

Option Subject
Advanced Chemical Biology
3rd year Hilary Term 8 Lectures

BGD and CJS

Segment 1: Protein and Peptide Synthesis

Ben.Davis@chem.ox.ac.uk

<http://www.chem.ox.ac.uk/researchguide/bgdavis.html>

Lecture 1: Overview. Symbols and Abbreviations. Structure. Structure Determination. Making Dipeptides – basic ideas. The Need for Protection. Higher Peptides. *N*-protection. *C*-protection.

Lecture 2: Peptide bond Formation. Activating Carboxylates. Racemization as a Side Reaction. Strategy. Solution Phase vs Solid Phase. Beyond Peptides, Towards Proteins.

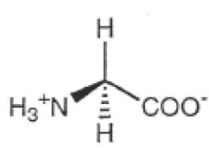
Good books:

J. Jones, *Amino Acid and Peptide Synthesis*, OCP 7, 2nd edition, 2002

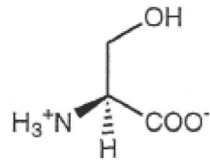
J. Jones, *The Chemical Synthesis of Peptides*, Clarendon Press, 1994

The 20 Proteinogenic Amino Acids

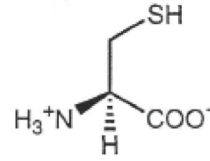
Polar



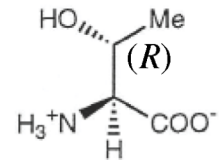
Glycine
Gly, G



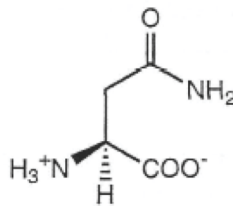
Serine
Ser, S



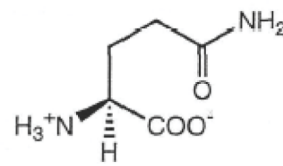
Cysteine
Cys, C



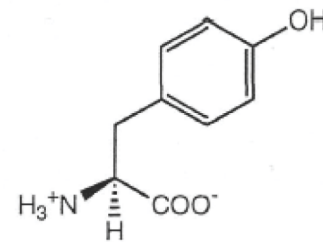
Threonine
Thr, T



Asparagine
Asn, N



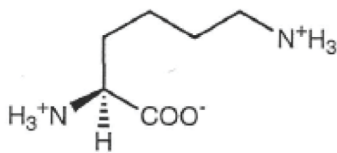
Glutamine
Gln, Q



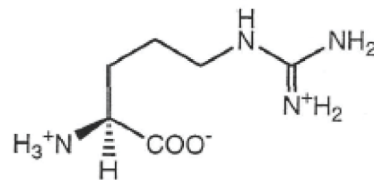
Tyrosine
Tyr, Y

Ionized

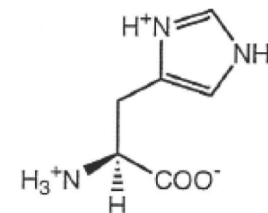
Bases



Lysine
Lys, K

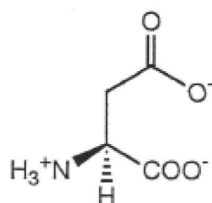


Arginine
Arg, R

