

biochemical society
TRANSACTIONS

646th Meeting Leeds

Ciba Medal Lecture

Dissection of the Protein Phosphorylation Cascades Involved in Insulin and Growth Factor Action

Wellcome Trust Award Lecture

Life Style, Genetic Factors and the Risk of Heart Attack: The Apolipoprotein B Gene as an Example

Morton Lecture

Structure and Function of Sphingoglycolipids in Transmembrane Signalling and Cell-Cell Interactions

colloquia

Molecular Recognition

Novel Approaches to the Treatment of Atherosclerosis

Neuropeptide Processing and Metabolism: Molecular and Clinical Aspects

Charting Endocytic Membrane Traffic Pathways

Free Radical Enzymes

Regulation of Oxidative Phosphorylation

communications

■ *Biochemical Society Transactions* (ISSN 0300-5127) is published by Portland Press Ltd on behalf of the Biochemical Society. Each issue contains the lectures, colloquia and communications presented at one of the Biochemical Society's meetings held in various parts of the U.K. and Ireland and, occasionally, in conjunction with other Societies, abroad. Submitted primary research papers are not published. Authors of lectures and colloquium contributions at Society meetings will receive instructions on the format of their article prior to the meeting; instructions for authors intending to present communications at Society meetings appear in the Society's membership journal, *The Biochemist*, and occasionally in this journal.

■ For information about the advantages of membership of the Biochemical Society, contact the Executive Secretary, The Biochemical Society, 59 Portland Place, London W1N 3AJ, U.K. (telephone 071-580 5530).

■ Editorial and publishing office: *Biochemical Society Transactions*, 59 Portland Place, London W1N 3AJ, U.K. (telephone 071-637 5873; facsimile 071-323 1136).

Subscription rates

■ Subscriptions department: Portland Press, P.O. Box 32, Commerce Way, Colchester CO2 8HP, U.K. (telephone 0206-796351; facsimile 0206-799331). *Biochemical Society Transactions* is published in February, May, August and November of each year. Subscription rates for volume 21, parts 1-4 (1993):

	North America	Rest of world
Volume 21	\$225.00	£125.00
Single issues	\$58.00	£32.00

Subscribers to the *Biochemical Journal* may take a joint subscription to that journal and to *Biochemical Society Transactions*, saving \$25 (North America) or £15 (rest of world). North American subscription rates include airfreight delivery, and those for Japan include Accelerated Surface Post; other overseas locations are serviced by surface mail. Airmail delivery is available at extra cost. Back issues are available. Subscribers in Japan should send orders to Kinokuniya Company Ltd, Journal Department, P.O. Box 55, Chitose, Tokyo 156.

■ All rights reserved. Apart from any fair dealing for the purposes of research or private study, or criticism or review, as permitted under the Copyright, Designs and Patents Act, 1988, this publication may be reproduced, stored or transmitted, in any form or by any means, only with the prior permission in writing of the publishers, or in the case of reprographic reproduction in accordance with the terms of permissions granted by the copyright clearing houses such as the Copyright Licensing Agency (U.K.) or the Copyright Clearance Center (U.S.A.). The CCC item-fee code for this publication is 0300-5127/93/\$5.00 + 0.00. Inquiries concerning reproduction outside those terms should be sent to the publishers at the London address.

■ Although, at the time of going to press, the information contained in this publication is believed to be correct, neither the authors nor the publisher nor the editor assume any responsibility for any errors or omissions herein contained.

■ Display advertising is accepted; information is available on request from the London office of Portland Press.

■ Second-class postage paid at Rahway, NJ, U.S.A.

■ U.S. Postmaster: send address changes to *Biochemical Society Transactions*, c/o Mercury Airfreight International Ltd, 2323 Randolph Avenue, Avenel, NJ 07001, U.S.A.

■ Typeset by Unicus Graphics Ltd, Horsham, and printed in Great Britain by Whitstable Litho Printers Ltd, Kent.

