

## Wellcome Trust Award Lecture

### Glycobiology: "Towards Understanding the Function of Sugars"

R. A. DWEK

1

## Morton Lecture

### Inositide Evolution: What can it tell us about Functions?

R. F. IRVINE

27

## colloquia

### 652nd Meeting Canterbury

#### colloquium: The Neuronal Cytoskeleton

<b>Phosphorylation of microtubule-associated protein 1B and axonal growth</b>	P. R. GORDON-WEEKS, M. JOHNSTONE AND M. BUSH	<b>37</b>
<b>The phosphatidylinositol-binding site of microtubule-associated protein MAP2</b>	R. G. BURNS AND C. D. SURRIDGE	<b>41</b>
<b>Changes in microtubule-associated protein 1B during development of the nervous system</b>	R. A. CALVERT	<b>47</b>
<b>Subcellular targeting of the retrograde motor cytoplasmic dynein</b>	K. T. VAUGHAN, E. L. F. HOLZBAUR AND R. B. VALLEE	<b>50</b>
<b>A60, an axonal membrane-skeletal spectrin-binding protein</b>	N. V. L. HAYES, F. E. HOLMES, J. GRANTHAM AND A. J. BAINES	<b>54</b>
<b>The post-synaptic density: putative involvement in synapse stabilization via cadherins and covalent modification by ubiquitination</b>	P. W. BEESLEY, R. MUMMERY, J. TIBALDI, A. P. CHAPMAN, S. J. SMITH AND C. C. RIDER	<b>59</b>
<b>Synapsin I and the cytoskeleton: calmodulin regulation of interactions</b>	A. J. BAINES, K.-M. CHAN AND R. GOOLD	<b>65</b>
<b>Neuronal aspects of cytosolic chaperonin complexes: structures implicated in the production of functional cytoskeletal proteins</b>	M. J. CARDEN AND A. ROOBOL	<b>70</b>
<b>Post-translational modifications of microtubule- and growth-associated proteins in nerve regeneration and neuropathy</b>	W. G. MCLEAN, R. E. ROBERTS AND F. H. MULLINS	<b>76</b>
<b>Tau protein in Alzheimer's disease</b>	M. GOEDERT, R. JAKES, M. G. SPILLANTINI, R. A. CROWTHER, P. COHEN, E. VANMECHELEN, A. PROBST, J. GÖTZ AND K. BÜRKI	<b>80</b>

---

## colloquium: G-Protein-Linked Receptors: Functional Domains

---

<b>Determinants of ligand binding at the D<sub>2</sub> dopamine receptor</b>	L. NAYLOR, R. WOODWARD, S. DANIELL, C. COLEY AND P. STRANGE	<b>87</b>
<b>The metabotropic glutamate receptors: their second intracellular loop plays a critical role in the G-protein coupling specificity</b>	J.-P. PIN, J. GOMEZA, C. JOLY AND J. BOCKAERT	<b>91</b>
<b>Tachykinin non-peptide antagonists: binding domain and molecular mode of action</b>	U. GETHER, J. A. LOWE, III AND T. W. SCHWARTZ	<b>96</b>
<b>Defining the ligand-binding site for vasopressin receptors: a peptide mimetic approach</b>	J. HOWL, R. A. PARSLAW AND M. WHEATLEY	<b>103</b>
<b>Allosteric regulation of G-protein-linked receptors</b>	N. J. M. BIRDSALL, F. COHEN, S. LAZARENO AND H. MATSUI	<b>108</b>
<b>Four ways of being an agonist: multiple sequence determinants of efficacy at D<sub>2</sub> dopamine receptors</b>	K. A. NEVE AND B. L. WIENS	<b>112</b>
<b>Palmitoylation of G-protein-coupled receptors: a dynamic modification with functional consequences</b>	M. BOUVIER, S. MOFFETT, T. P. LOISEL, B. MOUILLAC, T. HEBERT AND P. CHIDIAC	<b>116</b>

