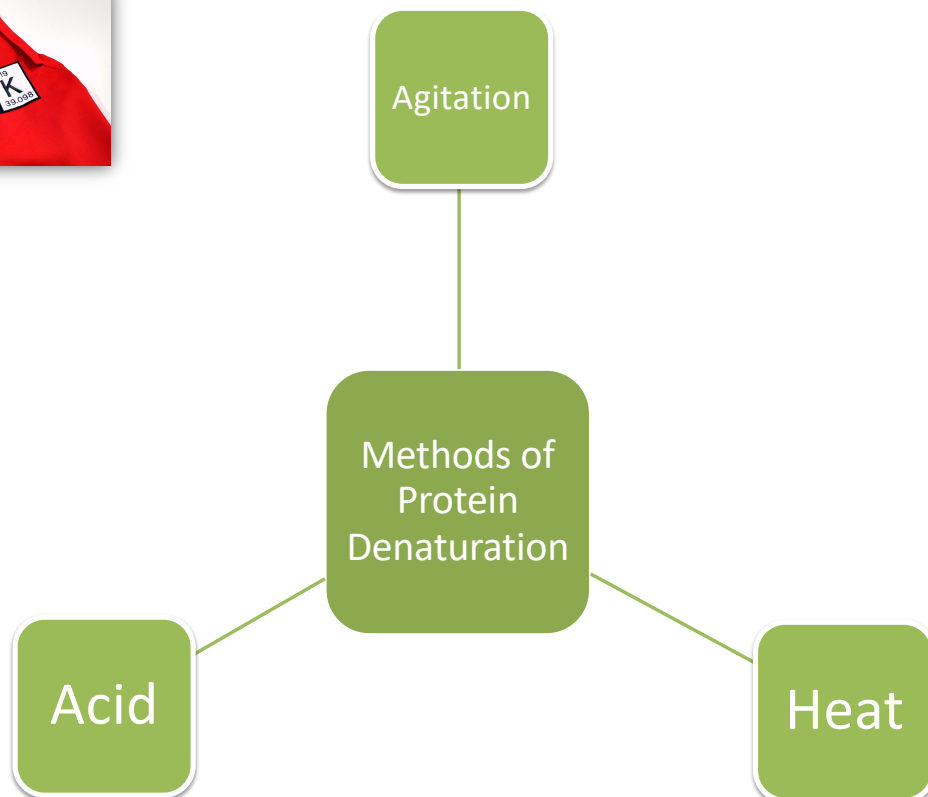
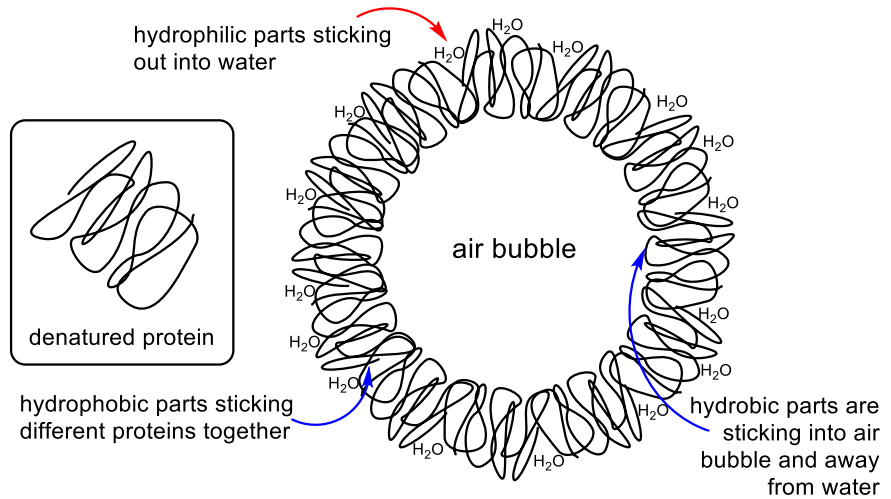




Variations on denaturation and coagulation

Cooking Eggs Part 2





Heating expands the air bubbles in the foam which **causes considerable rise**, and it also dries out the foam as water molecules evaporate. *When the proteins finally set enough from the heat* – the gas bubbles are trapped and can't expand anymore. The result is a **puffy/tall, hardened yet airy solid**.



Souffle

Why must the base be carefully folded in?



