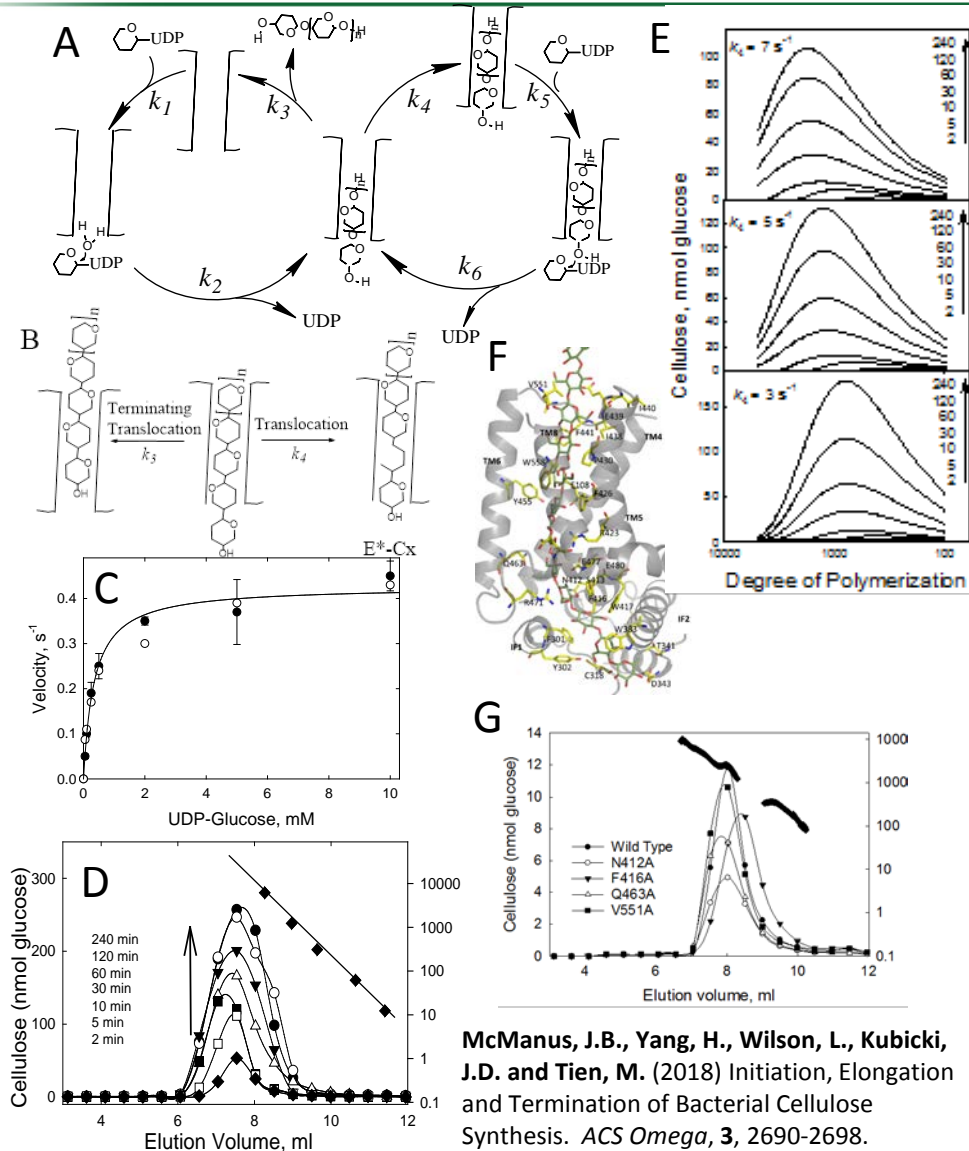


# Kinetic Model of Cellulose Synthase Activity; Structural Aspects Impacting Cellulose Degree of Polymerization (DP)



## Scientific Achievement

>A catalytic model of bacterial synthase processivity, including glucan chain initiation, elongation and termination, with kinetic constants.

>Point mutations identify residues impacting DP.

## Significance and Impact

This study identifies kinetic and structural aspects that govern cellulose synthase processivity, yielding insights for engineering cellulose properties (DP).

## Research Details

Processivity equals rounds of elongation before termination ( $k_4/k_3$ ). Steady state rate is dependent on elongation and initiation. A and B: overview of catalytic cycle. C: UDP-glc saturation curve (data + simulation). D: GPC profiles of cellulose made by isolated enzyme as function of time. E: Simulations of processivity with increasing  $k_4$ . F: Structure of bacterial synthase with glucan in channel. G: GPC profile of cellulose synthesized by synthases with point mutations, resulting in changes in cellulose DP.