

Structural biology techniques

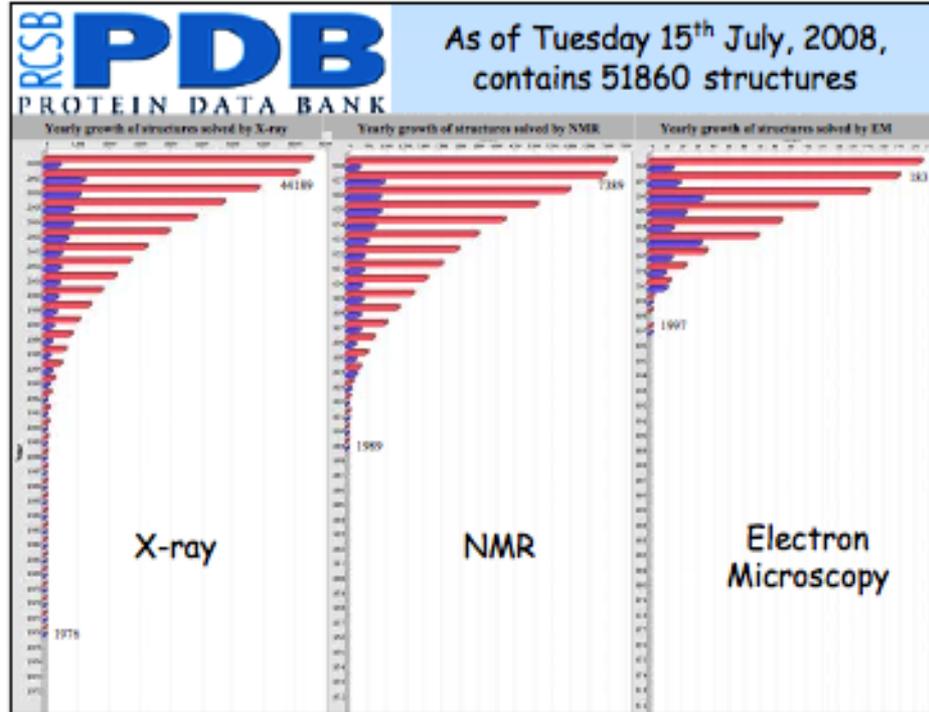
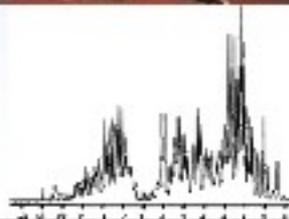
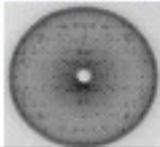
Current situation

High resolution (<1nm) structural tools:

X-ray diffraction

electron
microscopy

nuclear magnetic
resonance



Gene expression program

DNA



Transcription

RNA Pol I
RNA Pol II
RNA Pol III

RNA (rRNA,mRNA,tRNA)

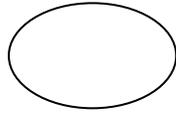


Translation

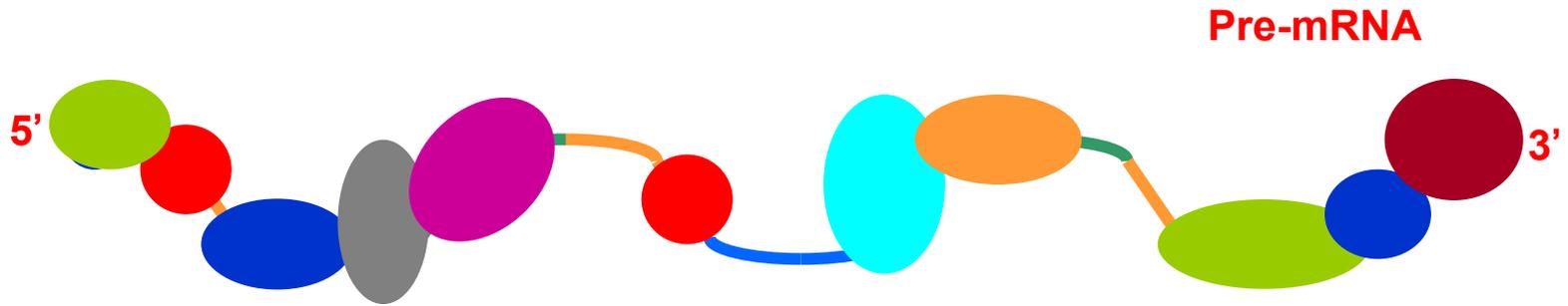
Protein

RNA biogenesis

RNA packaging, stability
5' capping, RNA editing
splicing, alternative splicing
3' end processing
(cleavage and polyadenylation)
export