---

## colloquium: Regulation of Signal-Transducing Polypeptides

---

<b>Signalling and regulation of the <math>\alpha_{1B}</math>-adrenergic receptor</b>	S. COTECCHIA, A. L. LATTION, D. DAVIANI AND A. CAVALLI	<b>121</b>
<b>Variability in the regulation of <math>\beta</math>-adrenoceptor subtypes</b>	S. MARULLO, F. NANTEL, A. D. STROSBURG AND M. BOUVIER	<b>126</b>
<b>Interactions between the G<sub>s</sub>/protein kinase A and the Ras/MAP-kinase signalling pathways</b>	J. CHEN AND R. IYENGAR	<b>129</b>
<b>Differential signal transduction by six splice variants of the pituitary adenylate cyclase-activating peptide (PACAP) receptor</b>	L. JOURNOT, C. WAEBER, C. PANTALONI, F. HOLSBOER, P. H. SEEBURG, J. BOCKAERT AND D. SPENGLER	<b>133</b>
<b>Use of antisense oligodeoxynucleotides and monospecific antisera to inhibit G-protein gene expression in cultured neurons</b>	N. J. BUCKLEY, J. FRENCH-MULLEN AND M. CAULFIELD	<b>137</b>
<b>The role of G-protein <math>\beta\gamma</math> subunits in signal transduction</b>	S. MÜLLER AND M. J. LOHSE	<b>141</b>
<b>Molecular mechanisms of regulation of phosphoinositide 3-kinase by insulin, insulin-like growth factor I and nerve growth factor in PC12 cells</b>	A. N. CARTER AND C. P. DOWNES	<b>148</b>
<b>Protein kinase C (PKC)-induced PKC degradation: a model for down-regulation</b>	P. J. PARKER, L. BOSCA, L. DEKKER, N. T. GOODE, N. HAJIBAGHERI AND G. HANSRA	<b>153</b>
<b>Receptor regulation of G protein palmitoylation</b>	S. M. MUMBY AND K. H. MUNTZ	<b>156</b>

**Mechanisms of protein prenylation and role in G protein function** P. J. CASEY 161

**Mechanisms of agonist-induced G-protein elimination** G. MILLIGAN, A. WISE, D. J. MACEWAN, M. A. GRASSIE, F. R. KENNEDY, T. W. LEE, E. J. ADIE, G. D. KIM, J. F. MCCALLUM, A. BURT, I. C. CARR, P. SVOBODA, B. H. SHAH AND I. MULLANEY 166

**colloquium: Glycobiology of Proteins**

**Monitoring and control of recombinant glycoprotein heterogeneity in animal cell cultures** N. JENKINS 171

**Novel glycosylation routes for glycoproteins: the lacdiNAc pathway** D. H. VAN DEN EIJNDEN, A. P. NEELEMAN, W. VAN DER KNAAP, H. BAKKER, M. AGTERBERG AND I. VAN DIE 175

**Expression and secretion of glycoproteins by hyphal fungi** F. W. HEMMING 180

**The carbohydrate-deficient glycoprotein syndrome: an experiment of nature in glycosylation** B. WINCHESTER, P. CLAYTON, N. MIAN, E. DI-TOMASO, A. DELL, A. REASON AND G. KEIR 185

**Mutational analysis of the epitopes recognized by anti-(rat CD2) and anti-(rat CD48) monoclonal antibodies** S. J. DAVIS, E. A. DAVIES AND P. A. VAN DER MERWE 188

<b>Regulation of signal-transducing polypeptides</b>		
The characterisation of insulin degradation products in endosomes	P. J. SEABRIGHT AND G. D. SMITH	<b>1S</b>
Compartmental modelling of insulin-receptor interactions	G. D. SMITH, J. TIKERPÄE AND B. J. HAMMOND	<b>2S</b>
Lipid modification of signal-transducing polypeptides in the free-living nematode <i>Caenorhabditis elegans</i>	R. A. ASPBURY, M. J. FISHER AND H. H. REES	<b>3S</b>
The effect of colchicine on cyclic AMP accumulation in NG108-15 cells	M. Z. CADER AND M. KEEN	<b>4S</b>
Prostaglandins which elevate cyclic AMP increase low density lipoprotein receptor mRNA and activity in human extra-hepatic cells	H. NIELD AND B. MIDDLETON	<b>5S</b>
Chemotactic peptide mediated cAMP production is inhibited by adenosine deaminase in HL60 cell granulocytes	P. C. BANFORD, K. J. MURRAY AND K. R. F. ELLIOTT	<b>6S</b>
Interactions of the $\beta$ 2-adrenoceptor with epitope-tagged $G_s\alpha$ in NG108-15 cells	I. MULLANEY AND G. MILLIGAN	<b>7S</b>
Agonist regulation of high affinity [ $^3$ H] forskolin binding as a measure of $G_s\alpha$ -adenylyl cyclase interactions	G. D. KIM AND G. MILLIGAN	<b>8S</b>
Palmitoylation negative mutants of murine $G_{11}\alpha$ have decreased ability to interact with the plasma membrane when expressed in COS-1 cells	J. F. MCCALLUM, A. WISE, M. PARENTI AND G. MILLIGAN	<b>9S</b>
Cyclic AMP differentially regulates the expression of the $\alpha$ -subunits of $G_s$ , $G_q$ and $G_{11}$ G-proteins and their mRNA levels in rat C6 glioma cells	B. H. SHAH AND G. MILLIGAN	<b>10S</b>
Signalling characteristics of thyrotropin releasing hormone (TRH) receptor isoforms	T. W. LEE, K. A. EIDNE AND G. MILLIGAN	<b>11S</b>
High level expression of mammalian G protein $\alpha$ subunit $G_q$ subtypes in <i>Escherichia coli</i>	A. WISE AND G. MILLIGAN	<b>12S</b>
Cyclic nucleotide and protein levels in preimplantation bovine embryos	M. GREALY AND J. M. SREENAN	<b>13S</b>
The lipid kinase activity of the phosphatidylinositol 3-kinase is affected by its intrinsic protein kinase activity	R. WOSCHOLSKI, T. KODAKI AND P. J. PARKER	<b>14S</b>
Phosphorylation site-specific antibodies to cardiac phospholamban	G. A. DRAGO AND J. COLYER	<b>15S</b>
Modulation of adenosine signalling in sheep adipose tissue by growth hormone	R. DORIS, E. KILGOUR, M. D. HOUSLAY, G. E. THOMPSON AND R. G. VERNON	<b>16S</b>
Activation of phospholipase C by G-protein $\beta\gamma$ subunits in DDT <sub>1</sub> MF-2 cells	J. M. DICKENSON AND S. J. HILL	<b>17S</b>
Expression of multiple somatostatin receptor genes in human colonic epithelial cells	G. WARHURST, N. B. HIGGS, M. R. GRIGOR, I. ROSS AND G. O. BARBEZAT	<b>18S</b>
G-protein dependent inhibition of $K^+$ channels by somatostatin analogues in human colonocytes	R. B. LOMAX, G. I. SANDLE AND G. WARHURST	<b>19S</b>

