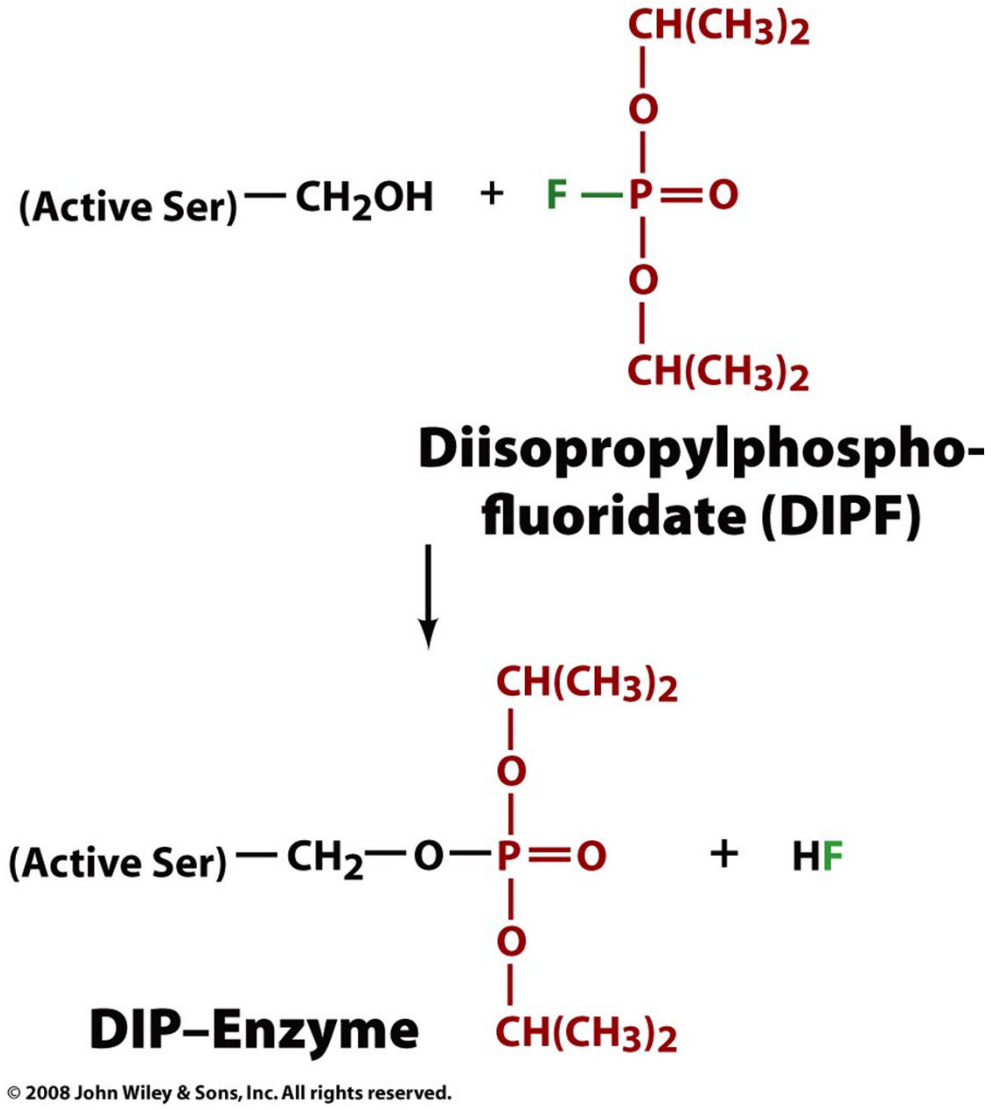
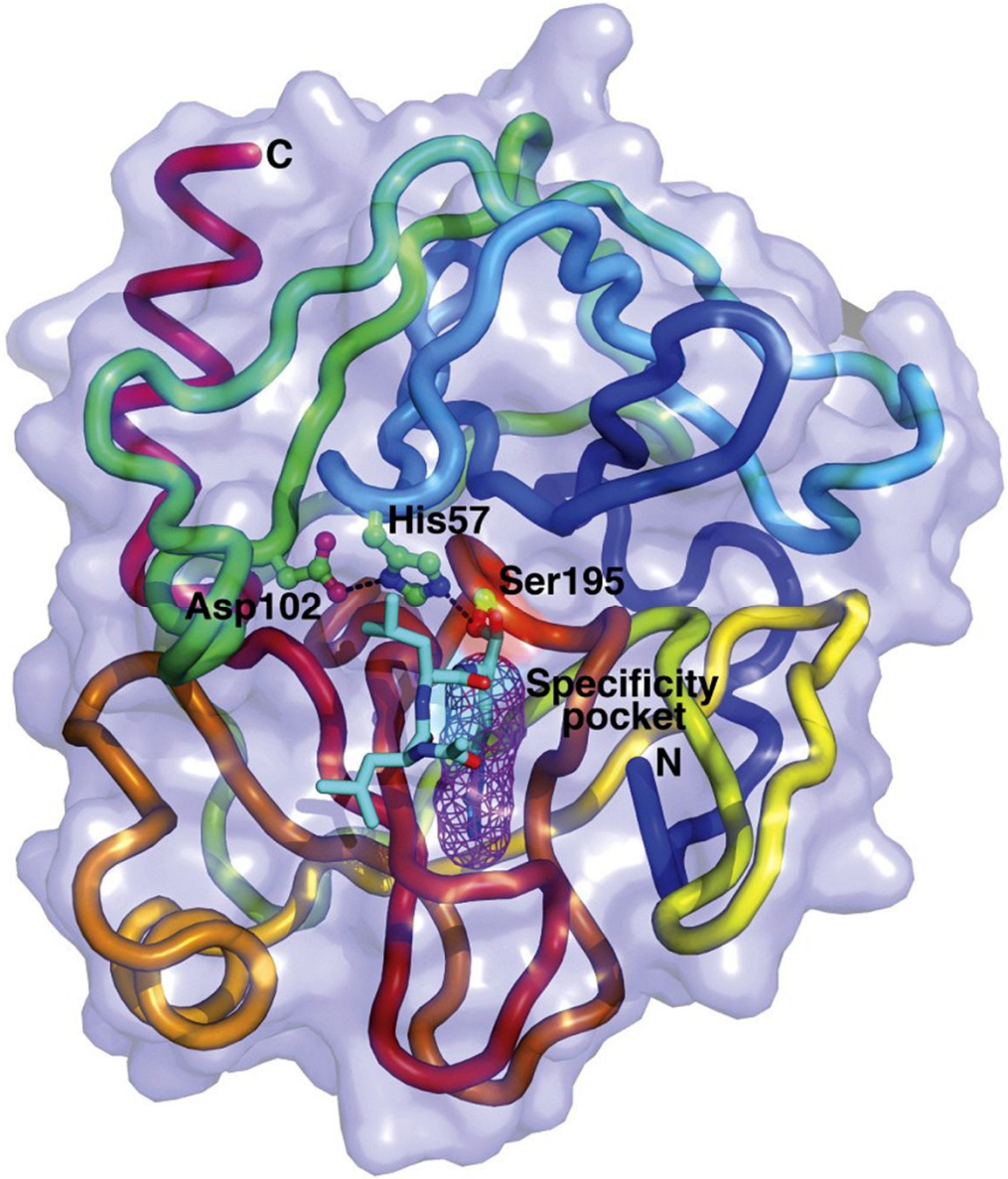