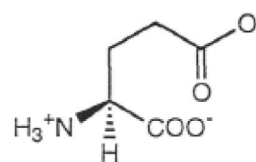


Histidine
His, H

Acids



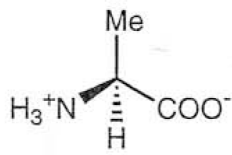
Aspartic Acid
Asp, D



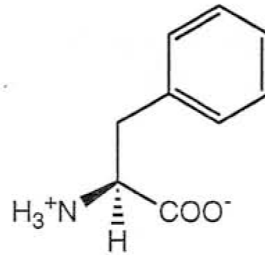
Glutamic Acid
Glu, E

The 20 Proteinogenic Amino Acids

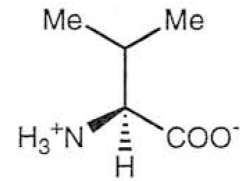
Non Polar : Hydrophobic



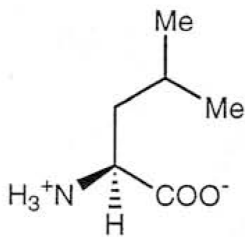
Alanine
Ala, A



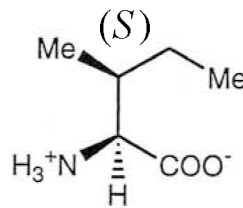
Phenylalanine
Phe, F



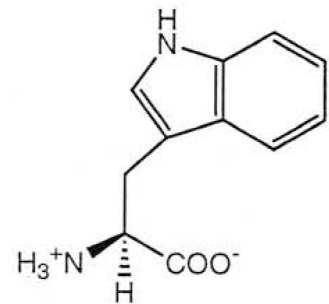
Valine
Val, V



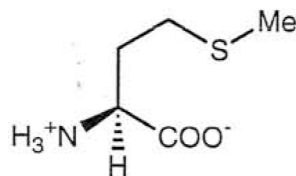
Leucine
Leu, L



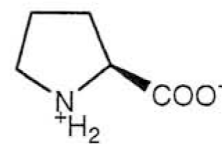
Isoleucine
Ile, I



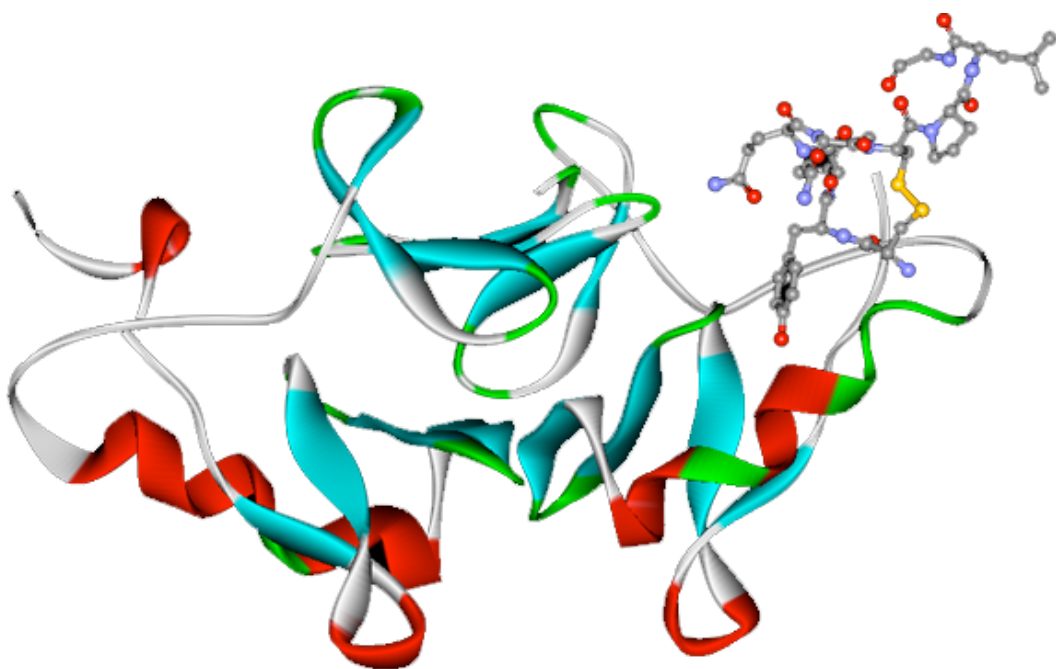
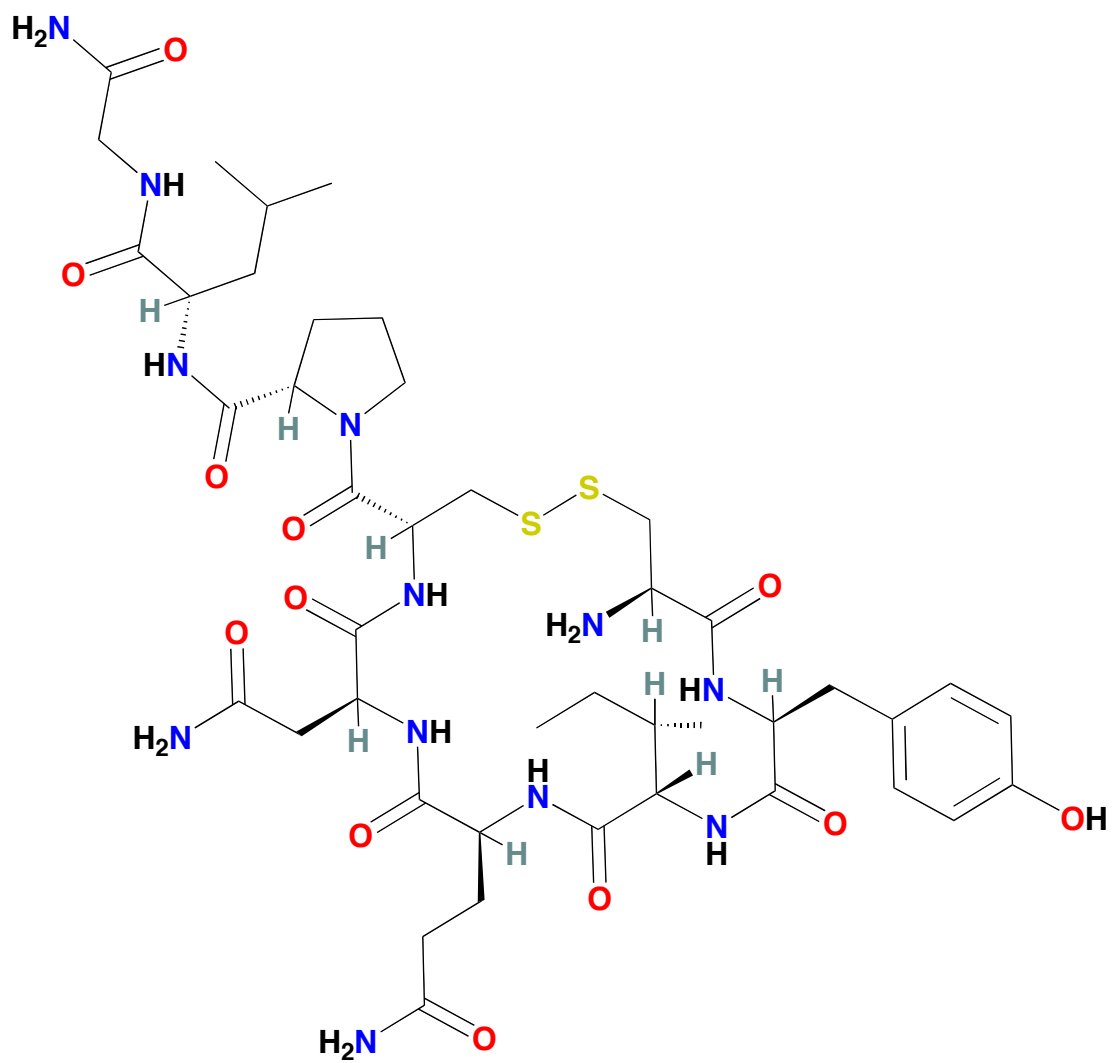
Tryptophan
Trp, W