Phosphoprotein phosphatase activities in rat luteal cells	S. L. FORD, S. J. PERSAUD, P. M. JONES AND R. E. ABAYASEKARA	20S
Second messenger pathways for oxytocin and prostaglandins in human myometrium	S. PHANEUF, G. ASBOTH, G. N. EUROPE-FINNER, S. P. WATSON AND A. LOPEZ-BERNAL	21S
<hr/>		
<b>Strategies for membrane and membrane protein isolation</b>		
Expression and purification of cardiac phospholamban in <i>Escherichia coli</i>	F. K. SMITH AND J. COLYER	22S
Changes in apical membrane composition of Caco-2 cells during enterocytic differentiation	P. W. PEMBERTON, J. C. OSYPIW, D. GLEESON, R. F. MCMAHON AND R. W. LOBLEY	23S
Salt sensitivity and arginine toxicity in <i>Aspergillus nidulans</i>	D. J. CLEMENT, N. A. ATTWELL, M. S. STANLEY, N. J. W. CLIPSON, P. HOOLEY AND D. A. FINCHAM	24S
Volume-activated solute transport in human placental tissue	D. B. SHENNAN AND S. A. MCNEILLIE	25S
The regulation of anion transport in lactating rat mammary tissue	J. M. SHILLINGFORD, D. B. SHENNAN AND R. B. BEECHEY	26S
Cytotoxic effects of membrane-active agents in human leukaemia cell lines	E. W. JONES AND R. MANNING	27S
Subcellular localization of annexins V and VI in isolated rat ventricular myocytes and porcine left ventricle	T. LUCKCUCK, C. H. ORCHARD, S. M. HARRISON AND J. H. WALKER	28S
Nucleobase transport in cultured renal epithelial cells	R. AKERMAN AND S. M. JARVIS	29S
Adenosine transport in <i>Crithidia fasciculata</i>	C. J. WATSON AND S. M. JARVIS	30S
Investigation into the lipid requirement for the membrane anchoring of <i>Escherichia coli</i> penicillin binding protein 5	D. A. PHOENIX	31S
The possible involvement of anionic phospholipids in the anchoring of penicillin binding protein 5 to the inner membrane of <i>Escherichia coli</i>	F. HARRIS, L. CHATFIELD AND D. A. PHOENIX	32S
Comparison of the potential membrane insertion geometries of <i>Escherichia coli</i> low molecular weight penicillin binding protein anchors	M. G. ROBERTS AND D. A. PHOENIX	33S
A pleiotropic secretion mutant of <i>Aeromonas hydrophila</i> is unable to secrete heterologously expressed <i>E. coli</i> enterotoxin: implication for common mechanisms of protein secretion	J. YU AND T. R. HIRST	34S
Subcellular localization of annexins in human foreskin fibroblasts	J. L. BARWISE AND J. H. WALKER	35S
Studies on annexins in primary cultures of human osteoblasts and in the human osteosarcoma cell line MG-63	J. MOHITI, J. H. WALKER AND A. M. CASWELL	36S
EGTA-resistant binding of annexin V to platelet membranes can be induced by physiological calcium concentrations	P. J. TROTTER, M. A. ORCHARD AND J. H. WALKER	37S
Use of lucifer yellow iodoacetamide in a flow cytometric assay to measure cell surface free thiol	J. R. ARCHER, S. S. BADAHERE, M. G. MACEY AND M. A. WHELAN	38S

