

# BIOCHEMICAL SOCIETY TRANSACTIONS



London: The Biochemical Society © 1984

Managing Editor D. C. WATTS

Book Reviews Editor R. EVANS

---

## Contents Volume 12, Part 3, June 1984

---

### 606th MEETING, CORK

#### Colloquium: Molecular Aspects of Malignant Hyperthermia and Muscular Dystrophy

A biochemical abnormality found in muscle from un-stressed malignant-hyperpyrexia-susceptible humans	F. R. ELLIS, P. J. HALSALL, P. ALLAM & E. HAY	357
Skeletal-muscle mitochondria and phospholipase A <sub>2</sub> in malignant hyperthermia	K. S. CHEAH	358
Mitochondrial and plasma membrane changes in skeletal muscle in the malignant hyperthermia syndrome	J. J. A. HEFFRON	360
Duchenne muscular dystrophy	S. V. PERRY	362
Problems in the prenatal diagnosis of Duchenne muscular dystrophy	D. C. WATTS	366
X-Chromosome-coded antigens in Duchenne muscular dystrophy	F. S. WALSH	368
X-Chromosome-specific polymorphisms in Duchenne muscular dystrophy: clinical applications	T. O'BRIEN	371

#### Symposium: Transport of Proteins, Ions and Electrons Through Mitochondrial Membranes

Import of mitochondrial proteins	M. A. HARMY & W. NEUPERT	373
Transport of nuclear-coded proteins into mitochondria	G. A. REID	374
Transport and processing of the precursors of mitochondrial carbamoyl phosphate synthetase I and ornithine transcarbamoylase	P. P. COHEN	377
Large amplitude protein movement. What functions?	A. WAKSMAN, G. CREMEL, P. HUBERT, C. MUTET & C. BURGEN	378
Transport of mature proteins into isolated mitochondria: a model system to investigate mitochondrial biogenesis	S. PASSARELLA, E. MARRA, S. DOONAN, C. SACCOME & E. QUAGLIARIELLO	381
Energy transduction, ion transport and protonmotive force: are they linked?	M. L. CAMPO, C.-J. ZHANG & H. TEDESCHI	384
Proton translocation coupled to mitochondrial electron transport	A. L. LEHNINGER	386
Proton and calcium circuits across the mitochondrial inner membrane	D. G. NICHOLLS, R. SNELLING & E. RIAL	388

