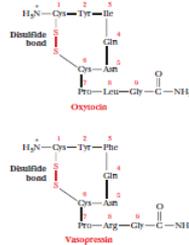


## Small Peptides with Physiological Activity

- Some important peptide hormones have cyclic structures.
- Two well-known examples with many structural features in common are oxytocin and vasopressin
- In each, there is an –S–S– bond responsible for the cyclic structure. Each of these peptides contains nine amino acid residues, each has an amide group (rather than a free carboxyl group) at the C-terminal end, and each has a disulfide link between cysteine residues at positions 1 and 6.
- The difference between these two peptides is that oxytocin has an isoleucine residue at position 3 and a leucine residue at position 8, and vasopressin has a phenylalanine residue at position 3 and an arginine residue at position 8. Both of these peptides have considerable physiological importance



- Many small peptides exert their effects at very low concentrations. For example, some extremely toxic mushroom poisons, such as amanitin, are also small peptides, as are many antibiotics.
- Glutathione (GSH) is a tripeptide composed of glutamat, cysteine and glycine
- is an important antioxidant in plants, animals, fungi, and some bacteria and archaea.
- Glutathione is capable of preventing damage to important cellular components caused by reactive oxygen species such as free radicals, peroxides and heavy metals

## What reactions do peptide bonds undergo?

- the reaction with phenylisothiocyanate, or Edman reagent, involves nucleophilic attack
- by the amino acid  $\alpha$ -amino nitrogen, followed by cyclization, to yield a phenylthiohydantoin (PTH) derivative of the amino acid

- Many peptides are potentially useful as pharmacologic agents, and their production is of considerable commercial importance.
- There are three ways to obtain a peptide:
  - 1) purification from tissue, a task often made difficult by the vanishingly low concentrations of some peptides;
  - 2) genetic engineering; or
  - 3) direct chemical synthesis.

❖ Powerful techniques now make direct chemical synthesis an attractive option in many cases. In addition to commercial applications, the synthesis of specific peptide portions of larger proteins is an increasingly important tool for the study of protein structure and function