<b>The neuronal cytoskeleton</b>		
Activities of A60, an axon specific cytoskeletal protein	J. GRANTHAM, N. V. L. HAYES AND A. J. BAINES	<b>39S</b>
Reconstitution of the rat brain serotonin transporter	H. M. TARRANT AND D. C. WILLIAMS	<b>40S</b>
Dithiothreitol promotes a higher affinity state of the serotonin transporter for the tricyclic antidepressant, imipramine	H. M. TARRANT AND D. C. WILLIAMS	<b>41S</b>
Non-uniform distribution and associations of triplet proteins in neurofilaments	J. A. B. NASH AND M. J. CARDEN	<b>42S</b>
Examination of neurofilament assembly dynamics <i>in vitro</i>	J. A. B. NASH AND M. J. CARDEN	<b>43S</b>
Morphological alterations in MDCK cells induced by exposure to <i>Clostridium perfringens</i> $\epsilon$ -toxin	J. L. HAMBROOK, C. D. LINDSAY AND N. HUGHES	<b>44S</b>
Phosphorylation of tau by glycogen synthase kinase-3 $\beta$ <i>in vitro</i> produces species with similar electrophoretic and immunogenic properties to PHF-tau from Alzheimer's disease brain	S. F. C. MULOT, K. HUGHES, J. R. WOODGETT, B. H. ANDERTON AND D. P. HANGER	<b>45S</b>
Dopamine concentrations in PC12 cells following neuronal differentiation induced by NGF or VIP	R. R. LIM, M. R. BLOOMFIELD, A. M. JOHNSON AND J. M. ALLEN	<b>46S</b>
Effect of cAMP elevation on the NPY gene transcription	A. PANCE, D. BALBI, N. HOLLIDAY AND J. M. ALLEN	<b>47S</b>
Nicotine-induced upregulation of $\alpha$ Bungarotoxin ( $\alpha$ Bgt) binding sites in cultured rat hippocampal neurons	A. T. ROGERS AND S. WONNACOTT	<b>48S</b>
Studies on peptides containing the 25–35 sequence of amyloid $\beta$ peptide	O. A. EL-AGNAF, D. J. S. GUTHRIE AND G. B. IRVINE	<b>49S</b>
Identification of vesicular proteins in the human neuroblastoma cell line, SH-SY5Y	A. R. GOODALL, J. H. WALKER AND P. F. T. VAUGHAN	<b>50S</b>
Developmental profile of tau in cerebellar granule cell neurons <i>in vitro</i>	S. A. PRZYBORSKI AND M. A. CAMBRAY-DEAKIN	<b>51S</b>
Characterisation of monoclonal antibodies against synapsin I	S. NICOL, K.-M. CHAN AND A. J. BAINES	<b>52S</b>
<b>Proteins and peptides as enzyme substrates and inhibitors</b>		
An investigation of the interaction between human complement factor H and C3b	C. J. SOAMES AND R. B. SIM	<b>53S</b>
Preparation of a fusion protein for vaccination against <i>Escherichia coli</i> enterotoxins	S. EAGLESTONE AND T. R. HIRST	<b>54S</b>
Strategies for the purification of intact and proteolytically activated native and engineered heat-labile enterotoxins of <i>Escherichia coli</i>	S. RUSTON, S. EAGLESTONE, H. WEBB AND T. R. HIRST	<b>55S</b>
$\beta$ -Amyloid inhibition of MTT reduction is not mimicked by inhibitors of mitochondrial respiration	S. R. HAWTIN, A. C. DOBBINS, V. J. TAILOR AND M. S. SHEARMAN	<b>56S</b>
The influence of cations on the polymerization of actin and actin in the presence of $\alpha$ -actinin/filamin	R. SENGER, W. H. GOLDMANN AND G. ISENBERG	<b>57S</b>