Characteristics of the uncoupling protein from brown-fat mitochondria	M. KLINGENBERG	390
A possible physiological role of the $\text{Na}^+/\text{Ca}^{2+}$ exchange mechanism of brown-fat mitochondria in the mediation of $\alpha_1$ -adrenergic signals	J. NEDERGAARD, E. CONNOLLY, E. NÅNBERG & N. MOHELL	393
Electron flow in membranes	R. J. P. WILLIAMS	396
Some implications of fixed-charge formation during electron-transport-chain activity	F. H. MALPRESS	399
A structural basis for mosaic protonic energy coupling	K. VAN DAM, H. WOELDERS, A. COLEN & H. V. WESTERHOFF	401
Lateral diffusion, collision and efficiency of oxidation-reduction components in mitochondrial electron transport	C. R. HACKENBROCK, S. GUPTA, E.-S. WU & K. JACOBSON	402
Effects of physical exercise and/or vitamin E on tissue oxidative metabolism	A. T. QUINTANILHA	403
Carboxyl groups and the proton pump of bacteriorhodopsin	J. M. HERZ & L. PACKER	405
<b>Colloquium: Current Problems in the Understanding of Protonmotive Systems</b>		
Properties and physiology of energy-coupled mutants of <i>Escherichia coli</i>	I. R. BOOTH, R. G. KROLL, M. J. FINDLAY, L. M. D. STEWART & G. C. ROWLAND	409
Bioenergetic problems of alkalophilic bacteria	A. A. GUFFANTI & T. A. KRULWICH	411
Proton-transfer pathways during bacterial electron-transport phosphorylation	D. B. KELL & G. D. HITCHENS	413
'Cross-talk' between redox- and ATP-driven $\text{H}^+$ pumps	G. F. AZZONE, V. PETRONILLI & M. ZORATTI	414
Analysis of relationships between the protonmotive force and rates and extents of ATP synthesis	S. J. FERGUSON & D. PARSONAGE	416
<b>Colloquium: Structures and Catalysis by Aspartate Aminotransferase Isoenzymes</b>		
On the catalytic factors involved in the mechanism of aspartate aminotransferase: Chairman's remarks	C. A. VERNON	420
Primary structures of aspartate aminotransferases	F. BOSSA, D. BARRA & S. DOONAN	421
Three-dimensional structure of mitochondrial aspartate aminotransferase and some functional derivatives: implications for its mode of action	J. N. JANSONIUS, G. EICHELE, G. C. FORD, J. F. KIRSCH, D. PICOT, C. THALLER, M. G. VINCENT, H. GEHRING & P. CHRISTEN	424
Correlation of structure and catalysis by aspartate aminotransferase isoenzymes	P. CHRISTEN, H. GEHRING, E. SANDMEIER, H. KIRSTEN, K. PFISTER & J. N. JANSONIUS	427
Comparison of aspartate aminotransferase with other aminotransferases by absorption-spectrum analysis	R. A. JOHN, P. H. MORGAN & L. J. FOWLER	430
<b>COMMUNICATIONS</b>		
<b>605th MEETING, STRATHCLYDE</b>		
<b>Colloquium: Genetic Aspects of Glycoproteins</b>		
Genetic aspects of glycoproteins: Chairman's introduction	R. D. MARSHALL	513
Model studies on <i>N</i> -glycosylation of proteins	E. BAUSE	514
The role of three-dimensional structure in the control of <i>N</i> -linked oligosaccharide biosynthesis	J. P. CARVER	517
Studies of membrane glycoproteins in the rough endoplasmic reticulum	P. H. ATKINSON & A. K. KABCENELL	519
Role of $\alpha$ -D-mannosidases in the biosynthesis and catabolism of glycoproteins	B. WINCHESTER	522
Exchange of lysosomal enzymes between cells	M. F. DEAN & S. DIMENT	524
Non-specific adsorptive pinocytosis	J. B. LLOYD & K. E. WILLIAMS	527
Intracellular turnover and secretion of lysosomal enzymes	W. JESSUP, J. L. BODMER, R. T. DEAN, V. A. GREENAWAY & P. LEONI	529
<b>Colloquium: Glycoconjugates and Tumour-Cell Surfaces</b>		
Regulation of cell-surface structures in malignancy, differentiation and proliferation	M. F. GREAVES	532
A variant of Tamm-Horsfall glycoprotein produced by transformed (BHK 21/C13) cells: implications in the biosynthesis of carbohydrates moieties	R. D. MARSHALL	533
Surface glycoproteins in chronic lymphocytic leukaemias	S. K. SMITH & A. H. MADDDY	535

**CONTENTS**

iii

The structure of the Ca-antigen	G. WISEMAN, M. E. BRAMWELL, V. P. BHAVANANDAN & H. HARRIS	537
Cell interactions: some critical reappraisals	A. S. G. CURTIS & J. V. FORRESTER	538
Heparan sulphate alterations in tumour cells	D. J. WINTERBOURNE & Z. KHAN	540
Proteoglycans in cellular differentiation and neoplasia	J. T. GALLAGHER & I. N. HAMPSON	541
Carbohydrate differentiation and cancer-associated antigens detected by monoclonal antibodies	J. L. MAGNANI	543
Monoclonal antibodies reveal saccharide structures of glycoproteins and glycolipids as differentiation and tumour-associated antigens	T. FEIZI	545
Surface glycoprotein changes during normal and malignant haematopoietic differentiation	C. G. GAHMBERG, L. C. ANDERSSON, K. K. KARHI & H. RODT	549
Mutants, revertants and variants of metastasis	M. M. BURGER, J. FINNE & J.-P. PRIEELS	553
<b>BOOK REVIEWS</b>		<b>557</b>

