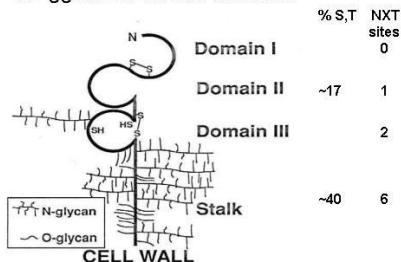


THE *S. CEREVISIAE* SEXUAL AGGLUTININS

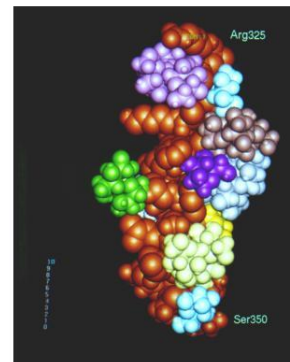
We are investigating the structure and roles of cell adhesion proteins and other cell surface markers in eukaryotes, especially yeast.

1. During mating in baker's yeast, *Saccharomyces cerevisiae*, two cell adhesion molecules bind the two yeast mating types together. This interaction is similar to those of other members of the immunoglobulin superfamily of cell adhesion proteins. In animals such proteins also have roles in fertilization, neurogenesis, and immune response.
 - a. **We study the structure** of these proteins using molecular modeling, circular dichroism spectroscopy, peptide mapping

α -Agglutinin Domain Structure



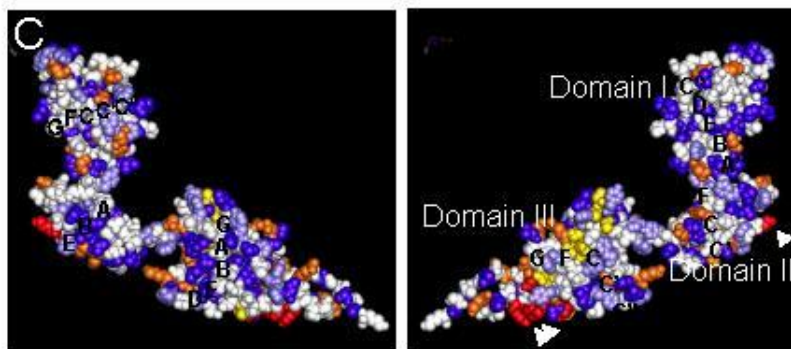
If the first 25 residues of the α -agglutinin stalk were in α -helical conformation:



Peptide in orange/brown

Glycosylations in other colors

Model of 3 Ig-like domains of α -agglutinin



- Important for binding
- Glycosylated
- Proteolysis site
- Hydrophobic aliphatic
- Aromatic

Biochemical, physical, and genetic studies are leading to three-dimensional models of the sexual cell adhesion proteins in baker's yeast, *Saccharomyces cerevisiae*. Currently (2006) we are overproducing these proteins for studies of domain function and glycosylation.

[Shen, Z.M., L. Wang, J. Pike, C.K. Jue, H. Zhao, H. de Nobel, J. Kurjan, and P.N. Lipke.](#) 2001. Delineation of Functional Regions within the Subunits of the *Saccharomyces cerevisiae* Cell Adhesion Molecule α -Agglutinin. *J. Biol. Chem.* 276:15768-15775

[Grigorescu, A., M.-H. Chen, H. Zhao, P.C. Kahn, and P.N. Lipke.](#) 2000. A CD2-based model of the yeast cell adhesion protein α -agglutinin elucidates solution and binding properties. *IUBMB Life* 50: 105-113.

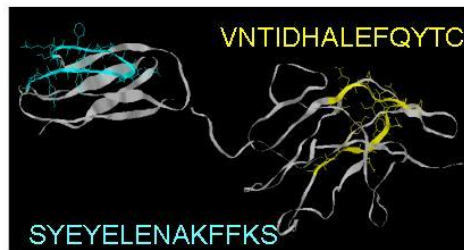
[de Nobel, H., P.N. Lipke, and J. Kurjan.](#) 1996. Identification of a ligand binding site in *Saccharomyces cerevisiae* α -agglutinin. *Cell. Mol. Biol.* 7: 143-153

[Chen, M.-H., Z.-M. Shen, S. Bobin, P.C. Kahn and P.N. Lipke.](#) 1995. Structure of *Saccharomyces cerevisiae* α -agglutinin: evidence for a yeast cell wall protein with multiple immunoglobulin-like domains with atypical disulfides. *J. Biol. Chem.* 270: 26168-26177

[Jue, C.K. and P.N. Lipke.](#) 2002. Roles of Fig2p in mating and agglutination in *Saccharomyces cerevisiae*. *Euk. Cell* 1: 843-845.

- b. **We also study the way that these proteins bind** to each other to form a bond that is specific for the opposite mating type, and very tight. To quote the old musical South Pacific: “Once you have found (him/her), never let (her/him) go.”—Rogers and Hart, These binding studies include showing that changes in protein structure drive tightening of the bond between two cells.

Peptides in α -Agglutinin that Switch Conformation



(Both regions have been implicated in binding)

[Zhao, H., M.H. Chen, Z.-M. Shen, P.C. Kahn, and P.N. Lipke.](#) 2001. Environmentally-induced conformational switching in the yeast cell adhesion protein, α -agglutinin. *Protein Science* 10: 1113-1123

[Zhao, H., Z.-M. Shen, P.C. Kahn, and P.N. Lipke.](#) 2001. Interaction of α -Agglutinin and α -Agglutinin, *Saccharomyces cerevisiae* Sexual Cell Adhesion Molecules. *J. Bacteriol.* 183: 2874-2880