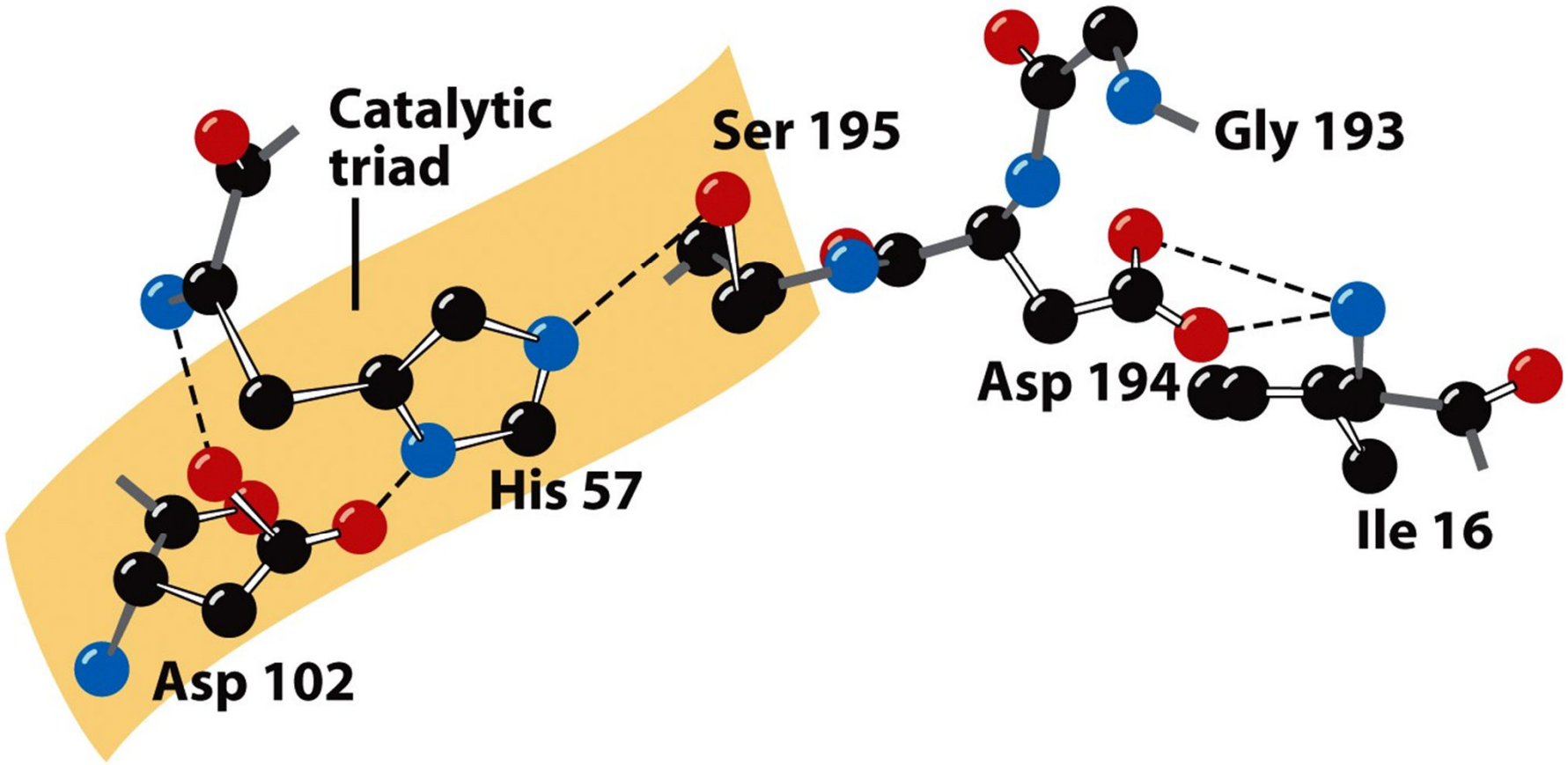
Serine proteases have a reactive serine



