

The BIOCHEMICAL JOURNAL

B London: The Biochemical Society © 1985

VOLUME 230, No. 3

15 September 1985

EDITORIAL BOARD

Chairman

C. I. Pogson (*Beckenham*)

Deputy Chairmen

J. A. Lucy (*London*)

P. J. Garlick (*Aberdeen*)

M. D. Houslay (*Glasgow*)

J. E. Kay (*Brighton*)

A. J. Turner (*Leeds*)

Editorial Manager

A. G. J. Evans

Editorial Secretary

A. S. Beedle

G. Allen (*Beckenham*)

T. ap Rees (*Cambridge*)

K. Brocklehurst (*London*)

B. Burchell (*Dundee*)

R. J. Cherry (*Colchester*)

M. J. Clemens (*London*)

B. A. Cooke (*London*)

N. Crawford (*London*)

P. Davies (*Rahway*)

R. T. Dean (*Uxbridge*)

J. F. Dice (*Boston*)

P. J. England (*Welwyn*)

W. H. Evans (*London*)

J. E. Fothergill (*Aberdeen*)

R. B. Freedman (*Canterbury*)

C. Greenwood (*Norwich*)

B. A. Haddock (*Edinburgh*)

J. L. Harwood (*Cardiff*)

F. W. Hemming (*Nottingham*)

L. Hue (*Bruxelles*)

O. T. G. Jones (*Bristol*)

P. F. Knowles (*Leeds*)

J. Knudsen (*Odense*)

R. H. Michell (*Birmingham*)

G. Murphy (*Cambridge*)

D. G. Nicholls (*Dundee*)

G. C. K. Roberts (*London*)

G. G. Rousseau (*Bruxelles*)

E. D. Saggerson (*London*)

K. Snell (*Guildford*)

A. M. Tartakoff (*Cleveland*)

K. F. Tipton (*Dublin*)

J. E. Walker (*Cambridge*)

D. A. Walsh (*Davis*)

C. W. Wharton (*Birmingham*)

The Editorial Board includes two members nominated by the British Biophysical Society

- The Biochemical Journal is published and distributed by the Biochemical Society, and appears twice monthly.
- Editorial and Publishing Offices: The Biochemical Journal, 7 Warwick Court, London WC1R 5DP, U.K.
- Subscriptions Department: The Biochemical Society Book Depot, P.O. Box 32, Commerce Way, Colchester CO2 8HP, Essex, U.K.
- All rights reserved. No part of this publication may be reproduced, stored in a retrieval system, or transmitted, in any form or by any means, electronic, mechanical, photocopying, recording or otherwise without the prior permission of the copyright owner.
- Copies of articles in this journal may be made in the U.S.A. for personal or internal use, or for the personal or internal use of specific clients, on the condition, however, that the copier pay the stated per-copy fee through the Copyright Clearance Center Inc. (P.O. Box 765, Schenectady, New York 12301, U.S.A.) for copying beyond that permitted by Sections 107 or 108 of the U.S. Copyright Law. This consent does not extend to other kinds of copying, such as copying for general distribution, for advertising or promotional purposes, for creating new collective works, or for resale. The Copyright Clearance Center code for this journal is 0264-6021/85/\$2.00.
- Second-class postage paid at New York, NY, U.S.A.
- U.S. Postmaster: send address changes to *Biochemical Journal*, c/o Expeditors of the Printed Word Ltd., 527 Madison Avenue, New York, NY 10022, U.S.A. (U.S. mailing agent).

AUTHORS

The *Biochemical Journal* places emphasis on the prompt publication of **Full-length Papers** (on average about 6 months after receipt), **Rapid Papers** (on average within 3 months of receipt), **Reviews** and **BJ Letters**. It is the Journal's policy to publish papers in English in all fields of biochemistry, provided that they make a sufficient contribution to biochemical knowledge. Papers may include new results obtained experimentally, descriptions of new experimental methods of biochemical importance, or new interpretations of existing results. Theoretical contributions will be considered equally with papers dealing with experimental work. All work presented should have as its aim the development of biochemical concepts rather than the mere recording of facts. Preliminary or inconclusive experiments should not be described.