## COMMUNICATIONS

Purification of NAD <sup>+</sup> -dependent dehydrogenases by affinity precipitation with adipo- <i>N<sup>2</sup>,N<sup>2'</sup></i> -dihydrazidobis-( <i>N<sup>6</sup>-carboxymethyl-NAD<sup>+</sup></i> )(bis-NAD <sup>+</sup> )	R. BEATTIE, L. D. GRAHAM, T. O. GRIFFIN & K. F. TIPTON	433
Mitochondrial transplantation in hepatocytes and HTC cells: studies of subsequent protein destruction	S. M. RUSSELL, P. J. EVANS & R. J. MAYER	434
Stimulation by feeder layers of human tumour-cell colony formation in agar	V. McMANUS & M. CLYNES	435
Inhibition of fibroblast contamination in cultures of human epithelial cells	S. McDONNELL, M. MORIARTY & M. CLYNES	435
The non-identity of protein phosphatase deinhibitor and protein kinase inhibitor	E. WAELKENS, J. GORIS, D. A. WALSH & W. MERLEVEDE	436
The effects of pulsed electromagnetic fields on membrane transport, protein and ATP synthesis in rat skin	P. H. DELPORT, N. CHENG, J. C. MULIER, W. M. SANSEN & W. DE LOECKER	437
Differential gene expression in rapidly dividing cells of <i>Schizosaccharomyces pombe</i>	G. M. WALKER & B. KRAMHØFT	438
Magnesium and control of mitochondrial morphology in fission yeast	G. M. WALKER & A. BIRCH-ANDERSEN	439
Multiple forms of calf prochymosin and chymosin	W. J. DONNELLY, D. M. O'CALLAGHAN, D. P. CARROLL, D. J. McCONNELL & F. GANNON	440
Changes in the surface of mouse spermatozoa during their passage through the epididymis	K. M. DEVINE & J. CARROLL	441
Immunofluorescence studies on spermatozoa from the mouse epididymis	G. J. P. MURPHY & J. CARROLL	442
Cytosolic and mitochondrial fumarases	M. C. O'HARE & S. DOONAN	443
Import of aspartate aminotransferase into mitochondria	K. M. C. O'DONOVAN, S. DOONAN, E. MARRA & S. PASSARELLA	444
Comparative studies of the primary structures of aspartate aminotransferase	F. MARTINI, S. ANGELACCIO, D. BARRA, F. BOSSA & S. DOONAN	445
Biliary excretion of [ <sup>14</sup> C]androstenedione metabolites in control and clofibrate-treated male rats	M. E. BEARY & V. O'SHEA	446
The effects of surgery and hepatic dysfunction on alanine metabolism in man	G. M. HALL, M. FLANNIGAN, J. L. PATERSON & S. M. SAPSED	447
Insulin suppression is the primary mediator of changes in circulating metabolites during surgery in man	G. M. HALL, E. S. WALSH, J. L. PATERSON & K. MASHITER	448
The effect of inhibitors of ADP-ribose transferase on the concentration of (ADP-ribose) <sub>n</sub> <i>in vitro</i>	W. H. MULLEN, L. MINSHALL & W. J. D. WHISH	449
Effect of dimethyl sulphate on ADP-ribosylation in mouse L1210 cells	W. H. MULLEN & W. J. D. WHISH	449
Loss of nicotinamide from cells treated with dimethyl sulphate	S. AL-MUHTASEB & W. J. D. WHISH	451
Monoclonal antibody-mediated delivery of deacetylcolchicine to human peripheral blood neutrophils	T. G. COTTER, T. D. FECYZC & K. O'MALLEY	452
Mitochondrial functions in mutants of <i>Drosophila melanogaster</i>	N. O'BRYNE-RING, H. QAZZAZ, A. BEHAN & E. J. DUKE	453
The antigenic region of the coat protein of the O subtypes of foot and mouth disease virus	F. BROWN, A. CARROLL, B. E. CLARKE, B. H. NICHOLSON & D. J. ROWLANDS	454
Effect of allopurinol (4-hydroxypyrazolo [3,4- <i>d</i> ]pyrimidine on purine metabolism in rat skeletal muscle	J. M. MURPHY & E. R. TULLY	455
The puzzle of high phosphorylation potential and low protonmotive force generated by oxidative phosphorylation in <i>Paracoccus denitrificans</i> membrane vesicles in the presence of nitrate	D. PARSONAGE & S. J. FERGUSON	456
Complementation studies in fibroblast cultures from patients with abnormal cystathionine $\beta$ -synthase activity (homocystinuria)	J. S. FOX, N. A. J. CARSON & M. H. R. LEWIS	457
Prenatal diagnosis of non-ketotic hyperglycinaemia	J. S. FOX, N. A. J. CARSON & M. H. R. LEWIS	458
The analysis, metabolism and encapsulation of coumarin	E. MORAN, R. O'KENNEDY & R. D. THORNES	459
Purification of pig gastric-mucosal <i>N</i> -acetyl- $\beta$ -D-glucosaminidase	R. DEVERY, P. B. COLLINS, A. H. JOHNSON & G. WATSON	460
Suppressor T-lymphocytes in malignancy	B. M. HANNIGAN, A. H. JOHNSON, P. B. COLLINS, M. MORIARTY & P. KEELING	461

