

BIOCHEMICAL SOCIETY TRANSACTIONS



London: The Biochemical Society © 1984

Managing Editor D. C. WATTS

Book Reviews Editor R. EVANS

Contents Volume 12, Part 2, April 1984

THE NINTH KEILIN MEMORIAL LECTURE

- The evolution and function of biological molecular assemblies: from catalase to viruses M. G. ROSSMANN 115

THE TWENTIETH COLWORTH MEDAL LECTURE

- DNA: sequence, structure and supercoiling D. M. J. LILLEY 127

604th MEETING, CAMBRIDGE

Colloquium: Carbohydrate Transport in Micro-organisms

- Binding-protein-mediated transport systems in *Escherichia coli* W. Boos 141

Sugar-proton transport systems of *Escherichia coli*

- P. J. F. HENDERSON, S. BRADLEY, 146

A. J. S. MACPHERSON, P. HORNE, E. O. DAVIS,
K. R. DARUWALLA & M. C. JONES-MORTIMER

Reconstitution of the lactose carrier from mutant and parent cells of *Escherichia coli*

- T. H. WILSON, D. SETO-YOUNG & S. BEDU 148

Tightness of energy coupling during carbohydrate uptake in eukaryotic micro-organisms

- A. A. EDDY 150

Relation between the protonmotive force and solute transport in bacteria

- W. N. KONINGS, R. OTTO, B. TEN BRINK, 152

G. T. ROBILLARD, M. G. L. ELFERINK &
K. J. HELLINGWERF

Regulation of sugar transport by the bacterial phosphoenolpyruvate: glucose phosphotransferase system

- D. FOX, M. KUKURUZINSKA, K. D.-F. LIU, 155

The role of the phosphoenolpyruvate-phosphotransferase system in inducer exclusion

- N. D. MEADOW, D. SAFFEN & S. ROSEMAN 157

H. L. KORNBERG, P. BRITTON,
M. C. JONES-MORTIMER & L. G. LEE

Colloquium: Growth Factors

Studies on the structure and function of the epidermal-growth-factor receptor

- M. GREGORIOU & A. R. REES 160

Uptake and intracellular processing of epidermal-growth-factor-receptor complexes

- J. BEARDMORE & C. R. HOPKINS 165

Transforming growth factors: sources, properties and possible roles in normal and malignant cell growth control

- K. D. BROWN & D. M. BLAKELEY 168

Nerve Growth Factor—an enigma still?

- B. E. C. BANKS 173

Symposium: Enterotoxins and Anti-toxins

Enterotoxins and ion transport	M. C. RAO & M. FIELD	177
The mechanism of action of <i>Escherichia coli</i> heat-stable toxin	H. R. DE JONGE	180
The ADP-ribosyltransferase activity of cholera toxin and <i>Escherichia coli</i> heat-labile toxin	C. J. COULSON, P. M. NASSAU & R. M. TAIT	184
Genetics of enterotoxin production in <i>Escherichia coli</i>	H. R. SMITH	187
Cellular location of enterotoxin in <i>Escherichia coli</i>	T. R. HIRST, L. L. RANDALL & S. J. S. HARDY	189
Enteric diseases in animals caused by <i>Escherichia coli</i> : their control and prevention	C. WRAY	191
<i>Clostridium difficile</i> enterotoxin (toxin A): new results	J. STEPHEN, S. C. REDMOND, T. J. MITCHELL, J. KETLEY, D. C. A. CANDY, D. W. BURDON & R. DANIEL	194
<i>Clostridium perfringens</i> enterotoxin: a brief review	B. A. BARTHOLOMEW & M. F. STRINGER	195
<i>Bacillus cereus</i> enterotoxins: present status	R. J. GILBERT & J. M. KRAMER	198
Present status of cholera vaccines	M. M. LEVINE, R. E. BLACK, M. L. CLEMENTS & J. B. KAPER	200
Antimotility drugs in the treatment of acute diarrhoea	S. HUGHES	202
Opiate agonists and enterotoxins	B. K. SANDHU, A. D. PHILLIPS & P. J. MILLA	205
α -Adrenergic agonists and enterotoxins	P. M. NEWSOME, M. N. BURGESS, M. R. BURGESS, G. D. HOLMAN & S. R. NAHORSKI	208
Inhibition of cholera toxin-induced secretion by neuroleptics	J.-J. LARSEN, A. V. CHRISTENSEN & J. HYTTEL	211

Colloquium: The Application of Recombinant DNA Technology to Enzymology and Membrane Transport Processes