RNA binding proteins

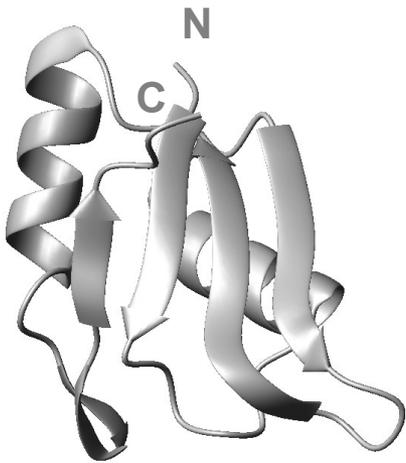


RNA binding proteins control the fate of the pre-mRNA

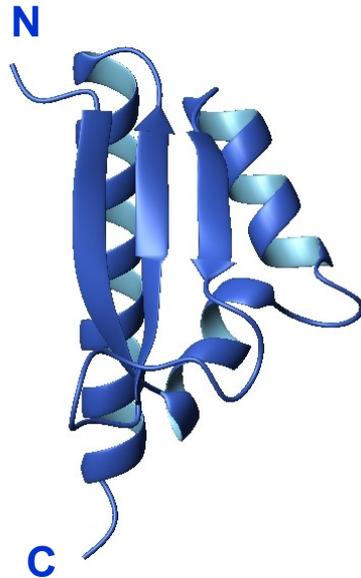
RNA binding proteins



RNA Binding Domain



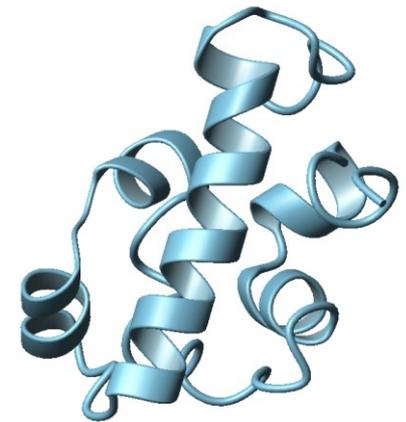
RRM/RBD/RNP



KH domain



dsRBM



SAM domain

RNA binding proteins of two types:

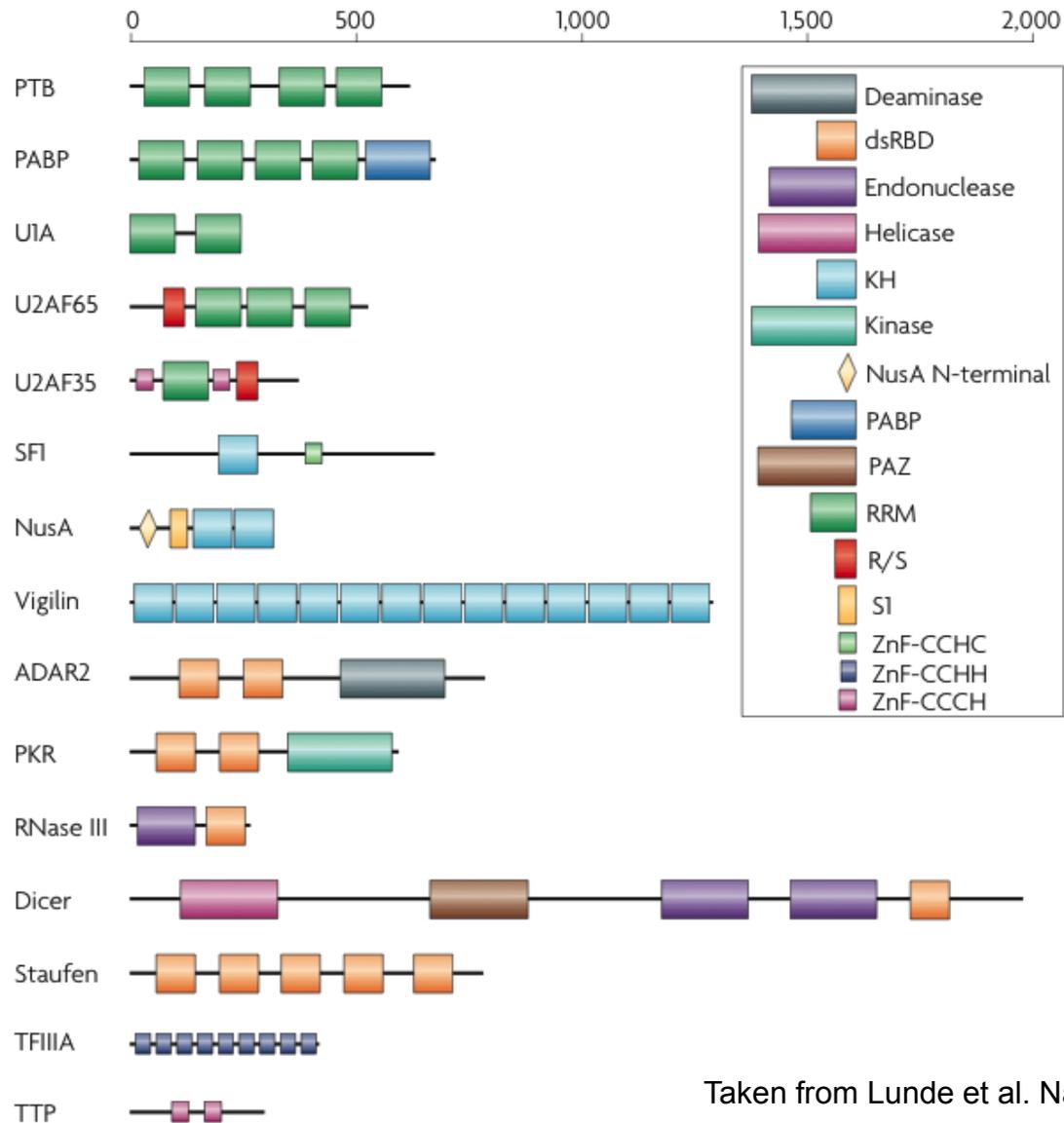
- **enzymes**

polymerase, nuclease, modifying enzymes

- **binding proteins**

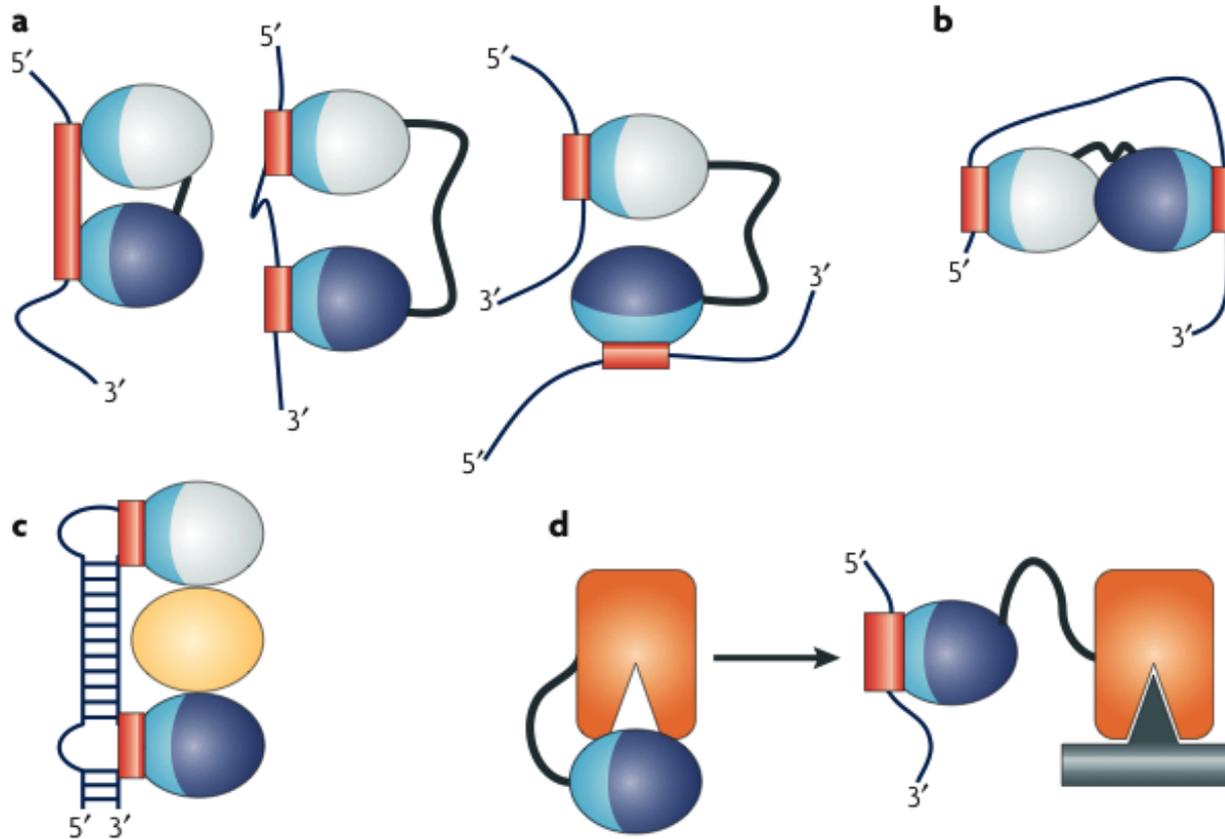
protection, folding (chaperone), gene regulation