Aberg, A. 735
Adcock, I. M. 277S
Addey, C. V. P. 294S
Afanas'ef, I. B. 314S
Aitken, A. 233S
Akkoçlu, A. 305S, 306S
Allen, J. M. 269S
Allouche, A. 302S
Amzel, L. M. 744
Andalibi, A. 65I
Apps, D. K. 253S
Austen, B. M. 311S

Ballantyne, J. S. 78S
Bard, J. M. 647
Barelli, H. 692
Barnes, K. 246S
Barnes, P. J. 277S
Baron, A. J. 319S, 752
Bartlett, K. 804
Baskin, Y. 305S, 307S, 308S
Beaudet, A. 692
Bell, C. G. H. 287S, 288S, 289S
Bhogal, G. 241S
Birch-Machin, M. A. 804
Blanchard, S. 315S
Blau, C. 739
Blundell, T. L. 597
Boileau, G. 668
Booker, S. 727
Bosworth, A. E. 323S
Botham, K. M. 284S
Boudjelal, M. 619
Boustead, C. M. 292S
Bowen, D. M. 238S, 239S, 240S, 241S, 242S
Boyington, J. C. 744
Braganza, I. M. 326S
Brand, M. D. 757, 769, 785
Brewis, I. A. 252S
Brinkmann, K. 769
Brocklebank, I. 752
Broderick, J. 727
Brown, C. R. 277S
Brown, S. 259S
Brown, S. 282S, 283S
Brownleader, M. D. 229S
Bryson, J. M. 294S

Calas, B. 266S
Candan, G. 223S, 224S, 285S, 286S, 309S

Castro, M. G. 318S
Çelikoğlu, F. 285S, 309S
Çelikoğlu, S. 285S, 309S
Ceryan, K. 307S, 308S
Chavanieu, A. 266S
Checler, F. 692
Chessell, I. P. 240S
Chien, L.-F. 757
Chrétien, M. 685
Clarke, N. A. 242S
Coates, D. 243S
Cohen, P. 55S
Cooper, C. E. 78I
Coppack, S. W. 231S
Corbeil, D. 668
Cornell, M. J. 243S
Crilley, C. T. 271S
Crine, P. 668
Cunliffe, W. J. 303S

Dalton, H. 749
Daniel, E. E. 692
Dauch, P. 692
Day, J. P. 321S
Day, R. 68S
de Feyter, P. J. 642
De Sousa, M. A. 322S
de Vos, A. 614
Dean, M. F. 270S
Denton, R. M. 793
Dey, P. M. 229S
Di Mario, C. 642
Dickenson, J. M. 296S
Diplock, A. T. 314S
Diomez, P. 769
Dive, V. 692
Djavani, M. 273S, 274S, 275S
Dobson, C. B. 321S
Dodson, E. J. 609
Dodson, G. G. 609
Dos Santos Medeiros, M. 247S, 248S
Durrant, L. G. 324S

Edwards, R. H. T. 301S
Eklund, H. 73S
Elbert, S. 73I
Ellis, L. 266S, 267S
Enrich, C. 722
Erensoy, N. 286S
Esen, N. 309S
Evans, P. R. 60S
Evans, W. H. 722

Fell, D. A. 256S, 257S
Ferguson, M. W. J. 298S
Fielding, B. A. 235S
Findlay, J. B. C. 226S, 619
Fisher, R. M. 231S
Fitton, V. 773
Fogelman, A. M. 65I
Foster, K. A. 291S
Fox-Threlkeld, J. E. T. 692
Francis, P. T. 238S, 239S, 240S, 241S, 242S
Frayn, K. N. 235S
Frey, M. 73I
Fruchart, J. C. 647
Fuchs, R. 716

Gaffney, B. J. 744
Garred, Ø. 707
Garton, A. J. 233S
Gelder, C. M. 277S
Gelişgen, R. 286S
Gennis, R. B. 255S, 259S
Geraghty, R. 261S
Gibb, B. A. 291S
Goddard, J. P. 302S
Golmohammadi, R. 627
Goodman, S. T. S. 627
Grand, R. J. A. 267S
Griffiths, D. E. 253S
Griffiths, H. R. 299S
Grigorescu, F. 266S
Groarke, A. 227S
Gu, J. 280S
Guérin, B. 773
Güner, G. 273S, 274S, 275S, 305S, 306S, 307S, 308S
Guthrie, D. J. S. 261S, 268S, 269S

Habgood, N. T. 236S
Hacibekiroğlu, M. 223S, 224S
Hadad-Halfon, N. 272S
Hakomori, S.-i. 583
Haraux, F. 769
Harper, M.-E. 78S
Harris, D. A. 778
Harris, M. 290S
Harte, R. A. 325S
Hatemi, H. 223S, 224S, 285S, 286S
Hatemi, S. 223S, 224S
Hayes, T. K. 244S

Haynes, C. 276S
Hayward, J. R. 276S
He, M. 311S
Henderson, B. 290S
Hider, R. C. 234S
Hill, H. R. 627
Hill, S. J. 293S, 296S
Hoang, V.-Q. 284S
Hodge, P. 318S
Hodgkiss, A. D. 242S
Holm, P. K. 707
Holmes, C. 238S
Holness, M. J. 312S, 313S
Hooper, N. M. 236S, 250S, 251S, 252S
Howard, R. M. 310S
Howell, S. 252S
Hudecz, F. 324S
Hue, L. 327S
Humphreys, S. M. 235S
Humphries, S. E. 569
Hussain, R. 269S
Hynes, T. 614

