identical  $\alpha$ -helical bundles connected by highly dynamic, disordered linkers. Notably, this is consistent with Raman spectroscopy (from Laval!) of wrapping silk in the spider gland. Furthermore, fibres may be readily drawn from solutions of the 40 kDa double-repeat construct under the NMR study conditions. Our solution-state repeat unit structure therefore appears intimately linked to the fibrillogenesis process. In our ongoing studies, we are determining the fate of this helical-bead-on-a-disordered-string architecture upon fibre formation, as significant  $\beta$ -strand character is evident both in recombinant and natural silk fibres. Beyond providing insight into this enigmatic process, such an understanding will facilitate engineering of wrapping silk-based functional (bio)materials.

Les conférences ont lieu à 11h au **VCH-3850** du **Pav. Alexandre-Vachon**  
Un café sera servi avant la conférence. Cordiale invitation à toutes et à tous !

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