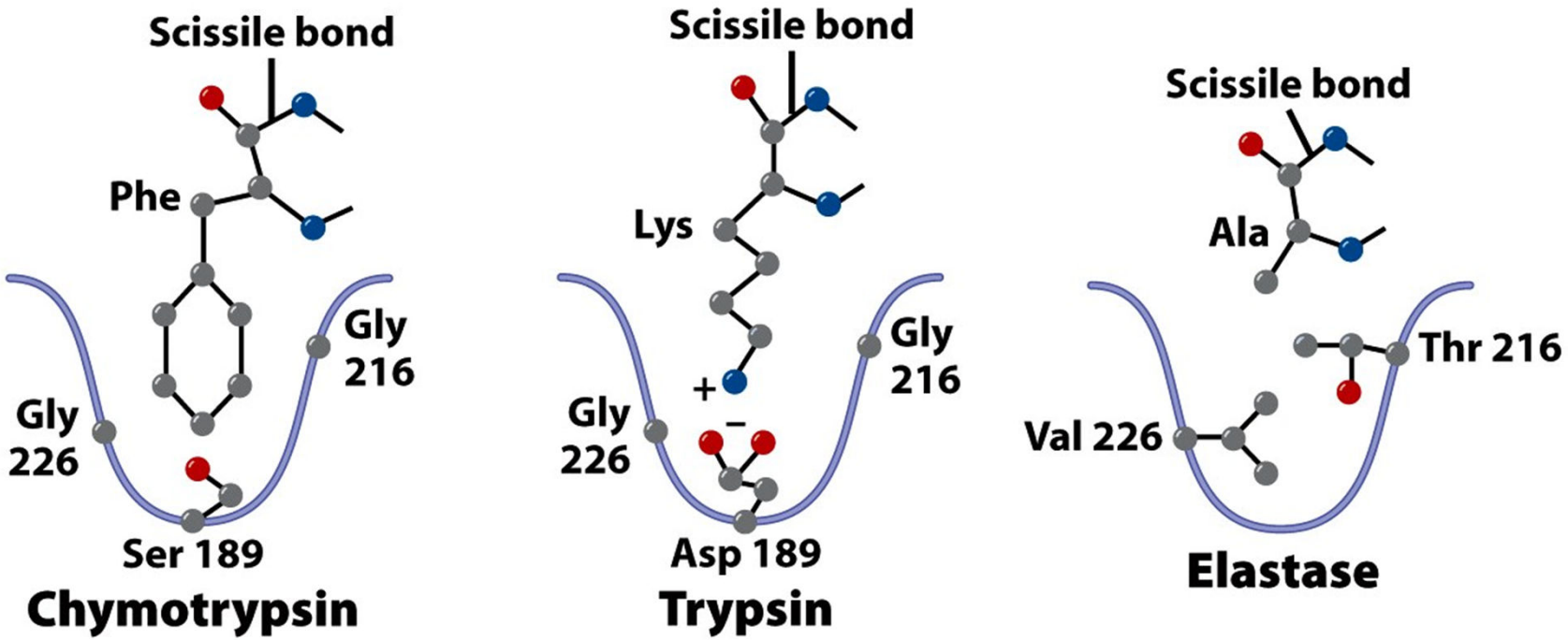
Trypsin is a serine protease



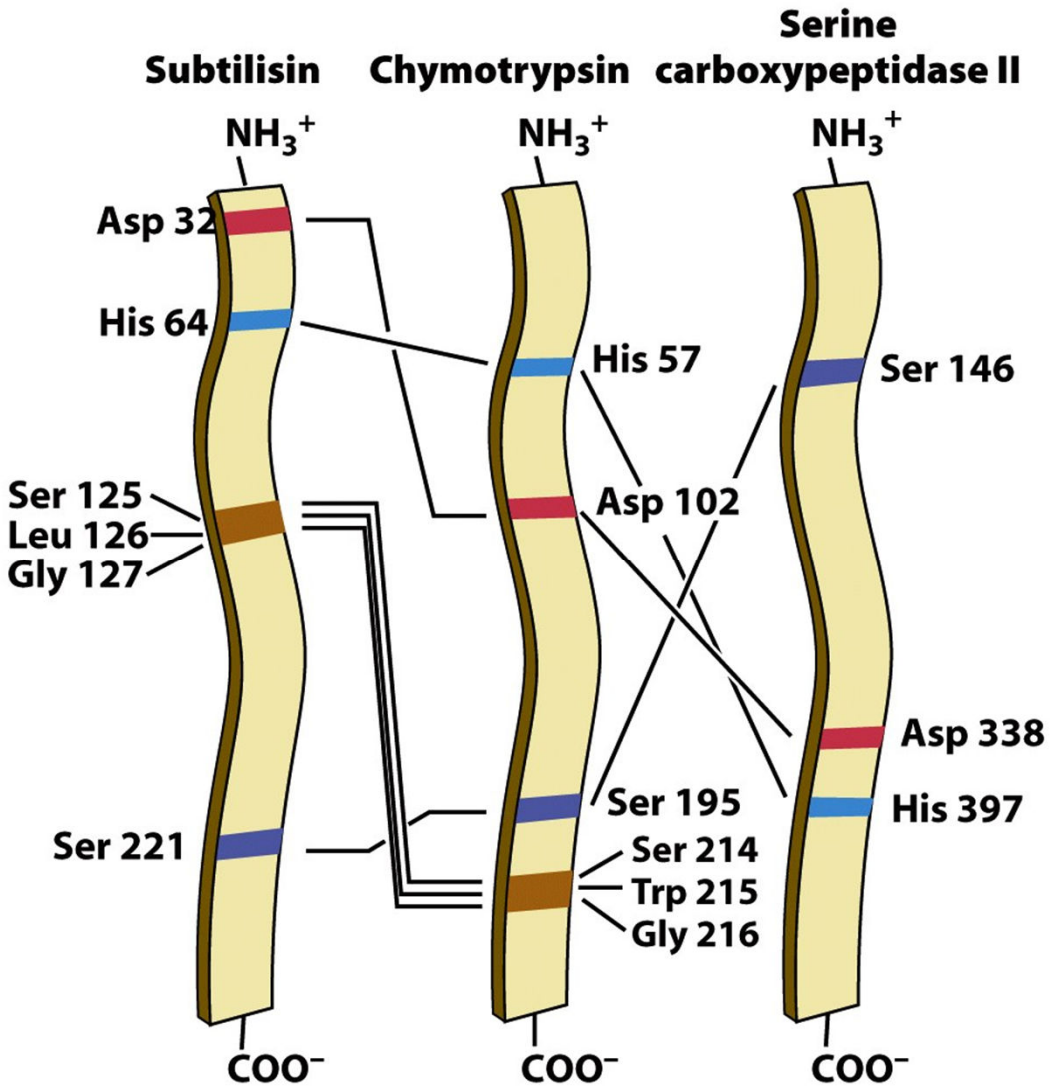
All serine proteases have an active site catalytic triad containing Ser, His, and Asp