Imes, S. 65I
Ingledeew, W. J. 255S
Irvine, G. B. 261S, 269S
Isaac, R. E. 243S, 244S, 245S, 295S
Ishak, Z. 263S
Ito, N. 60S
Ito, N. 752
Itzhaki, R. F. 321S, 322S, 323S

Jackson, B. 325S
Jackson, J. B. 260S
Jackson, M. J. 300S, 301S
Jackson, R. L. 650
Jalal, F. 668
Jenkins, H. A. 326S
Jepson, C. A. 232S
Jesson, T.-H. 60S
Jiang, Y. 749
Johnson, D. J. 280S
Johnson, M. S. 597
Jones, M. 326S
Jutley, J. K. 303S

Kajtár, J. 324S
Karayel, T. 309S
Karlikaya, C. 305S, 306S
Keane, N. E. 266S, 267S
Kemp, G. J. 762

- Kenny, A. J. 246S, 252S, 292S, 663
 Kessler, A. 769
 Ketterman, A. J. 304S
 Kirkali, G. 273S, 274S, 275S, 305S, 307S, 308S
 Knappe, J. 731
 Knowles, P. F. 319S, 752
 Korkina, L. G. 314S
 Kossiakoff, A. A. 614
 Kottke, B. A. 231S
 Kulkarni, S. 311S
- Laird, A. 283S
 Lall, A. 278S
 Lamango, N. 245S
 Lamb, D. J. 234S
 Lanctôt, C. 668
 Layton, A. M. 303S
 Leach, G. 76S
 Leach, M. 78S
 Leake, D. S. 234S
 Lemay, G. 668
 Levine, B. A. 265S, 266S, 267S
 Li, J. 60S
 Liao, F. 651
 Liberman, D. 283S
 Liljas, L. 627
 Linton, E. A. 318S
 Lloyd, G. S. 236S
 Loscalzo, J. 656
 Louie, G. V. 597
 Lovell, J. 268S
 Lowenstein, P. R. 318S
 Lowerson, S. 804
 Lowry, P. J. 318S
 Lunec, J. 299S
 Lusic, A. J. 651
 Luzio, J. P. 721
- Macedo, J. M. B. 627
 Maldjian, A. 297S
 Marsh, M. 703
 Masuo, Y. 692
 McArdle, A. 301S
 McCormack, J. G. 793
 McGarry, L. C. 323S
 McKernan, R. M. 622
 McPherson, M. J. 317S, 319S, 752
 Medina, G. 627
 Middleton, A. 230S
 Middleton, B. 230S
- Miles, J. M. 231S
 Millner, P. A. 226S, 227S, 228S, 263S
 Mole, E. J. 237S, 262S
 Molloy, D. P. 267S
 Moniz-Barreto, P. 256S
 Moody, A. J. 255S, 258S
 Moreland, B. 278S
 Moore, A. L. 76S
 Morhy, L. 226S
 Morrison, E. 318S
 Muimo, R. 295S
 Mullock, B. M. 721
 Munro, A. W. 316S
 Murphy, R. F. 716
- Nagai, K. 60S
 Naik, S. 279S
 Nair, N. G. 254S
 Nebbali, M. 282S
 Ng, K. Y. 303S
 Noble, R. C. 297S, 298S
 Nordlund, P. 73S
- O'Farrell, S. 300S
 Ogel, Z. B. 752
 Oktay, G. 306S
 Oppong, S. Y. 251S
 Orchard, M. A. 281S
 Orfali, K. A. 310S
 Oubridge, C. 60S
 Ouhabi, R. 773
 Overington, J. P. 597
 Owen, D. 267S
 Öztürk, M. 286S
- Parsons, I. J. 703
 Patchall, V. B. 265S
 Paynter, H. 237S, 262S
 Pearce, B. R. 239S
 Pearce, N. J. 284S
 Pelchen-Matthews, A. 703
 Peters, M. J. 277S
 Petrick, A. T. 264S
 Phillips, S. E. V. 319S, 752
 Phoenix, D. A. 225S
 Ponchaut, S. 327S
 Prapantadara, L.-A. 304S
 Price, M. R. 324S
 Pritchard, C. 60S
- Procter, A. W. 238S, 242S
- Quirk, P. 266S
- Raab-Brill, U. 739
 Radda, G. K. 762
 Ragan, C. I. 622
 Reedy, M. 265S
 Reid, P. 703
 Ricart, C. A. 226S
 Rich, P. R. 255S, 258S, 259S
 Rigoulet, M. 773
 Robinson, N. R. 322S
 Roelandt, J. R. T. C. 642
 Rolfe, D. F. S. 757
 Roques, B. P. 678
 Ruf, H. H. 739
 Rumbley, J. N. 255S, 259S
- Şahin, G. 309S
 Şali, A. 597
 Sandvig, K. 707
 Sansom, P. A. 270S
 Sazanov, L. A. 260S
 Schmid, J. 716
 Schofield, J. G. 320S
 Schulster, D. 278S
 Seidah, N. G. 68S
 Seneviratne, K. 752
 Şengör, T. 307S, 308S
 Şengül, R. 285S, 309S
 Serruys, P. W. 642
 Sessiz, H. T. 273S, 274S, 275S
 Seven, A. 223S, 224S, 285S, 286S, 309S
 Shand, J. H. 298S
 Sharpe, M. A. 781
 Shepherd, J. 63S
 Sherratt, H. S. A. 804
 Shiel, N. 326S
 Shoshan-Barmatz, V. 272S
 Sivaprasadarao, A. 619
 Slatter, D. A. 265S
 Smith, G. M. 233S
 Soboll, S. 799
 Sowdhamini, R. 597
 Speake, B. K. 297S, 298S
 Speakman, P. T. 279S, 280S
- Spencer-Dene, B. 290S
 Stafford, S. J. V. 320S
 Steel, C. C. 254S
 Steele, Jr., G. 264S
 Stevens, C. 319S
 Stevenson, P. J. 269S
 Stevens, C. 752
 Stockley, P. G. 627
 Stonehouse, N. J. 627
 Stoorvogel, W. 711
 Storch, J. 291S
 Strasburg, G. M. 265S
 Stratmann, G. C. 241S
 Strey, A. 244S
 Stubbe, J. 727
 Styles, P. 762
 Suckling, K. E. 284S, 325S, 660
 Sugden, M. C. 310S, 312S, 313S
 Sugden, P. H. 313S
 Summan, M. 326S
 Sutton, R. 237S, 262S
- Talbot, S. J. 627
 Taylor, D. J. 762
 Taylor, R. W. 804
 Templar, J. 321S
 Teo, C. H. 60S
 Tewary, H. K. 627
 Thomas, P. 264S
 Thorogood, P. 290S
 Tiekü, S. 250S
 Tipping, A. J. 317S
 Toktamiş, N. 223S, 224S
 Tomasec, P. 318S
 Trotter, P. J. 281S
 Turkenburg, J. P. 609
 Turnbull, D. M. 804
 Turner, A. J. 236S, 246S, 247S, 248S, 251S, 252S, 271S, 697
 Turner, N. A. 249S
- Uhlin, U. 73S
 Uray, K. 324S
- Vajda, K. 298S
 Valegård, K. 627
 Valerio, M. 769
 van den Hove, M.-F. 327S
 van Deurs, B. 707