Papers are accepted from non-members and members of the Biochemical Society. Prospective authors should note that the *Biochemical Journal* offers rapid publication and makes no manuscript handling charges, no page charges and no charges for plates (except colour). Fifty reprints are provided free of charge; further copies are available at modest cost.

The paragraphs below are a summarized version of information provided in the Biochemical Society's *Policy of the Journal and Instructions to Authors* (*Biochem. J.* (1985) **225**, 1-26). Copies are available from the Editorial Office.

The following types of submission are considered by the Editorial Board.

1. **Full-length Papers** (normally eight printed pages maximum)
2. **Rapid Papers** (four printed pages maximum)
3. **Letters** (two printed pages maximum)
4. **Reviews** (usually solicited)

Full-length Papers and Rapid Papers

Full-length Papers should not normally exceed eight printed pages, including figures and tables. Longer papers may be acceptable if their content justifies their length. Indeed, the Board's desire to restrict the length of papers should not lead authors to split their work into two or more shorter papers. For example, a single paper consisting justifiably of ten printed pages will

normally be considered more favourably than two papers each of six pages dealing with the same material. Authors should remember that short papers are generally published with the least delay.

All papers that can be accommodated in four pages of the Journal will be treated as **Rapid Papers**. They receive priority treatment and it is aimed for their publication to be within 3 months of receipt. However, the criteria of reviewing and the appearance of Rapid Papers in the Journal are identical with those of Full-length Papers. In order to achieve the accelerated schedule, reviewers are asked to deal with the paper within 48 h and proofs of accepted Rapid Papers are not normally supplied to authors. However, authors are given details of any editing of Rapid Papers at the same time that the typescripts are sent to the printer, with a request that any essential amendments be sent to the Editorial Secretary as soon as possible. The scientific editorial staff in the Editorial Office check the proofs to ensure that they tally exactly with the edited typescripts and make any necessary alterations indicated by the authors.

Papers submitted for publication should be addressed to the Editorial Secretary, The Biochemical Journal, 7 Warwick Court, London WC1R 5DP, U.K. Three copies of the typescript should be submitted. The typescript should bear the name and address of the person to whom correspondence (including proofs) should be sent. An additional copy of the synopsis should be enclosed. The top copy should be accompanied by the original artwork (see the Appendix to *Policy of the Journal and Instructions to Authors* for advice on the preparation of figures). Photocopies of line drawings are acceptable for the other two copies but glossy prints (not photocopies) of all the halftone figures must be provided.

It is helpful if the author encloses copies of relevant preceding papers, especially if these were not published in the *Biochemical Journal*. If the paper submitted refers to a paper 'in the press' in another journal the reviewers will not have access to this material and it is important that the author should include photocopies of the relevant typescript together with documentary evidence that it has been accepted for publication. Any reference to a 'personal communication' must be supported by documentary evi-

dence from the individual quoted showing that agreement with the quotation is given.

Before preparing papers, authors should consult a current issue of the Journal to make themselves familiar with the general format, such as the use of cross-headings, lay-out of tables and citation of references. Typescripts should be in double-spaced typing throughout (including the references and legends of tables and figures) on sheets of uniform size with wide margins.

Full-length Papers should not normally exceed 6000 words in length, and Rapid Papers must not exceed 3000 words, each inclusive of title, synopsis and references. Authors must assess what proportion of a page insertions (such as tables, figures and schemes) will occupy and reduce the number of text words accordingly at the rate of 800 words per full page of the Journal.

Authors should state under which section of the contents list they wish their paper to appear:

Proteins
Enzymes
Carbohydrates
Lipids
Nucleic acids and molecular genetics
Synthesis and degradation of macromolecules
Intermediary metabolism and metabolic control
Bioenergetics and transport
Membranes and receptors
Cell structure and function
Methods

BJ Letters and Reviews

BJ Letters are intended to provide an opportunity to discuss, criticize or expand particular points made in published work, or to present a new hypothesis. They should not be comments on general aspects of the biochemical world, nor should they be used as an alternative to a Rapid Paper. If a letter is polemical in nature, a reply may be solicited from other interested parties before its publication. Letters must not exceed 1200 words, which is approximately the equivalent of two printed pages.