## CONTENTS

v

Ascorbic acid content of plasma and cellular components of blood	A. M. B. KEATINGE, B. M. HANNIGAN, A. H. JOHNSON, P. B. COLLINS, M. MORIARTY & P. KEELING	462
Effect of varied membrane protein density on the lateral diffusion of lipids in the mitochondrial inner membrane	B. CHAZOTTE, E.-S. WU & C. R. HACKENBROCK	463
The pyruvate-oxidation system of the lipoamide dehydrogenase-containing anaerobe <i>Peptococcus glycinophilus</i>	S. G. MAYHEW, G. DOHERTY, D. MCGRATH & C. H. WILLIAMS, JR.	464
Dimethyl sulphoxide inhibits electron transfer to haem $a_3$ from haem $a$ and its associated copper in cytochrome $c$ oxidase	N. S. DAHABRAH & J. M. WRIGGLESWORTH	465
Hydrogen peroxide as a substrate for cytochrome $c$ oxidase	J. M. WRIGGLESWORTH, J. ELSDEN & H. BAUM	466
Investigation of the nature of inhibition of the mitochondrial $F_1$ -ATPase by 4-chloro-7-nitrobenzofurazan	R. SUTTON & S. J. FERGUSON	467
The effect of pH on the slow kinetic transients of arylsulphatase A	B. M. BUTLER & T. J. MANTLE	468
Purification and structural analysis of aromatic-amino-acid-accepting tRNA species from the green alga <i>Scenedesmus obliquus</i>	G. A. GREEN & D. S. JONES	468
The effect of $\text{Na}^+$ on growth and intracellular pH of a facultative alkalophile	D. McLAGGAN, M. J. SELWYN, B. M. LUND & A. P. DAWSON	470
Effect of acetylcholine and tetraethylammonium on the contractile response produced in the rat ileum	F. A. WALI	471
Does glycerol facilitate neuromuscular transmission?	F. A. WALI	472
Multiple forms of calmodulin on sodium dodecyl sulphate/polyacrylamide-gel electrophoresis	D. C. WILLIAMS, C. O'RIORDAN, R. E. BEATTIE & C. O'NEILL	472
Purification of the mitochondrial phosphate hydroxyl ion antiporter from rat liver	G. M. GIBB, G. P. REID & J. G. LINDSAY	474
Organization and distribution of carbohydrate on mitochondrial membranes	J. G. LINDSAY, G. P. REID & W. DARLINGTON	475
Prostaglandin synthase activity in tissues from guinea pigs fed fatty acid- and aspirin-supplemented diets	C. HADJIGAPIOU, C. TRITSCHLER & M. G. HARRINGTON	476
Relationships between forms of deoxyribonuclease I from several mammals	C. SMYTHE & F. G. WINDER	477
An inhibited form of deoxyribonuclease I b in extracts of <i>Aspergillus nidulans</i>	F. G. WINDER & D. SHEILS	478
Relationship between products and mechanism of action of deoxyribonuclease I b of <i>Aspergillus nidulans</i>	F. G. WINDER & M. SHIKARA	479
Calcium uptake and retention by skeletal-muscle mitochondria	A. P. ALLSHIRE & J. J. A. HEFFRON	480
Effects of denervation on calcium uptake and release pathways of rabbit skeletal-muscle mitochondria	L. A. BURKE & J. J. A. HEFFRON	481
Second-derivative fluorescence spectroscopy in the study of membrane protein conformational changes	J. J. BIRMINGHAM & J. J. A. HEFFRON	482
Possible biochemical basis for bilirubin neurotoxicity	A. O'CALLAGHAN & P. F. DUGGAN	483
Calcium fluxes in synaptosomes from rat cerebral cortex	M. CAPLICE & P. F. DUGGAN	484
Comparison of the degree of non-biospecific binding of $^{125}\text{I}$ -labelled insulin to Sepharose CL-6B conjugates prepared with different activating agents	J. G. MAXWELL & G. B. IRVINE	485
A strategy for the cloning of the human oestrogen-receptor gene: optimization of an immunodetection system for use in the screening of a cDNA library	P. GILNA, D. COLLINS, G. L. GREENE & F. GANNON	486
Towards the cloning of the calf prochymosin gene	D. J. McCONNELL, D. HUGHES, Y.-F. CHEN, D. P. CARROLL, W. J. DONNELLY, J. F. OLLINGTON, D. QUINN, T. BARRY & F. GANNON	487
Replacement of anticodon-loop nucleotides to produce functional tRNAs	A. G. BRUCE, J. F. ATKINS, N. WILLS, L. BARE, O. UHLENBECK & R. F. GESTELAND	488
Molecular studies on the DNA-repair genes of the cyanobacterium <i>Gloeocapsa alpicola</i>	D. NUTTALL, C. GEOGHEGAN & J. A. HOUGHTON	488
Expression of phosphoglucose isomerase and glucose 6-phosphate dehydrogenase from <i>Leuconostoc mesenteroides</i> in <i>Escherichia coli</i>	T. SCHWARZ, N. B. MURPHY & D. McCONNELL	489
Characterization of complex genetic rearrangements in recombinant plasmids	N. B. MURPHY, T. SCHWARZ & D. McCONNELL	490