Vaughan, P. F. T. 249S, 292S, 315S	Walton, C. 627	Whitehouse, D. G. 765	Woolf, N. 639
Veitch, K. 327S	Wang, A. C. L. 265S	Whiting, P. J. 622	Wrigglesworth, J. M. 781
Vekrellis, K. 239S	Webster, J. 227S	Wilde, C. J. 294S	Xiao Bing 609
Vincent, B. 692	Webster, L. C. 253S	Wilkins, M. R. 673	Yeaman, S. J. 232S, 233S, 325S
Vincent, J. P. 692	Webster, M.-T. 238S, 239S, 241S, 242S	Wilkins, P. C. 749	Yenice, S. 273S, 274S, 275S
Wafford, K. 622	Welby, C. M. 276S	Wilkinson, T. C. I. 276S	Yigit, G. 223S, 224S
Wagner, A. F. V. 731	West, D. W. 298S	Willets, J. M. 299S	Yilmazer, S. 286S
Waksman, G. 668	West, I. C. 804	Williams, A. C. 299S	Zhu, Z.-Y. 597
Walker, J. H. 249S, 281S, 292S, 315S	White, D. A. 283S	Williams, C. H. 261S	
Walters, D. A. 627	White, I. R. 226S, 227S, 228S, 263S	Wilmot, C. M. 319S, 752	
	White, T. E. 293S	Wise, A. 228S	
		Withers, K. 668	
		Wood, E. J. 303S	