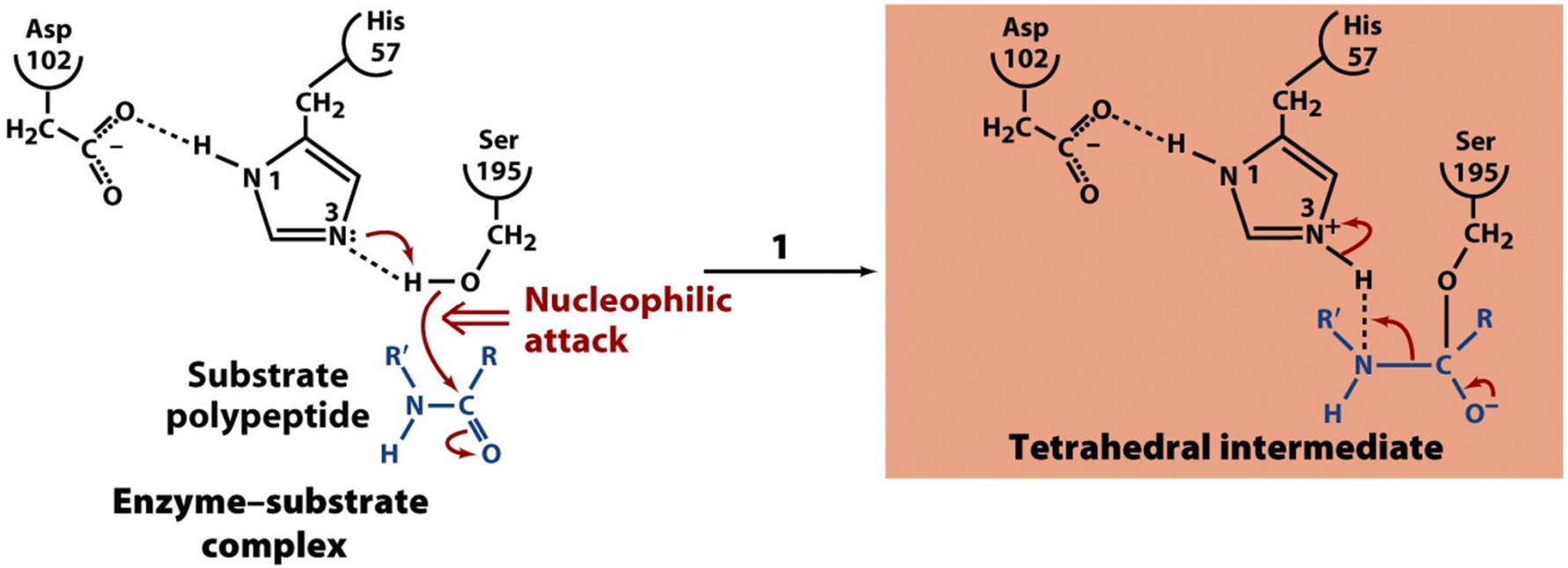
Serine proteases differ in their substrate specificity (differing specificity pockets)