What is causing the rise?



Why did it shrink upon cooling?



These vanilla soufflés were made first by beating egg white into a stiff, glossy foam, then *folding* in a “base” to add flavor to the whites, then baked. The base contained egg yolks, milk, butter, flour, sugar and vanilla bean



What makes the foam?



Does *not* denature much with whipping/beating, but does denature with heat. This stabilizes the foam structure once cooked

Table 9-1 Proteins In Egg White Albumen [1]

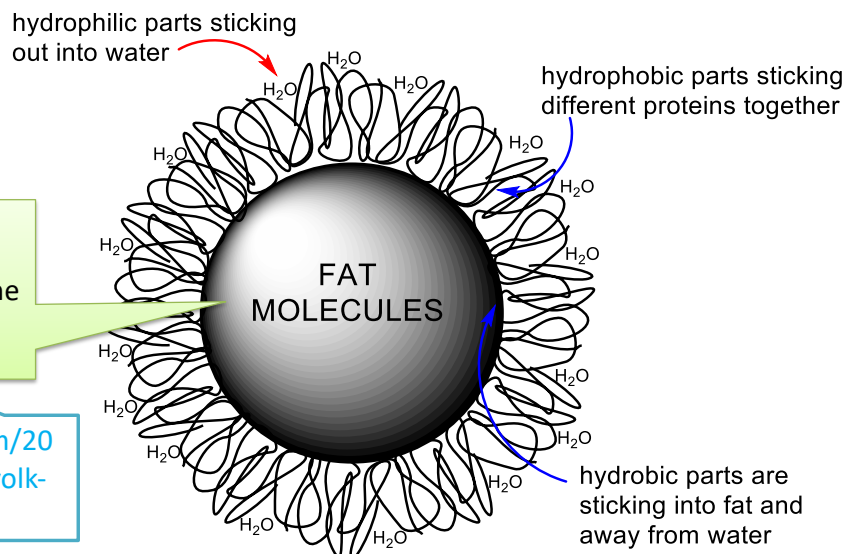
Protein	% of total	Natural Function
Ovalbumin	54	Nourishment for chick, <i>may</i> block digestive enzymes. Contains six cysteine residues. Two are engaged in a disulfide (-S-S-) bond.
Ovotransferrin	12	Binds iron
Ovomucoid	11	Blocks digestive enzymes
Globulins	8	Plug defects in membranes and shell
Lysozyme	3.5	Enzyme that digests bacterial cell walls
Ovomucin	1.5	Thickens albumen, inhibits viruses
Avidin	0.09	Binds the vitamin biotin
Others	10	Bind vitamins; block digestive enzymes....



Perfecting the egg white foam

Addition of fat to a foam stabilized by denatured protein is problematic for the foam...how much of a problem? Not epic..

<http://www.serious-eats.com/2014/10/is-it-true-not-to-get-yolk-in-egg-whites.html>



The denatured protein preferentially clusters around the fat molecules (since fats are very hydrophobic) and the air bubbles escape or never form in the first place.



Perfecting egg white foams



Getting more elastic and puffier egg white foams

- Copper bowl
- Cream of tartar (tartaric acid)
- Aging egg whites

Egg White Foams can get "overwhipped" and become grainy...this happens when the proteins denature and coagulate too tightly



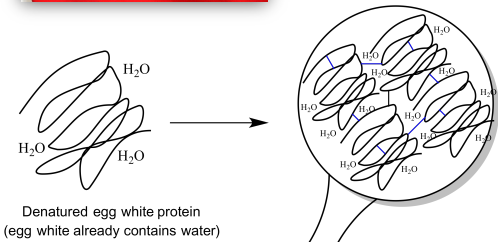
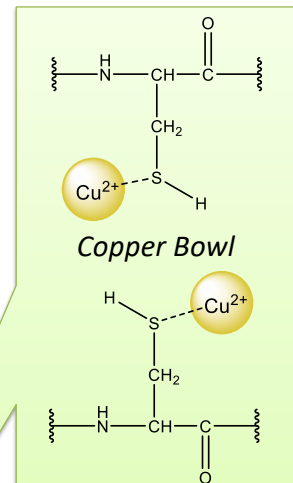
Stiff peaks



Overwhipped



Add acid (add H+) to make it harder for the S-H groups to lose H's and become S-S



overbeating