Over-production and isolation of a precursor protein in a form ideal as a substrate for leader peptidase	N. N. KADERBHAI, V. J. HARDING AND M. A. KADERBHAI	58S
Further studies on the action of aminopeptidases towards sulphur-containing substrates	M. ROBERTS, D. J. S. GUTHRIE AND C. H. WILLIAMS	59S
Aminopeptidase P: cation activation and inhibitor sensitivity are substrate-dependent	G. S. LLOYD AND A. J. TURNER	60S
Construction of a fusion protein between B subunit of <i>E. coli</i> heat-labile enterotoxin and the C-terminus of herpes simplex virus-DNA polymerase	A. LOREGIAN, A. MARCELLO, T. R. HIRST, H. S. MARSDEN AND G. PALU	61S
Release of Ca <sup>2+</sup> -Mg <sup>2+</sup> ATPase inhibition by phospholamban phosphorylation	W. A. JACKSON AND J. COLYER	62S

---

**Catalysing of protein folding**

---

The <i>in vitro</i> catalysis of protein folding by endoplasmic reticulum luminal peptidyl prolyl <i>cis-trans</i> isomerase	S. BOSE, H. LILIE, J. BUCHNER AND R. B. FREEDMAN	63S
Cloning and expression of <i>Vibrio cholerae dsbA</i> , a gene encoding a periplasmic protein disulphide isomerase	E. D. LOWE, R. B. FREEDMAN, T.R. HIRST AND P. T. BARTH	64S
The effect of denaturants on PDI conformation and activity	H. C. HAWKINS AND R. B. FREEDMAN	65S
Properties and cellular functions of related yeast ER proteins, protein disulphide-isomerase and Eug1p	P. A. WEBSTER, D. PIOLI, M. F. TUIE AND R. B. FREEDMAN	66S
The chaperonins of <i>Clostridium thermocellum</i>	S. J. CROSS AND R. B. FREEDMAN	67S
Refolding of the mixed disulphide of RNase T <sub>1</sub> and glutathione	R. B. FREEDMAN AND M. RUOPPOLO	68S
Cloning and expression of active domains of human protein disulphide isomerase	S. H. McLAUGHLIN AND R. B. FREEDMAN	69S
The importance of water to biocatalysis in organic solvents	M. J. ALSTON AND R. B. FREEDMAN	70S
The expression in <i>E. coli</i> and purification of isolated non-thioredoxin-like domains of human PDI	J. W. L. PARRY, J. R. CLARK, M. F. TUIE AND R. B. FREEDMAN	71S
A chloroplast envelope-transfer transit peptide is export competent in <i>Escherichia coli</i>	Y.-Y. LIU, A. KARIM AND M. A. KADERBHAI	72S
Mapping the ligand-binding domain of PDGF-receptor	W. ELDRIDGE AND B. ROONEY	73S
Multi-state thermal unfolding and aggregation of $\beta$ -lactoglobulin A	X. L. QI, S. BROWNLOW, C. HOLT AND P. SELLERS	74S
The refolding of hen egg white riboflavin binding protein	D. A. McCLELLAND, N. C. PRICE AND L. STEVENS	75S
Codon bias in <i>Escherichia coli</i> may modulate translation initiation	R. F. COLLINS, M. ROBERTS AND D. A. PHOENIX	76S
The <i>Saccharomyces cerevisiae</i> small heat shock protein Hsp26 inhibits actin polymerisation	D. R. J. RAHMAN, N. J. BENTLEY AND M. F. TUIE	77S
Protein disulphide isomerase (PDI) is required for the secretion of a native disulphide-bonded protein from <i>Saccharomyces cerevisiae</i>	A. DUNN, J. M. LUZ, D. NATALIA, J. A. GAMBLE, R. B. FREEDMAN AND M. F. TUIE	78S