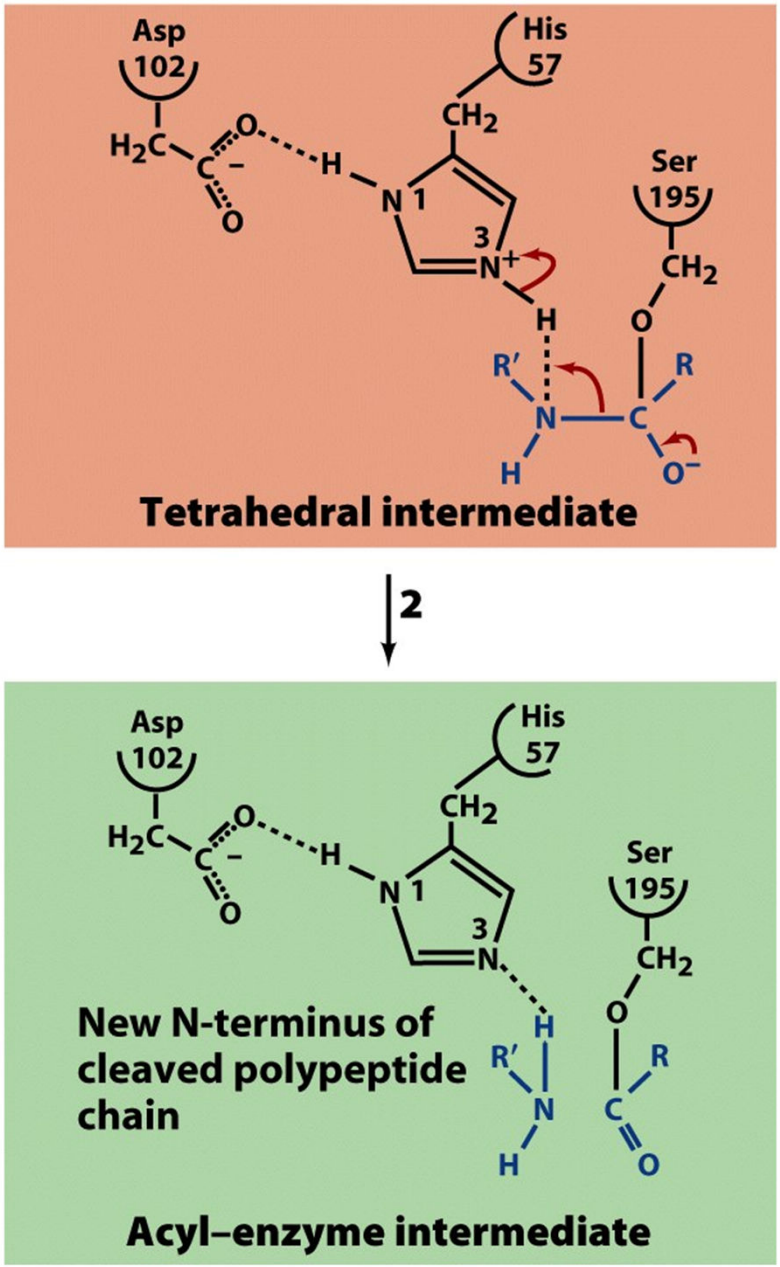


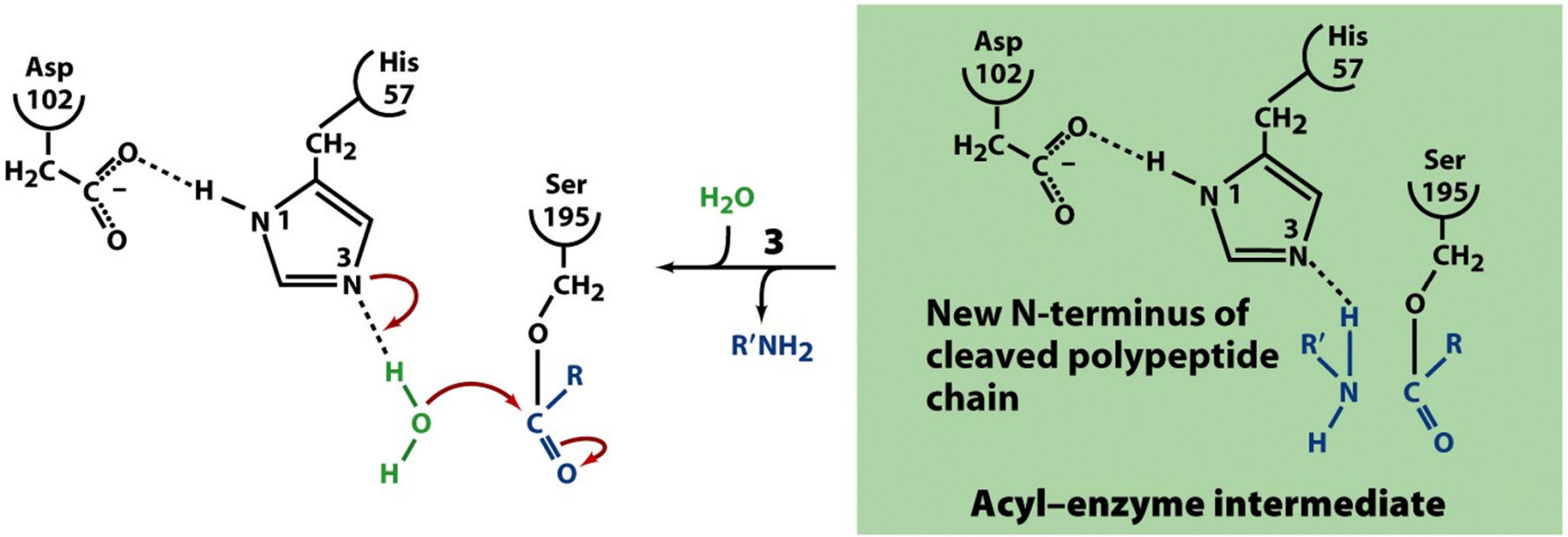
Serine proteases arose through convergent and divergent evolution