Reviews will usually be solicited, although unsolicited reviews will be considered for publication; however, prospective writers of reviews should first consult the Chairman of the Editorial Board.

SUBSCRIBERS

The *Biochemical Journal* is published and distributed by the Biochemical Society. It is published twice monthly; in 1985 eight volumes (225-232) of three parts each will appear. An Annual Index is supplied to all subscribers as soon as possible after publication of the year's volumes.

Subscription rates

For non-members of the Biochemical Society the subscription rates for 1985 are shown below. Subscribers to the *Biochemical Journal* can subscribe additionally to *Biochemical Society Transactions* on a joint subscription, saving £15.00 (U.K. and Overseas) or \$25.00 (N. America). The methods of despatch of both publications are shown below.

Terms are cash with order (£ sterling for subscribers other than in North America or U.S. \$ equivalent at current rate of exchange) or against proforma invoice. Orders and subscriptions should be sent to the address below, or through your usual agent.

	U.K. & Overseas	U.S.A., Canada & Mexico
1 year (8 volumes)	£445	U.S. \$890
Per volume	£56	U.S. \$112
Per part	£19.50	U.S. \$40

Subscription rates for Japan are available on application.

The subscription rate for North America includes an element for airfreight service.

Advertisements

Applications for advertising space should be sent to the Advertising Department at the Society's London address. Copy is required eight weeks before publication date. Rate cards are available on request.

Microfiche

Volumes 102-224 of the *Biochemical Journal* are available on microfiche. Further details are available from the address below.

Subscription Department

The Biochemical Society Book Depot,
P.O. Box 32, Commerce Way,
Colchester CO2 8HP, Essex, U.K.

LIBRARIANS

Preliminary pages: The preliminary pages in each issue have been arranged and paginated so that they can be assembled to give a set of volume preliminary pages; pages (i) and (ii) are the volume title pages supplied with part 1 of each volume, pages (iii)-(vi), (vii)-(x) and (xi)-(xiv) are the contents pages from parts 1, 2 and 3 respectively, and pages (xv) and (xvi) are the volume author index supplied in part 3 of each volume.