Cloning enzyme genes for overproduction	T. ATKINSON, D. A. BARSTOW, S. A. JONES, N. P. MINTON & R. F. SHERWOOD	215
Use of recombinant DNA techniques to study DNA repair in <i>Escherichia coli</i>	P. T. EMMERSON, I. D. HICKSON, H. M. ARTHUR, K. E. ATKINSON, D. BRAMHILL, P. FINCH & L. HUTTON	218
Cloning and sequence analysis of the pyruvate and 2-oxoglutarate dehydrogenase complex genes of <i>Escherichia coli</i>	J. R. GUEST, M. G. DARLISON, M. E. SPENCER & P. E. STEPHENS	220
Cloning and sequencing of the gene encoding NADP-specific glutamate dehydrogenase in <i>Neurospora crassa</i>	J. R. S. FINCHAM & J. A. KINNAIRD	223
Genetic dissection of tyrosyl-tRNA synthetase	G. WINTER, P. CARTER, M. M. Y. WAYE, D. M. BLOW, A. J. WILKINSON, J.-P. SHI & A. R. FERSHT	224
Directed mutagenesis as a technique to study protein function: application to β -lactamase	G. DALBADIE-MCFARLAND, A. D. RIGGS & J. H. RICHARDS	226
Probing the catalytic mechanism of yeast triose phosphate isomerase by site-specific mutagenesis	G. A. PETSKO, R. C. DAVENPORT, JR., D. FRANKEL & U. L. RAIHANDARY	229
Molecular mechanisms of bacterial periplasmic transport systems	C. F. HIGGINS	232
Genes for bacterial and mitochondrial ATP synthase	J. E. WALKER, G. FALK, N. J. GAY & V. L. J. TYBULEWICZ	234
Potassium transport in <i>Escherichia coli</i> : genetic and biochemical characterization of the K^+ -transporting ATPase	W. EPSTEIN, L. WIECZOREK, A. SIEBERS & K. ALTENDORF	235
Isolation and manipulation of genes coding for energy-transducing enzymes from <i>Neurospora crassa</i> and <i>Escherichia coli</i>	W. SEBALD, H. ARENDTS & J. E. G. McCARTHY	236
Molecular and genetic aspects of the fumarate reductase of <i>Escherichia coli</i>	S. T. COLE	237
COMMUNICATIONS		239
605th MEETING, STRATHCLYDE COMMUNICATIONS		287
CHARING CROSS MEETING		
Symposium: Use of Liposomes in Medicine		
Brenda E. Ryman	W. J. WHELAN	331

CONTENTS

iii

Liposomes: bags of challenge	H. M. PATEL	333
Interaction of liposomes with hepatocytes and Kupffer cells <i>in vivo</i> and <i>in vitro</i>	F. H. ROERDINK, J. DIJKSTRA, H. H. SPANIER & G. L. SCHERPHOF	335
Targeting of small unilamellar liposomes to the galactose receptor <i>in vivo</i>	G. GREGORIADIS & J. SENIOR	337
Role of lipoproteins in stability and clearance of liposomes administered to mice	J. SENIOR & G. GREGORIADIS	339
Antibody-directed liposomes: the development of a cell- specific cytotoxic agent	T. D. HEATH, K. S. BRAGMAN, K. K. MATTHAY, N. G. LOPEZ-STRaubinger & D. PAPAHADJOPoulos	340
Natural antibodies against phospholipids and liposomes in humans	C. R. ALVING	342
Liposomal drug delivery in chronic ischaemia	T. N. PALMER, M. A. CALDECOURT & R. O. KINGABY	344
Liposomes in diagnostic radiology	V. J. CARIDE	346
Liposomes as aids to tumour detection	G. M. BARRATT, B. E. RYMAN, K. A. CHESTER & R. H. J. BEGENT	348
Liposomes for gene transfer and expression <i>in vivo</i>	C. NICOLAU	349
BOOK REVIEWS		351