Characterisation of the isoforms of GRP78 using two-dimensional electrophoresis	A. PEARCE, W. E. FARRELL AND H. A. JENKINS	79S
Expression of the pro-regions of papain and papaya proteinase IV in <i>Escherichia coli</i> and their inhibition of mature cysteine proteinases	M. A. J. TAYLOR, G. S. BRIGGS, K. C. BAKER, N. J. CUMMINGS, K. A. PRATT, R. B. FREEDMAN AND P. W. GOODENOUGH	80S
Characterization of the major form of glutathione transferase in the mosquito <i>Anopheles dirus A</i>	L.-A. PRAPANTHADARA, S. KUTTASTEP, J. HEMINGWAY AND A. J. KETTERMAN	81S
Protein disulphide isomerase assisted folding of human glucose-6-phosphate dehydrogenase	F. GOMEZ-GALLEGO, A. GARRIDO-PERTIERRA AND J. M. BAUTISTA	82S
<hr/> <b>G-Protein linked receptors — functional domains</b> <hr/>		
Molecular characterisation of novel receptors for PACAP and VIP	E. M. LUTZ, S. MENDELSON, K. WEST, R. MITCHELL AND A. J. HARMAR	83S
Modulation of D-[2,3 <sup>3</sup> H]aspartate release from rat forebrain slices by non-NMDA receptor agonists and antagonists	D. R. PATEL, N. J. H. STURT AND M. J. CROUCHER	84S
The importance of acidic amino acid residues in the binding of ligands to the V <sub>1a</sub> vasopressin receptor	A. R. L. DAVIES AND M. WHEATLEY	85S
Photolabelling implicates an amino acid in the second transmembrane domain of the rat AT <sub>1A</sub> receptor in agonist binding	B. P. S. BAJAJ, A. J. BALMFORTH AND S. G. BALL	86S
Palmitoylation of metabotropic glutamate receptor subtype 4 but not I $\alpha$ expressed in permanently transfected BHK cells	S. ALALUF, E. R. MULVIHILL AND R. A. J. MCLHINNEY	87S
Agonist mediated phosphorylation of metabotropic glutamate receptor I $\alpha$ by protein kinase in permanently transfected BHK cells	S. ALALUF, E. R. MULVIHILL, N. WILLMOTT AND R. A. J. MCLHINNEY	88S
Expression of epitope-tagged D <sub>2</sub> dopamine receptors in Sf21 cells	E. M. SANDERSON AND P. G. STRANGE	89S
Comparison of [ <sup>3</sup> H]nemonapride and [ <sup>3</sup> H]spiperone binding to D <sub>2(long)</sub> dopamine receptors	J. M. VILE AND P. G. STRANGE	90S
Pharmacological characterisation of high affinity [ <sup>35</sup> S]GTP $\gamma$ S binding in membranes from CHO-K1 cells stably expressing rat D <sub>2(short)</sub> dopamine receptors	B. GARDNER AND P. G. STRANGE	91S
Allosteric regulation of the rat D <sub>2</sub> dopamine receptor	S. R. J. HOARE AND P. G. STRANGE	92S
Expression of the rat D <sub>2</sub> and D <sub>3</sub> dopamine receptors in insect cells using the baculovirus system	C. WOODCOCK, S. G. GRABER, B. C. ROONEY AND P. G. STRANGE	93S
Site-directed mutagenesis of conserved serine residues in the rat D <sub>2</sub> dopamine receptor	C. COLEY, R. WOODWARD, P. STRANGE AND L. NAYLOR	94S
Human neurokinin-1 receptors, transiently transfected into Cos-7 cells, couple to simian G-proteins	S. G. EWAN, C. L. SEAR, E. SKIDMORE, P. MCINTYRE AND M. C. S. BROWN	95S
Molecular modelling of the human formyl peptide receptor	B. J. DENNY, P. A. LAMBERT AND D. R. POYNER	96S
Human and rat bradykinin B <sub>2</sub> receptors are differentially sensitive to D-Phe <sup>7</sup> -containing antagonists	C. L. DAVIS, E. PHILLIPS, E. SKIDMORE, M. WEBB, P. MCINTYRE AND G. M. BURGESS	97S



---

**Glycobiology of proteins**

---

Processing and glycosylation of preproteins by sheep pancreatic microsomes	M. A. KADERBHAI, V. HARDING, A. KARIM AND N. N. KADERBHAI	<b>98S</b>
N-linked glycosylation of tissue plasminogen activator in Namalwa cells	M. W. KHAN, S. C. MUSGRAVE AND N. JENKINS	<b>99S</b>
Analysis of human interferon- $\gamma$ glycoforms produced in baculovirus infected insect cells by matrix assisted laser desorption spectrometry	O. W. OGOHAH, R. B. FREEDMAN, N. JENKINS AND B. C. ROONEY	<b>100S</b>
Purification of GPI anchors by immunoaffinity chromatography	S. P. HEYWOOD AND N. M. HOOPER	<b>101S</b>
Oligosaccharide-protein interactions in IgG antibody molecules: structural and functional consequences	J. LUND, N. TAKAHASHI, M. GOODALL, J. D. POUND AND R. JEFFERIS	<b>102S</b>
Identification and sequencing of truncated glycan structures from a murine monoclonal IgG	R. F. E. DOSSETT, A. MERRY AND M. HARDY	<b>103S</b>
Patients with ulcerative colitis have reduced mucin polymer content in the adherent colonic mucus gel	B. J. RANKIN, E. D. SRIVASTAVA, C. O. RECORD, J. P. PEARSON AND A. ALLEN	<b>104S</b>
Stability of the glyco-enzyme tissue plasminogen activator studied by circular dichroism	D. T. CRANE, B. BOLGIANO, C. JONES, T. A. EDGELL, J. B. PRING AND P. J. GAFFNEY	<b>105S</b>
Glycosaminoglycans and sulphated polyanions attenuate the neurotoxic effects of $\beta$ -amyloid	I. I. J. SADLER, S. R. HAWTIN, V. TAILOR, M. S. SHEARMAN AND S. J. POLLACK	<b>106S</b>
Application of Taguchi experimental design to the optimisation of a baculovirus expression system	G. J. BURCH, C. H. R. FERGUSON, G. CARTWRIGHT AND F. Y. P. KWONG	<b>107S</b>
Structural and functional stability of horseradish peroxidase	S. HUDDLESTON, S. ROBERTSON, C. DOBSON, F. Y. P. KWONG AND B. M. CHARALAMBOUS	<b>108S</b>