INDEX OF AUTHORS

	PAGE		PAGE		PAGE
Barber, T.	675	Hatton, M. N.	817	Ragan, C. I.	739
Berg, T.	617	Hill, C. E.	733	Rao, K. M. K.	709
Betschart, J. M.	709	Imai, T.	561	Rasmussen, M.	617
Beyersmann, D.	625	Isobe, K.	561	Ryder, N. S.	765
Blech, D. M.	771	Itoh, S.	561	Saunders, J. E.	771
Blomhoff, R.	617	Jamil, H.	791	Schlösser, M.	625
Bone, E. J.	825	Janmohamed, N. S.	777	Senior, M. B.	587
Borders, C. L., Jr.	771	Jarvis, S. M.	777	Sharp, R. B.	587
Bose, S. K.	785	Jensson, H.	609	Shaw, E.	645
Brunori, M.	797	Kenny, A. J.	753	Shaw, L.	723
Cabo, J.	675	Kido, R.	635	Silvestrini, M. C.	797
Clarke, J. B.	791	Kindberg, G. M.	617	Stowell, K. M.	595
Cleeter, M. W. J.	739	Kuivaniemi, H.	639	Sullivan, M. H. F.	821
Colosimo, A.	797	Kuroiwa, T.	635	Tabak, L. A.	817
Cooke, B. A.	821	Le Cam, A.	603	Tahir, M. K.	609
Crow, K. E.	595	Le Cam, G.	603	Takikawa, O.	635
Csermely, P.	807	Levine, M. J.	817	Takuwa, Y.	715
Dawson, A. P.	733	Levy, G. C.	807	Taylor, S. S.	569
De Hoffmann, E.	683	Lewis, S. E. M.	833	Todd, J. A.	825, 829
Dothie, J. M.	569	Loomis, R. E.	817	Tordi, M. G.	797
Drevon, C. A.	617	Loviny, T.	579	Toyota, S.	561
Dupont, M.-C.	765	Majumder, S.	785	Tuttobello, L.	797
Easom, R. A.	747	Manabe, M.	561	Vamecq, J.	683
Ejchart, A. J.	807	Mannervik, B.	609	Van Hoof, F.	683
Ellar, D. J.	825, 829	Martonosi, A.	807	Vernon, R. G.	651
Engel, P. C.	723	Moore, C. B.	569	Viña, J.	675
Finley, E.	651	Mukhopadhyay, N. K.	785	Viña, J. R.	675
Fridovich, I.	771	Murthy, M. S. R.	657	Virji, M. A.	709
Gallagher, J. T.	665	Ngai, P. K.	695	Walker, A.	665
Garner, C. D.	625	Norton, P. M.	579	Walker, B.	645
Gee, N. S.	753	Norum, K. R.	617	Walsh, M. P.	695
Ghosh, S. K.	785	Nyström, L.	609	Wardell, E. M.	625
Giglio, J. R.	569	Ogata, E.	715	Wikstrom, P.	645
Goldspink, D. F.	833	Onishi, S.	561	Yamakawa, T.	561
Guthenberg, C.	609	Österlund, E.	609	Yamazaki, F.	635
Hartley, B. S.	569, 579	Pande, S. V.	657	Young, J. D.	777
Hasnain, S. S.	625	Penning, T. M.	587	Zammit, V. A.	747
		Pryor, J. S.	733		