COMMUNICATIONS

604th MEETING, CAMBRIDGE

Phosphotransferase system of <i>Clostridium pasteurianum</i>	W. J. MITCHELL & I. R. BOOTH	239
Regulation of hexose uptake in Chinese-hamster ovary cells	P. FAIK & M. J. MORGAN	240
Irreversible uptake of dihydrostreptomycin by <i>Escherichia coli</i> K12	S. N. YOUNG & W. W. NICHOLS	240
Epidermal growth factor receptors on porcine thyroid cell membranes: lack of receptor antibodies in Graves' disease	S. ATKINSON & P. KENDALL-TAYLOR	242
Distribution of epidermal-growth-factor receptors in rat skin during embryonic development: evidence for a specific inductive interaction between a mesenchyme and an epithelium	M. R. GREEN & J. R. COUCHMAN	243
Amidolytic activity of 7S nerve growth factor	W. F. LONG & F. B. WILLIAMSON	244
The purification by immuno-affinity chromatography of bacterial methionyl-(human somatotropin)	G. W. JACK & H. J. GILBERT	246
Characterization of mRNA sequences encoding sheep somatotropin (growth hormone) by cloning of pituitary complementary DNA	J. M. WARWICK & M. WALLIS	247
Monoclonal antibodies that inhibit somatomedin-like activity	D. C. WATKINS & M. WALLIS	249
The specificity of binding of somatotropin (growth hormone) and prolactin to purified plasma membranes from rabbit liver	C. F. LEAROYD, H. F. CADMAN & M. WALLIS	250
Plasma somatomedin activity and tri-iodothyronine and thyroxine concentrations in female rats treated with the growth promoter trenbolone acetate	P. A. SINNETT-SMITH, A. N. BROOKS, N. W. DUMELOW, B. G. VERNON, N. B. HAYNES & P. J. BUTTERY	251
Posterior pituitary peptides in human foetal and neonatal tissues	A. SMITH, N. MCINTOSH & N. D. CARTER	252
The ontogeny of (arginine)vasotocin in the human foetus and newborn	N. MCINTOSH, A. SMITH & N. D. CARTER	253
The sympathetic control of brown-fat growth in animals and humans	G. MORY, D. RICQUIER, M. NECHAD, F. BOUILLAUD & J. THIBAULT	254
Is GTPase involved in the stimulation by human chorionic gonadotropin of luteal adenylate cyclase?	G. J. MURPHY & D. A. STANSFIELD	255
Silica-released macrophage factor that stimulates protein synthesis in fibroblasts	E. KULONEN, M. AALTO & M. POTILA	256
Regulation of growth kinetics of endometrial cells in primary culture	R. P. FIELD & R. E. LEAKE	258
Growth potential of endometrial cells in primary culture	I. MUNIR & R. E. LEAKE	259
Low-molecular-mass tumour angiogenesis factor	J. B. WEISS, C. R. HILL & A. SCHOR	260
The partial purification of colony-stimulating factors from human placental-conditioned medium	W. S. GILMORE	261
The effect of mouse fibroblast interferon on proinsulin biosynthesis	C. J. RHODES & K. W. TAYLOR	262
Large-scale production and purification of <i>Clostridium perfringens</i> type A enterotoxin	D. REYNOLDS, H. S. TRANTER, B. J. CAPEL, B. A. BARTHOLOMEW & M. F. STRINGER	262
The effect of <i>Escherichia coli</i> enterotoxin and methotrexate on drug absorption	J. LYNCH & M. L. LUCAS	263
Development of an inhibition Magnetic Enzyme Immuno-Assay (MEIA) technique for determination of staphylococcal enterotoxin B	P. D. PATEL & P. A. GIBBS	264
Effect of <i>Clostridium botulinum</i> toxin on neuroblastoma cells	P. NEAVES, L. F. J. WOODS, P. D. PATEL & P. A. GIBBS	265
Development of a Magnetic Enzyme ImmunoAssay (MEIA) technique for determination of anti-(staphylococcal enterotoxin) immunoglobulin G-type antibodies	P. D. PATEL, J. M. WOOD & P. A. GIBBS	266
The effect of chemical modification on the activity of heat stable enterotoxin from <i>Escherichia coli</i>	B. R. BOOTH, E. J. WOLFFE & M. A. SOWA	268
Effects on prostaglandin synthesis in WI-38 human lung fibroblasts following inhibition of acylation	S. A. HUNTER, S. BURSTEIN & C. SEDOR	269
Chloroplast genes for components of the ATP synthase complex	A. K. HUTTLY, C. J. HOWE, C. M. BOWMAN, T. A. DYER & J. C. GRAY	270