Host selection of <i>Rhizobium trifolii</i> on <i>Trifolium repens</i> (clover)	J. NEILAN, D. N. DOWLING & L. K. DUNICAN	<b>492</b>
Generation of multiple-host <i>Rhizobium</i> strains by plasmid transfer	L. K. DUNICAN, D. N. DOWLING, J. NEILAN & M. O'CONNELL	<b>492</b>
An improved spectrophotometric assay for monoamine oxidase in mitochondria	C. H. WILLIAMS	<b>493</b>
Characterization of mRNA from mumps-virus-infected cells	J. A. CURRAN, E. M. HOEY & B. K. RIMA	<b>494</b>
Molecular cloning of bovine enterovirus	E. M. HOEY, R. O. CAMPBELL, J. A. P. EARLE & S. J. MARTIN	<b>495</b>
Purification and characterization of canine-distemper-virus mRNA	S. E. H. RUSSELL, E. M. HOEY, B. K. RIMA & S. J. MARTIN	<b>496</b>
Neurovirulence of canine-distemper virus for hamsters	S. L. COSBY, C. LYONS & S. J. MARTIN	<b>497</b>
The effect of digitonin on the fluorescence anisotropy depolarization of cholesterol-containing liposomes	P. GREER & N. M. RYAN	<b>498</b>
Cloning and identification of promoters from temperate phage $\Phi 105$ in <i>Bacillus subtilis</i> , using a versatile 'promoter-probe' vector	P. DHAESE, C. HUSSEY & M. VAN MONTAGU	<b>499</b>
An electron paramagnetic resonance study of <i>Escherichia coli</i> fumarate reductase: its iron-sulphur centres and their organization	D. SIMPKIN & W. J. INGLEDEW	<b>500</b>
The iron-sulphur centres of the <i>Escherichia coli</i> electron transport chain: changes in response to aerobic growth on different carbon sources	M. C. KIRBY & W. J. INGLEDEW	<b>501</b>
A kinetic and electron spin resonance study of the blue copper protein rusticyanin from <i>Thiobacillus ferro-oxidans</i>	C. A. LEWIS, A. G. LAPPIN & W. J. INGLEDEW	<b>503</b>
The physiology of <i>unc</i> mutants of <i>Escherichia coli</i>	R. G. KROLL, C. V. SALMOND & I. R. BOOTH	<b>504</b>
D-Alanine transport in <i>Escherichia coli</i>	G. C. ROWLAND & I. R. BOOTH	<b>505</b>
Energy coupling to $K^+$ transport via the Trk system of <i>Escherichia coli</i>	L. M. D. STEWART, E. P. BAKKER & I. R. BOOTH	<b>506</b>
Direct interactions between electron transfer chains and solute transport systems in bacteria	K. J. HELLINGWERF, M. G. L. ELFERINK & W. N. KONINGS	<b>507</b>
Kinetic studies on the ATP synthesis reaction in liposomes containing bacteriorhodopsin and ATPase-complex	R. L. VAN DER BEND, J. PETERSEN & J. A. BERDEN	<b>508</b>
Direct interaction between ATP synthase and the respiratory chain in beef heart submitochondrial particles	M. A. HERWEIJER, J. A. BERDEN & A. KEMP	<b>509</b>
Free and total tri-iodothyronine and thyroxine in malnourished Jamaican infants	H. M. PAYNE ROBINSON, H. BETTON & A. A. JACKSON	<b>511</b>