---

**Cytokines and their receptors — therapeutic implications**

---

The human endothelial cell line ECV304 as a model of endothelial cell activation by interleukin-1	A. BOWIE, P. N. MOYNAGH AND L. A. J. O'NEILL	<b>109S</b>
Qualitative differences occur in phenoloxidase activity in <i>Anopheles</i> mosquitoes refractory to <i>Plasmodium</i>	S. AHMAD, C. J. LEAKE AND A. J. KETTERMAN	<b>110S</b>
Evidence for direct modification of NF $\kappa$ B by the tyrosine kinase inhibitor, herbimycin A	T. M. MAHON AND L. A. J. O'NEILL	<b>111S</b>
Effects of pertussis toxin and its binding subunit on IL-1 signalling in T cells	L. M. MCCARTHY AND L. A. J. O'NEILL	<b>112S</b>
Autocrine regulation of the transcription factor NF $\kappa$ B by TNF $\alpha$ in the human T cell lymphoma line Hut 78	R. CLEERE, A. LONG, D. KELLEHER AND L. A. J. O'NEILL	<b>113S</b>
Expression of leukaemia inhibitory factor/cholinergic differentiation factor is linked to adrenoceptor stimulation	D. A. CARTER	<b>114S</b>
5-HT transporter antibodies as a tool in serotonergic synaptosomal isolation	J. A. LAWRENCE, A. R. CHARTERS, S. P. BUTCHER, J. S. KELLY AND H. J. OLVERMAN	<b>115S</b>
Mitogenic stimulation of osteoblastic cells by IGF-I is increased by synchronisation of cells in G1-phase	P. M. J. MCSHEEHY, C. COLTRO-CAMPI, V. GRAZIOLI, R. MENA, L. SOLDINI, A. ZOCCHETTI AND G. D. CLARKE	<b>116S</b>

Investigation into the inhibition of prostacyclin release from endothelial cells by sodium nitroprusside	J. S. MATTHEWS, S. K. FIELD, M. KEEN, AND B. J. KEY	<b>117S</b>
Mercuric chloride modulates [ <sup>3</sup> H]AMPA binding to <i>Xenopus</i> brain membranes	J. M. HENLEY AND D. M. KIRKHAM	<b>118S</b>
Functional necessity for binding of monomeric IgG to permit internalisation of FcγRI	W. DAVIS, P. T. HARRISON AND J. M. ALLEN	<b>120S</b>
Transmembrane association with gamma-chain is required for FcγRI-mediated phagocytosis in transfected COS cells	M. J. HUTCHINSON, P. T. HARRISON AND J. M. ALLEN	<b>121S</b>
IFN-γ and dibutyryl cAMP pre-treatment of U937 cells results in different Ca <sup>2+</sup> signals triggered by antibody cross-linking of the human high affinity receptor for IgG (FcγRI)	R. A. FLOTO, M. MAHAUT-SMITH AND J. M. ALLEN	<b>122S</b>
A GTP-binding protein participates in the intracellular trafficking of the high affinity IgG receptor, FcγRI	J. NORMAN AND J. ALLEN	<b>123S</b>
Exercise induced modulation of immune parameters	G. M. WANNAN, W. H. STIMSON AND J. ALEXANDER	<b>124S</b>