CONTENTS

v

Chloroplast genes for components of the cytochrome <i>b-f</i> complex from pea	D. L. WILLEY, A. L. PHILLIPS & J. C. GRAY	271
Localization of the gene for the P700-chlorophyll <i>a</i> protein in chloroplast DNA from pea and wheat	A. G. SMITH & J. C. GRAY	272
cDNA cloning of rabbit fatty acid synthetase	I. R. CAMERON, R. DILS, R. A. FALLON & C. J. SKIDMORE	273
Subcloning of the <i>Escherichia coli</i> genes <i>aroA</i> (5-enol-pyruvylshikimate 3-phosphate synthase) and <i>aroB</i> (3-dehydroquinate synthase)	K. DUNCAN & J. R. COGGINS	274
Subcloning of the <i>Escherichia coli</i> shikimate dehydrogenase gene (<i>aroE</i>) from the transducing bacteriophage λ <i>spc1</i>	I. A. ANTON & J. R. COGGINS	275
The mercury-resistance genes of transposon Tn501: nucleotide sequence of the <i>mer</i> operon and a possible mechanism for mercury detoxification	N. L. BROWN, R. D. PRIDMORE & D. C. FRITZINGER	276
Cell-free translation of the uncoupling protein of brown-fat mitochondria	F. BOUILAUD, D. RICQUIER & J. THIBAULT	277
Purification and expression of an Abelson-murine-leukaemia-virus-encoded protein kinase from <i>Escherichia coli</i>	J. G. FOULKES, J. Y. J. WANG, N. C. ANDREWS & D. BALTIMORE	277
Investigation of the activity of yeast phosphoglycerate kinase by site-specific mutagenesis	C. A. B. WILSON, M. F. TUITE, M. J. DOBSON, S. M. KINGSMAN, A. J. KINGSMAN, L. A. GLOVER, N. HARDMAN, H. C. WATSON & L. A. FOTHERGILL	278
Non-radioactive gene-specific probes	J. L. WOODHEAD & A. D. B. MALCOLM	279
The properties of immobilized horseradish peroxidase	N. SMALL, J. L. WOODHEAD & A. D. B. MALCOLM	280
Analysis of a retrovirus-like mouse gene family	A. T. CARTER, J. D. NORTON & R. J. AVERY	281
Studies on a human tRNA gene	J. P. GODDARD, M. BIENZ, M. SQUIRE & J. D. SMITH	282
Putative high-mobility-group (HMG) non-histone chromosomal proteins from wheat germ	E. L. V. MAYES & J. M. WALKER	283
Restriction-endonuclease digestion of topoisomer families	G. S. SNOUNOU & A. D. B. MALCOLM	284
Coloured computergraphic displays of subunit-subunit interfaces of oligomeric proteins	E. J. MILNER-WHITE	285
The human glutathione <i>S</i> -transferases: studies on the distribution of the GST1, GST2 and GST3 isoenzymes	R. C. STRANGE, C. G. FAULDER, B. A. DAVIS, J. A. H. BROWN, D. A. HOPKINSON & W. COTTON	285

605th MEETING, STRATHCLYDE

The effect of microtubule and microfilament disruption on the secretion of fucose- and mannose-containing glycoproteins from normal and cystic-fibrosis fibroblasts	V. GAVRIAS & C. J. DANPURE	287
Biochemical evidence for a case of canine fucosidosis	D. ABRAHAM, W. F. BLAKEMORE, A. DELL, M. E. HERRTAGE, J. JONES, J. D. LITTLEWOOD, J. OATES, A. C. PALMER, R. SIDEBOOTH & B. G. WINCHESTER	288
The role of mannosyltransferase in cellulose synthesis in mung-bean hypocotyls	A. F. D. KENNEDY & C. T. BRETT	289
Changes in glucuronyltransferase activity during tissue development in pea epicotyls	K. W. WALDRON & C. T. BRETT	290
The use of concanavalin A as a probe for ADP-ribosylated glycoproteins	L. MINSHALL & W. J. D. WHISH	291
Partial purification of UDP- <i>N</i> -acetyl- β -D-glucosamine-L-asparagine sequon β -D-glucosaminyltransferase from human serum	O. M. P. SINGH & R. D. MARSHALL	292
Location of bi- and tri-antennary <i>N</i> -glycans among the heterogeneous forms of human serum transferrin: a topographical study	M. W. C. HATTON & L. R. BERRY	293
Incomplete blood-group substances in the metastases of gastro-intestinal tumours	D. A. R. SIMMONS	294
The formation of membrane-bound glycoproteins by explants of malignant human breast tissue	A. S. A. KASSAB, F. W. HEMMING & R. W. BLAMEY	296
Changes in transglutaminase activity during tumour growth and metastasis	R. N. BARNES, P. J. BUNGAY, B. M. ELLIOT, P. L. WALTON & M. GRIFFIN	297
A study of the pulmonary toxicity induced by the anti-tumour compound bleomycin	M. IQBAL, B. SCANLON, L. L. SMITH & M. GRIFFIN	298
Multiple antigenic determinants of the Epithelial Membrane Antigen	J. H. WESTWOOD, M. G. ORMEROD, K. STEELE & M. N. MAZZINI	299