Modular architecture of RNA-binding proteins



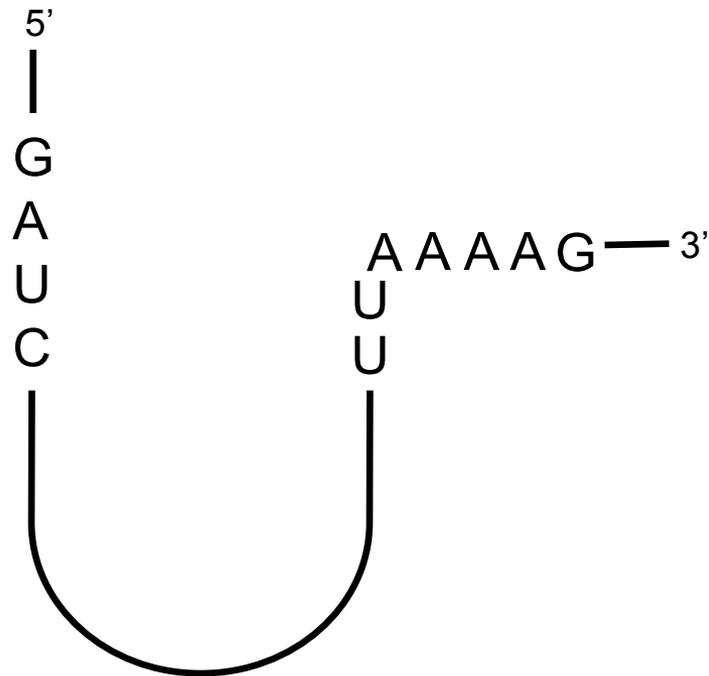
Taken from Lunde et al. Nat. Rev Mol. Cell Biol 2007

RNA-binding modules are often combined to perform multiple functional roles

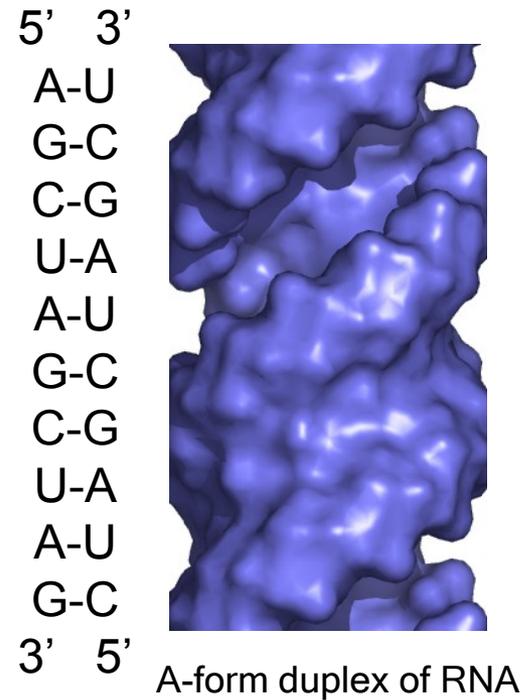


What information is recognized by proteins:

Recognition of RNA sequence

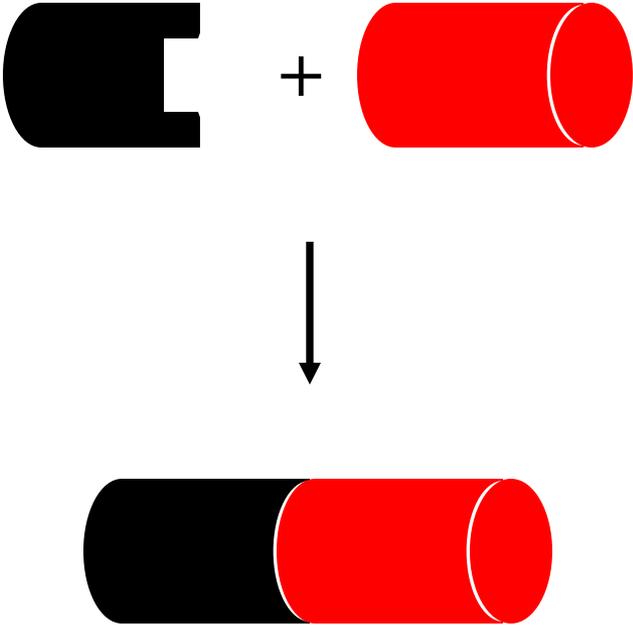


Recognition of RNA shape

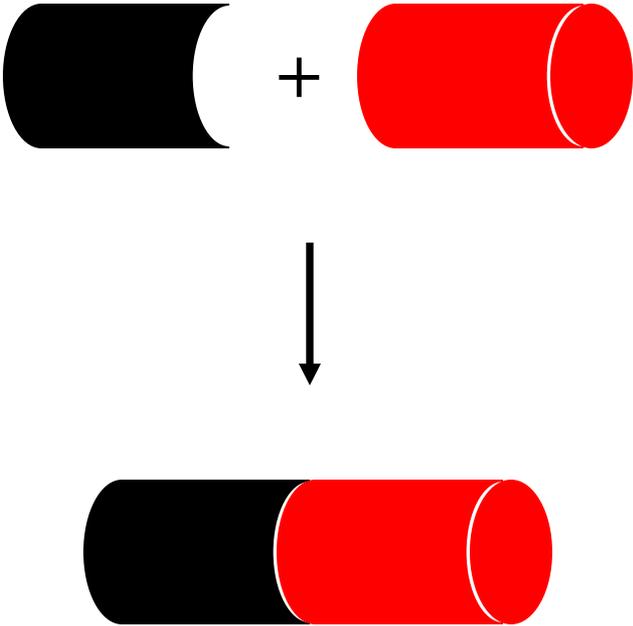


What recognition mode is used by proteins:

Induced fit



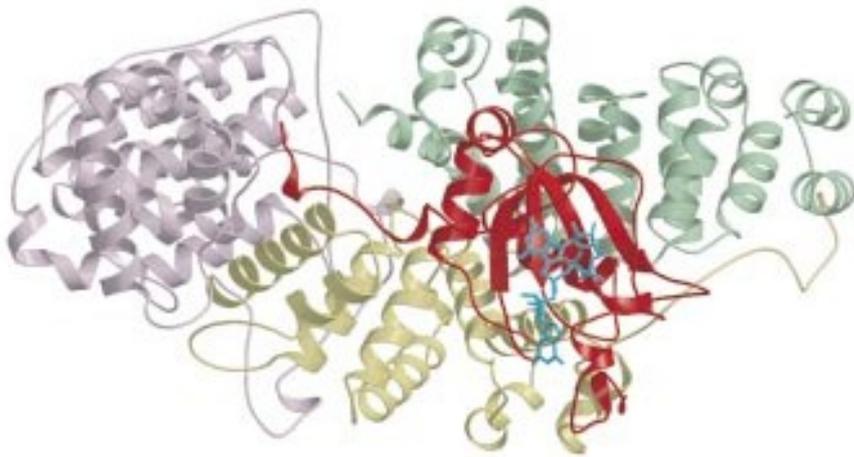
Rigid-body docking



Induced fit binding

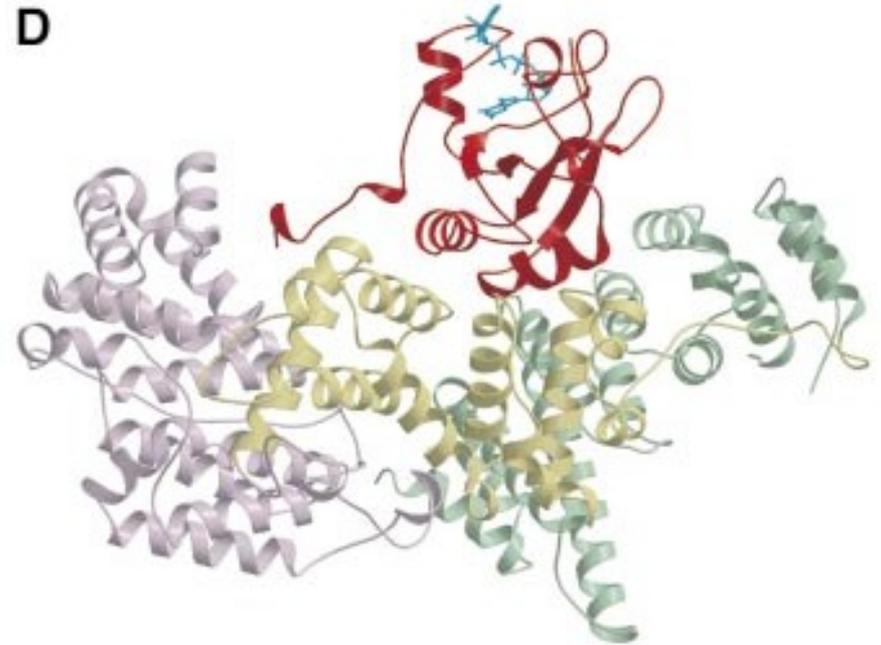
5' cap binding protein, **CBP20**-CBP80

C



CBP20-CBP80

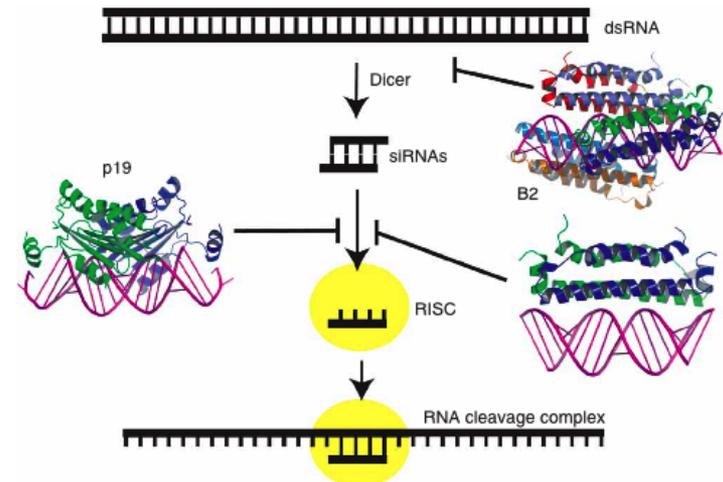
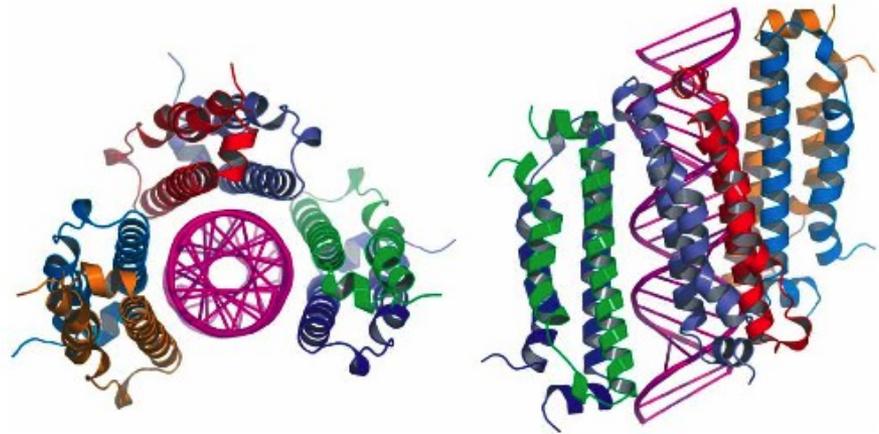
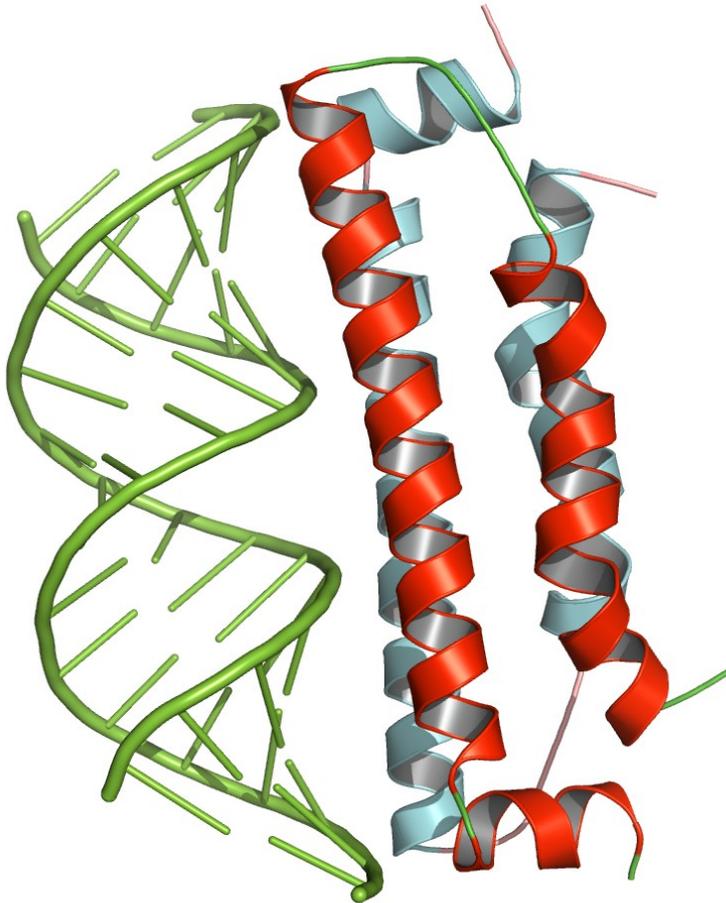