---

**RNA polymerase and its effectors in prokaryotes and eukaryotes**

---

Erythromycin dependence and RNA polymerase	B. A. MAGUIRE AND D. G. WILD	<b>125S</b>
Transcriptional regulation of denitrification genes in <i>Paracoccus denitrificans</i>	A. P. HINSLEY, M. G. DUCHARS AND S. SPIRO	<b>126S</b>
Small molecule mediated autoinduction of antibiotic biosynthesis in the plant pathogen <i>Erwinia carotovora</i>	P. F. CHAN, N. J. BAINTON, M. M. DAYKIN, M. K. WINSON, S. R. CHHABRA, G. S. A. B. STEWART, G. P. C. SALMOND, B. W. BYCROFT AND P. WILLIAMS	<b>127S</b>
Cytoplasmic gene expression in yeast: a plasmid-encoded transcription system in <i>Kluyveromyces lactis</i>	P. SCHAFFRATH, S. M. SOOND AND P. A. MEACOCK	<b>128S</b>
The sensitivity of competitive hybridisation for the detection of mutant p53 alleles in a background of wild type	K. CARPENTER, K. MORGAN, L. G. DURRANT, J. D. HARDCASTLE AND N. KALSHEKER	<b>129S</b>
Cloning of subunits of the human colonic epithelial Na <sup>+</sup> channel	E. H. BAKER, R. P. BOOT-HANDFORD AND G. I. SANDLE	<b>130S</b>
Expression of the proto-oncogenes <i>c-fos</i> and <i>c-myc</i> in <i>mdx</i> dystrophic mouse muscle	E. A. VEAL AND M. J. JACKSON	<b>131S</b>
Translational elongation factor 3 (EF-3): a study of its structural and functional divergence in fungi	N. ROSS-SMITH, P. TAN, G. BELFIELD AND M. F. TUIE	<b>132S</b>

---

**Lipid group**

---

Antioxidant activity of carotenoids in phosphatidylcholine vesicles: chemical and structural considerations	A. A. WOODALL, G. BRITTON AND M. J. JACKSON	<b>133S</b>
Supplementation of the diet with corn or olive oil enhances the hepatic metabolism of chylomicron remnants	M. S. LAMBERT, K. M. BOTHAM AND P. A. MAYES	<b>134S</b>

Metabolism of apolipoprotein A-I by the rat kidney	M. A. MINDHAM AND P. A. MAYES	<b>135S</b>
<b>Regulation in metabolism group</b>		
Nitric oxide synthase activation is a unique mechanism of garlic action	I. DAS, N. S. KHAN AND S. R. SOORANNA	<b>136S</b>
<b>Education group</b>		
Biochemistry practicals for all — meeting the needs of modular schemes	S. I. HOGG	<b>137S</b>
<b>General topics</b>		
Investigation of the redox state of recombinant horseradish peroxidase produced in inclusion bodies and factors affecting the efficiency of refolding	C. WHITE, C. SAMPSON, J. BURKE AND A. SMITH	<b>138S</b>
Promoter analysis of an African Swine Fever Virus gene encoding a putative elongation factor	P. R. YATES, L. K. DIXON AND P. C. TURNER	<b>139S</b>
EPR and visible spectroscopic analysis of a duodenal b-type cytochrome implicated in the process of intestinal iron absorption	D. J. POUNTNEY, J. K. SHERGILL, R. J. SIMPSON AND J. M. WRIGGLESWORTH	<b>140S</b>
Peptide substrates for AMP-activated protein kinase	C. M. TOOMEY, N. FLINN, C. VAN DER WALLE, I. TOTH AND M. R. MUNDAY	<b>141S</b>
Identification of an endogenous inhibitor of AMP-activated protein kinase	C. M. TOOMEY, K. J. WELHAM AND M. R. MUNDAY	<b>142S</b>
Phospholipase C-dependent activation of tyrosine kinases by LHRH in $\alpha$ T3-1 cells, and its role in LHRH priming of inositol phosphate production	R. MITCHELL, S. K. MCCONNELL AND P. SIM	<b>143S</b>
Activation of MAP kinase by the LHRH receptor through a PKC-dependent pertussis toxin-sensitive mechanism	P. SIM AND R. MITCHELL	<b>144S</b>
LHRH-induced tyrosine phosphorylation and MAP kinase activation in $\alpha$ T3-1 cells	B. WOLBERS, J. SIMPSON AND R. MITCHELL	<b>145S</b>
A novel high molecular weight form of protein kinase C in anterior pituitary	A. J. ISON, J. SIMPSON, E. M. LUTZ, R. A. CLEGG, K. CONNOR AND R. MITCHELL	<b>146S</b>
The properties of protein kinase C $\zeta$ purified from $\alpha$ T3-1 cells using hydroxyapatite chromatography	M. S. JOHNSON, J. SIMPSON, R. A. CLEGG AND R. MITCHELL	<b>147S</b>
Presence of a PKC species of molecular mass greater than 100 kDa in pituitary and lung but not midbrain	D. A. MCCULLOCH, J. SIMPSON, A. J. ISON AND R. MITCHELL	<b>148S</b>