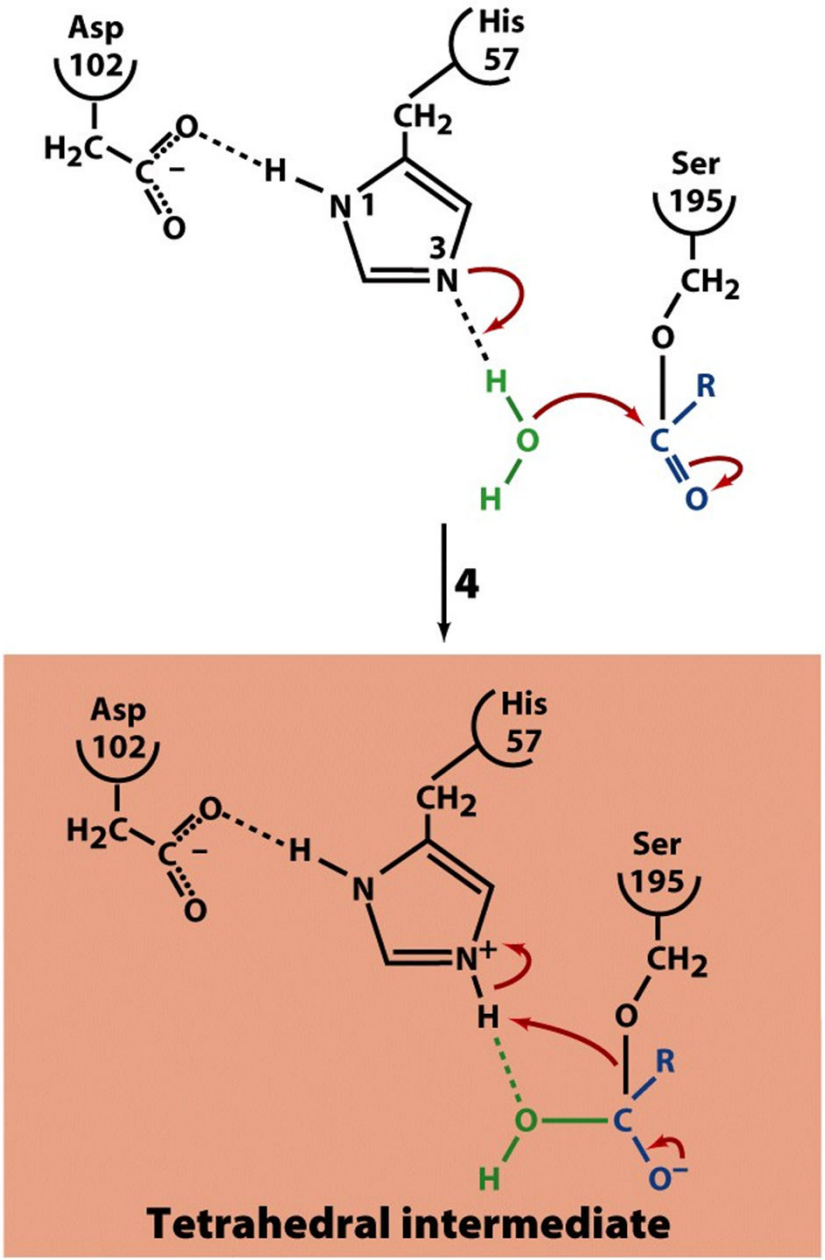


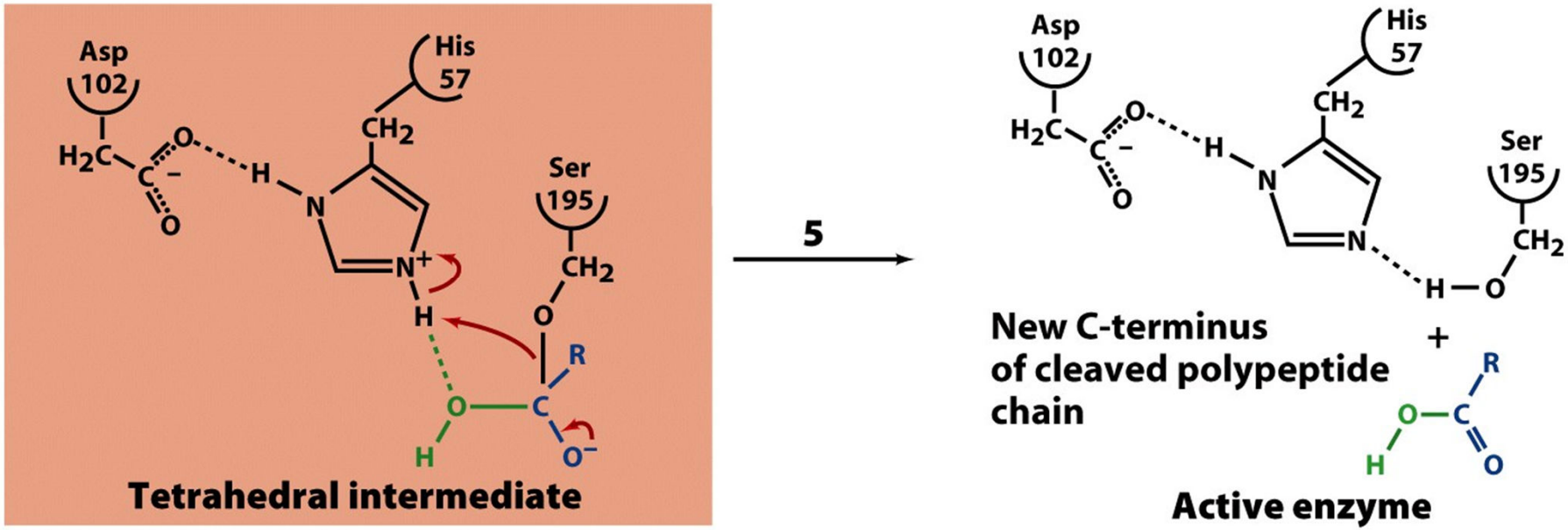
Serine proteases use multiple catalytic mechanisms in the hydrolysis of proteins