D



Mazza et al, EMBO J (2002)

Viral B2 protein supresses RNAi by masking dsRNA or siRNA.

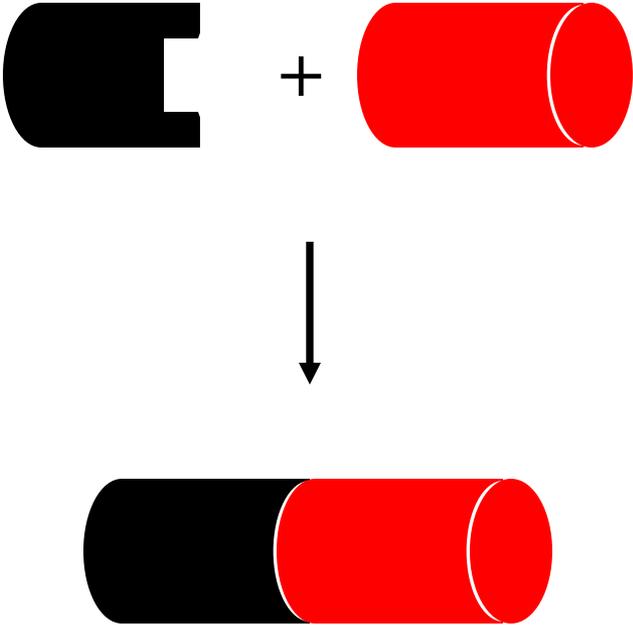
Rigid-body docking



Taken from Chao et al. Nat. Struct. Mol. Biol. 2005

What recognition mode is used by proteins:

Induced fit



Rigid-body docking