Heparin sulphates of chemically transformed BHK cells in which the transformed growth trait is temperature-dependent	N. E. WOODHEAD, W. F. LONG, F. B. WILLIAMSON & W. J. HARRIS	300
Polarimetry as a technique for the study of glycosaminoglycan-metal-ion interactions	C. F. MOFFAT, D. GRANT, W. F. LONG & F. B. WILLIAMSON	301
Altered water structure in mixtures of heparin and metal ions	D. GRANT, C. F. MOFFAT, W. F. LONG & F. B. WILLIAMSON	302
Binding of the <i>Helix pomatia</i> lectin to the surfaces of normal and leukaemic lymphoid cells	M. J. HARDING & J. T. GALLAGHER	302
Sequence analysis of dermatan sulphate oligosaccharides	I. N. HAMPSON & J. T. GALLAGHER	303
Ascorbate increases the sulphation of glycosaminoglycans synthesized by human skin fibroblasts	M. EDWARD & R. F. OLIVER	304
Effect of phorbol esters on ADP-ribose transferase in cultured mouse lymphoma (L1210) cells	M. WRIGHTMAN, D. FURNISS & W. J. D. WHISH	305
Germination and protein ADP-ribosylation	N. ABED & W. J. D. WHISH	305
Solubilization from sheep erythrocyte membranes of the potassium-transport-associated antigens L _p , L _t and M, and the molecular size determination of the L _p antigen by radiation inactivation	C. E. SMALLEY, E. M. TUCKER, I. SEPULVEDA & J. C. ELLORY	306
Isolation of a neurotensin-degrading enzyme from rat brain	J. R. McDERMOTT	307
Enhancement of the neuritogenicity of peripheral-nervous-system myelin proteins of P ₀ and P ₂ by lysophosphatidylcholine	C. A. LOVELIDGE, P. MILNER, W. A. TAYLOR, A. K. MACPHERSON & R. A. C. HUGHES	308
L-Homocysteine enhances pyridoxal 5'-phosphate-induced seizures in the rat	I. C. ALLEN & R. GRIFFITHS	309
Thermal stability properties of immobilized creatine kinase	J. RUDGE & G. F. BICKERSTAFF	311
Activation of the Ca ²⁺ -sensitive K ⁺ channel in erythrocytes at low temperature	A. C. HALL & J. S. WILLIS	312
Amino acids in the human placental intervillous space	N. MCINTOSH, C. H. RODECK & R. HEATH	314
Plasma amino acids in the mid-trimester human foetus	N. MCINTOSH, C. H. RODECK & R. HEATH	315
An electron-paramagnetic-resonance study of ferritin and haemosiderin	M. P. WEIR, J. F. GIBSON & T. J. PETERS	316
Human placental cell culture	D. M. L. MORGAN & V. J. TOOTHILL	317
Fluorescence-activated sorting of rat uterine deciduomal cells	K. N. MCCONNELL, B. D. YOUNG, J. E. O'GRADY & B. GREEN	318
Action of growth factors in rat uterine cells	R. P. FIELD & R. E. LEAKE	319
Attachment and growth of rat uterine cells <i>in vitro</i>	I. MUNIR & R. E. LEAKE	320
Factors regulating rat uterine oestrogen-receptor activation	L. MYATT, M. G. ELDER & J. O. WHITE	321
The interaction of oestrogen receptor with oligodeoxy-nucleotides	S. M. HYDER, M. G. ELDER, L. LIM & L. MYATT	322
Comparison of the activation of the rat uterine cytosol oestrogen receptor by oestradiol and anti-oestrogens	J. O. WHITE, M. G. ELDER & L. MYATT	323
Effect of oestrogen administration in fatty acid synthetase activity in male chick liver	S. COURTNEY & R. MANNING	324
Formation of free and sulphated oestrogens in porcine testicular microsomes: effects of aminoglutethimide on the pathway from 19-hydroxyandrost-4-enedione	R. M. AYLING, C. LYNE & D. B. GOWER	325
The involvement of calcium ions in phosphatidylinositol hydrolysis in the anterior pituitary	J. G. BAIRD, R. J. H. WOJCIKIEWICZ, P. R. M. DOBSON & B. L. BROWN	327
O-Glycosylation of herpes simplex virus glycoproteins carrying high-mannose glycans	F. SERAFINA-CESSI, F. DALL'OLIO & G. CAMPADELLI-FIUME	328