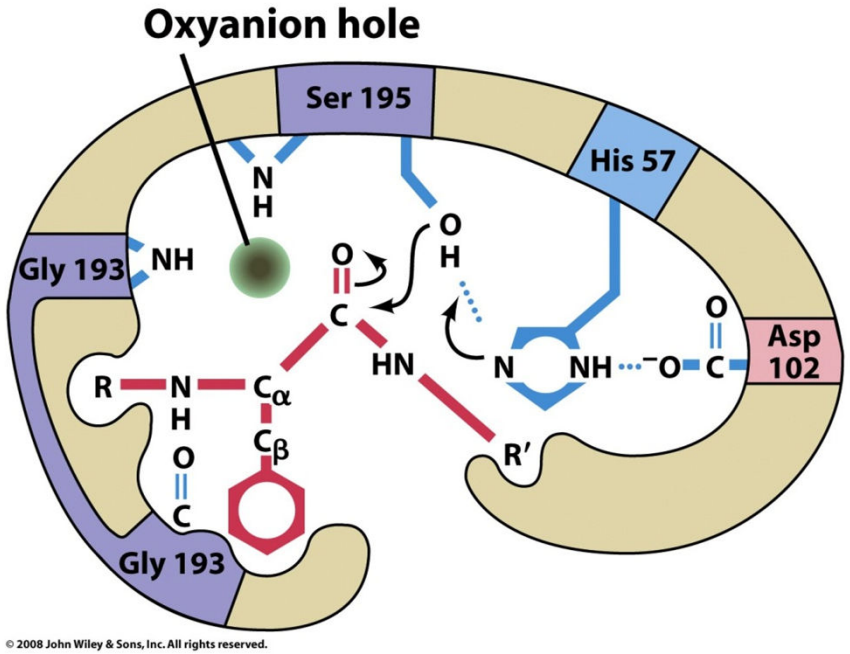


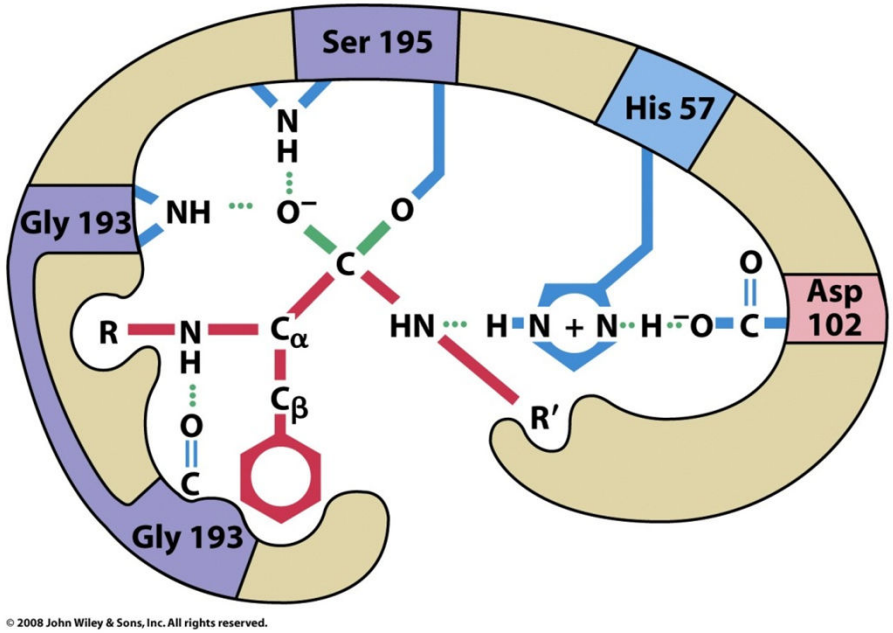




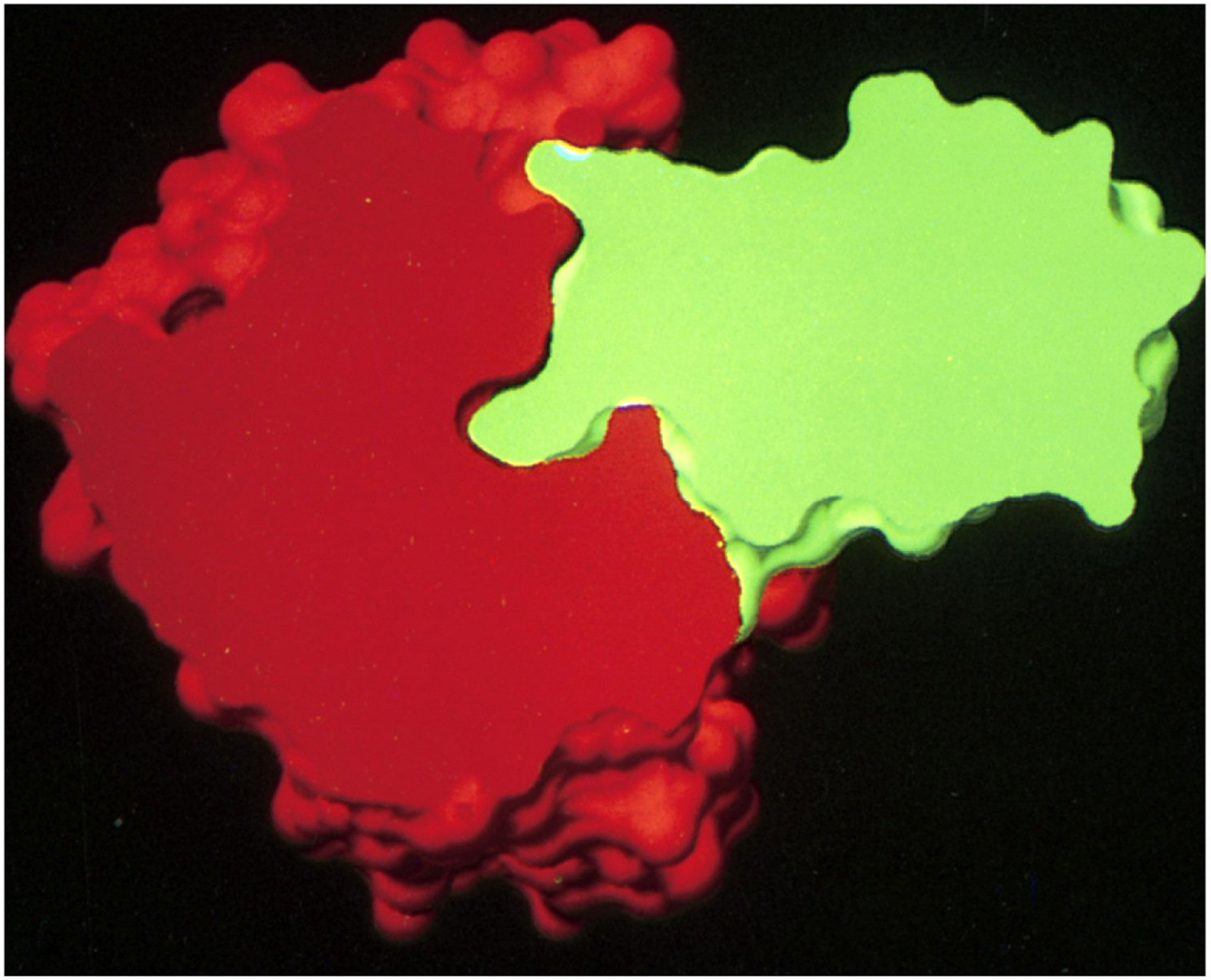


Chymotrypsin preferentially binds the tetrahedral intermediate



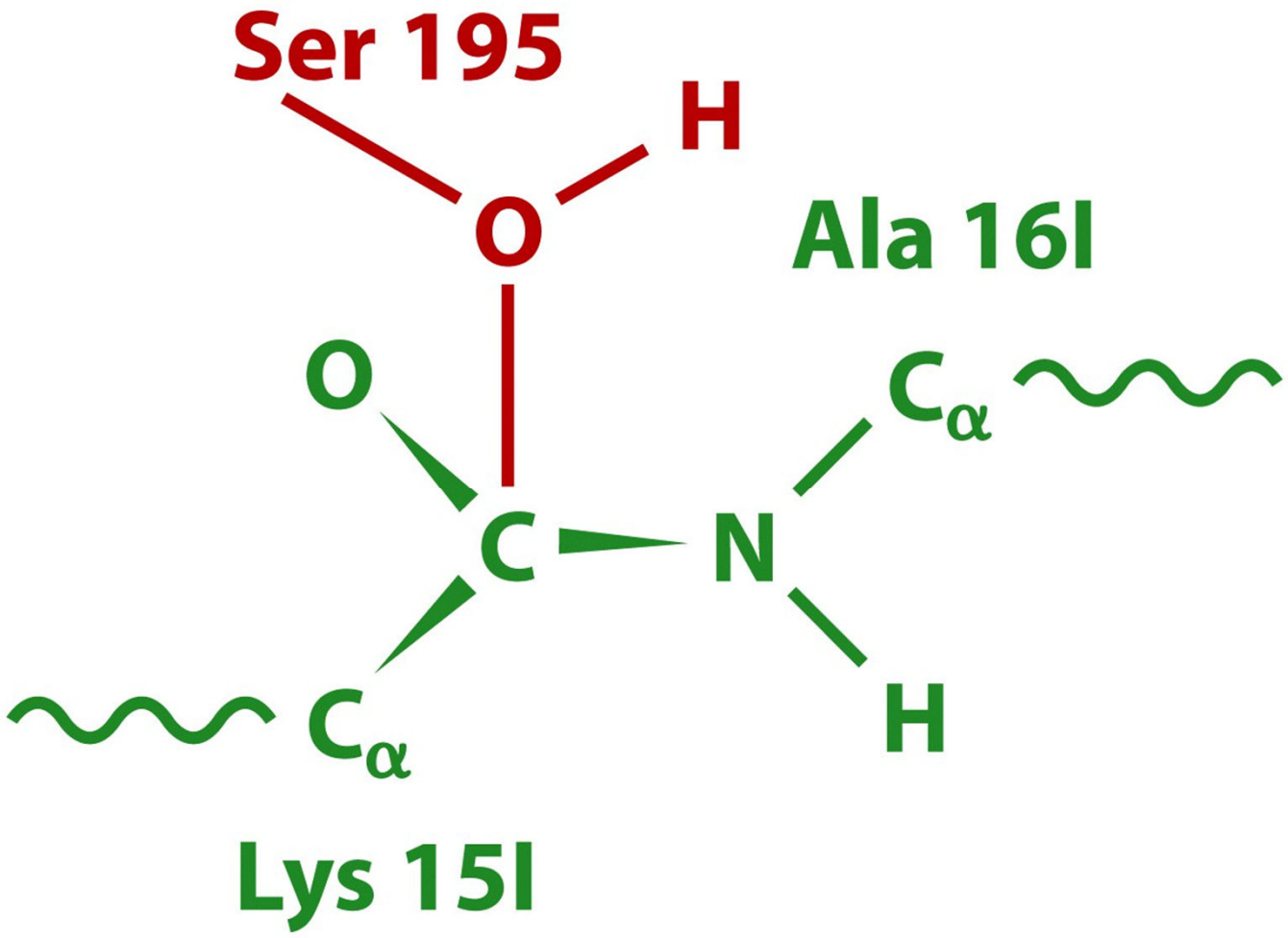


Pancreatic trypsin inhibitor binds tightly to trypsin

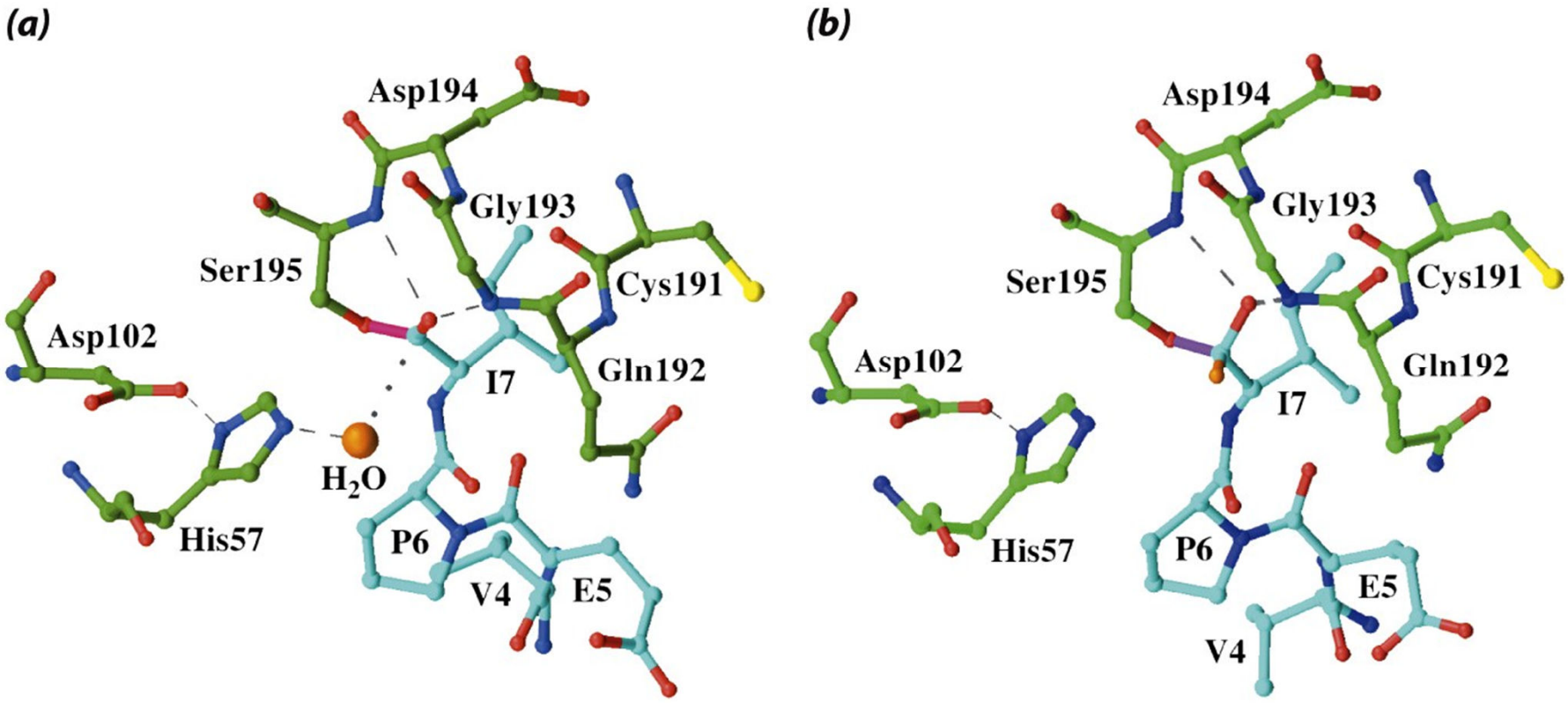


Courtesy of Michael Connolly, New York University

Bound trypsin inhibitor suggests formation of a tetrahedral intermediate



The tetrahedral intermediate was trapped through clever pH manipulation



Summary of important ideas on serine proteases

- Hydrolyze peptide bonds using an active site serine
- Common structure of active site, including:
  - Asp-His-Ser catalytic triad
  - Oxyanion hole
- Differ in substrate specificity
- Evolved through convergent and divergent evolution
- Use a combination of catalytic mechanisms
- Studies with inhibitors and under altered conditions can help clarify enzyme mechanisms