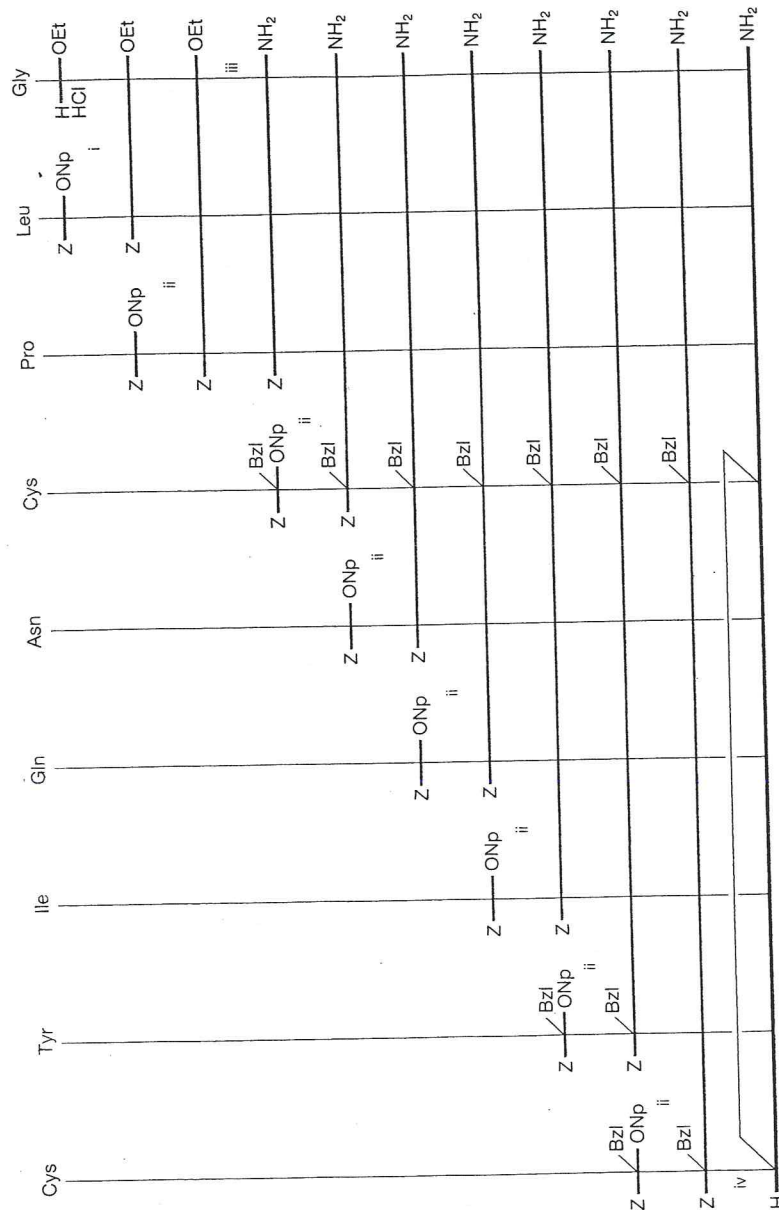
Methionine
Met, M



Proline
Pro, P



HCysTyrIleGlnAsnCysProLeuGlyNH₂
 Oxytocin (1)



Scheme Conditions: i, Et₃N/CHCl₃; ii, HBr/AcOH on the protected amino component, then conversion to the free base form, either before or during reaction with active ester in CHCl₃, EtOAc or DMF; iii, NH₃/MeOH; iv, Na/NH₃(l), then O₂, followed by countercurrent distribution purification.

Protecting Group Summary Sheet

ORTHOGONALITY / MUTUAL COMPATIBILITY

PG contains	N	C	side	Pd/H ₂	HBr/AcOH	TFA	Base	Pd(0)
Ph-CH ₂ -O-	Z	Bn ester	Bn-O ether/ester	✓	✓	X	X	X
t-Bu-O-	Boc	Bu ^t ester	Bu ^t -O ether/ester	X	✓	✓	X	X
Fmoc	Fmoc	-	-	(X)	X	X	✓	X
Allyl-O-	Alloc	Allyl ester	Allyl ether/ester	reacts	(X)	X	(X)	✓

OFF?

