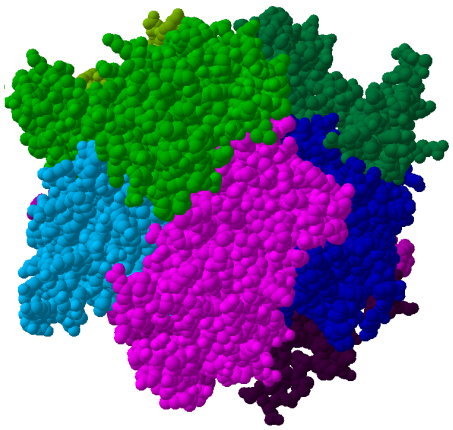
CONCEPT: COMPLEX PROTEIN STRUCTURES

- Proteins are often made up of more than one polypeptide chain
    - □ **Binding sites** on polypeptide chains allow for them to interact with other polypeptide chains and complexes
    - □ **Multi-protein complexes** are made up of multiple polypeptide chains with _____ functions
        - These are dynamic structures, and can assemble and disassemble in response to cellular signals
        - Example include protein machines that drive DNA synthesis, RNA processing, and ATP creation
    - □ Stabilization of large protein complexes occurs through covalent _____ bonds
        - Especially common in the extracellular matrix
    - □ Mostly, noncovalent bonds connect polypeptide chains together

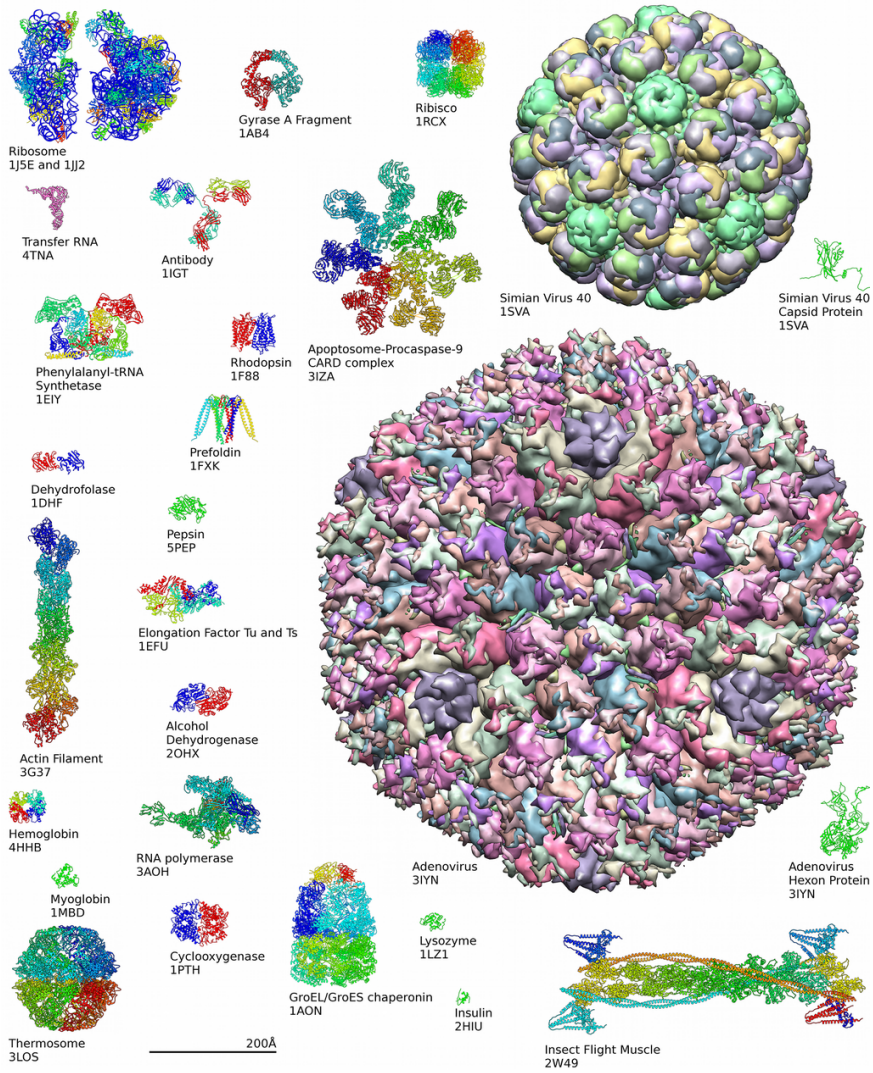
EXAMPLE: The exosome multi-protein complex is made up of 6 proteins represented by a different color



- Proteins and multi-protein complexes can form _____ shapes
    - □ *Helices* are a common shape of proteins
        - Helix is most energetically favorable way to link similar subunits in a long repetitive chain
    - □ Elongated fibrous shapes are another common shape of proteins
        - Fibrous proteins found in skin or the extracellular matrix
    - □ Compact globular shapes are a common shape of proteins
    - □ Unstructured polypeptide chains can provide flexibility to large protein structures

- Can be covalently cross-linked to create an elastic meshwork (Ex. Elastin)

EXAMPLE: Examples of diverse protein shapes



PRACTICE

1. What type of bonds hold polypeptide chains together to form complex proteins?
    a. Covalent bonds
    b. Phosphodiester bonds
    c. Ester bonds
    d. Noncovalent bonds

2. True or False: Due to the number of polypeptide chains, multiple protein complexes can only have a singular, globular shape.
    a. True
    b. False