VOLUME AUTHOR INDEX

Volume 230, 1985

	PAGE		PAGE		PAGE
Adiga, P. R.	363	Damjanov, I.	75	Graf, J.	441
Ahmed, K.	293	Davis, A. T.	293	Grant, M. E.	217, 465
Aiyar, V. N.	43	Davis, E. J.	303	Green, M. D.	403
Alhadeff, J. A.	75	Dawson, A. P.	733	Greenwood, C.	227
Aragozzini, F.	451	Dawson, R. M. C.	61	Griffiths, G.	379
Arion, W. J.	489	de Groot, H.	255	Guasch, M. D.	69
Authi, K. S.	247	De Hoffmann, E.	683	Guthenberg, C.	609
Avila, J.	551	de Klerk, G. J.	269	Gutteridge, J. M. C.	517
Ayad, S.	465	Din, W. S.	395		
		Diven, W.	19	Habberfield, A. D.	211
Bachhawat, B. K.	321	Dix, C. J.	211	Halliwell, B.	517
Bain, P. A.	117	Dixon, H. B. F.	535	Hartley, B. S.	569, 579
Bais, R.	53	Dorai, D. T.	321	Hasnain, S. S.	625
Barber, T.	675	Dothie, J. M.	569	Hatton, M. N.	817
Barnes, M. J.	475	Drevon, C. A.	617	Heinegård, D.	181
Barrett, A. J.	509	Dufrane, S. P.	345	Hellman, U.	353
Baum, B. J.	313	Duncan, R. J. S.	261	Helman, J.	313
Bentley, D. R.	133	Dupont, M.-C.	765	Hemington, N.	61
Berden, J. A.	543			Hershfield, M. S.	43
Berg, T.	617	Easom, R. A.	747	Hiipakka, R. A.	293
Betschart, J. M.	709	Edwards, M. R.	169	Hill, C. E.	733
Beyersmann, D.	625	Edwardson, J. M.	481	Hofsteenge, J.	497
Bidigare, R. R.	101	Eggertsen, G.	353	Humphreys-Beher, M. G.	369
Bird, M. I.	161, 169	Ejchart, A. J.	807		
Bjørnstad, K.	329	Ellar, D. J.	825, 829	Imai, T.	561
Björne-Persson, A.	181	Engel, P. C.	723	Irvine, R. F.	61
Blake, D. R.	517	Engelen, D.	269	Isobe, K.	561
Blech, D. M.	771	Engström, Å.	353	Itarte, E.	69
Blomhoff, R.	617	Estrela, J. M.	457	Itoh, S.	561
Bone, E. J.	825	Evêquoz, V.	339		
Borders, C. L., Jr.	771			Jackson, D. G.	195
Bose, S. K.	785	Falany, C. N.	403	James, H. M.	53
Boyer, T. D.	125	Fears, R.	525	Jamil, H.	791
Brailsford, S.	517	Ferrari, A.	451	Janmohamed, N. S.	777
Brindley, D. N.	525	Finley, E.	651	Jarvis, S. M.	777
Brunori, M.	797	Flamée, P.-A.	557	Jensson, H.	609
Burchell, A.	489	Fleisch, H.	339	Jordan, P. M.	25
Burchell, B.	489	Footo, N.	227		
		Fothergill-Gilmore, L. A.	535	Kembhavi, A. A.	509
Cabo, J.	675	Fowler, L. J.	481	Kenney, W. C.	125
Canzi, E.	451	Franzén, A.	181	Kenny, A. J.	753
Chambers, C. A.	465	Frazier, J. M.	395	Kido, R.	635
Chanderbhan, R.	19	Fridovich, I.	771	Kindberg, G. M.	617
Chapman, H. A., Jr.	109	Fuchs, R.	441	Kirby, N.	481
Chaudhry, A.-G.	25			Kirkpatrick, R. B.	403
Chung, L. P.	133	Gaal, J. C.	1	Knudsen, J.	435
Clarke, J. B.	791	Gadsby, P. M. A.	227	Krishnamurthy, K.	363
Cleeter, M. W. J.	739	Galla, H.-J.	277	Kuivaniemi, H.	639
Clegg, R. A.	239	Gallagher, J. T.	665	Kuroiwa, T.	635
Coade, S. B.	503	Gardell, S.	181		
Collins, M. K. L.	281	Garner, C. D.	625	Laury-Kleintop, L. D.	75
Colosimo, A.	797	Gee, N. S.	753	Le Cam, A.	603
Conyers, R. A. J.	53	Ghosh, S. K.	785	Le Cam, G.	603
Cöster, L.	181	Giambiagi, N.	203	Levine, M. J.	817
Cooke, B. A.	211, 821	Gibbs, P. N. B.	25	Levy, G. C.	807
Corstorphine, C. G.	389	Gietzen, K.	277	Lewis, S. E. M.	833
Crawford, N.	247	Giglio, J. R.	569	Liao, S.	293
Crow, K. E.	595	Giroix, M.-H.	345	Lisanti, M. P.	411
Csermely, P.	807	Glimcher, M. J.	423	Loomis, R. E.	817
Cusack, N. J.	503	Goldspink, D. F.	833	Loviny, T.	579
		Goueli, S. A.	293	Lunec, J.	517

Volume author index

	PAGE		PAGE		PAGE
Maconi, E.	451	Pryor, J. S.	733	Tabak, L. A.	817
Majumder, S.	785	Puszkin, S.	411	Tahir, M. K.	609
Malaisse, W. J.	345			Takeshita, M.	273
Malliopoulou, T. B.	89	Ragan, C. I.	739	Takikawa, O.	635
Malmström, A.	181	Rakitzis, E. T.	89	Takuwa, Y.	715
Manabe, M.	561	Rao, K. M. K.	709	Tamura, M.	273
Mannervik, B.	609	Rasmussen, M.	617	Taylor, D. J.	83
Martonosi, A.	807	Reeds, P. J.	117	Taylor, S. S.	569
McAleese, S. M.	535	Reid, K. B. M.	133	Templeton, D. M.	35
McCarthy, A. D.	95	Rizk, M.	19	Tephly, T. R.	403
Mehta, B. J.	101	Rofe, A. M.	53	Thomson, A. J.	227
Meijer, A. J.	457	Roth, G. S.	313	Tipton, K. F.	95
Merritt, J. E.	151	Royce, P. M.	475	Todd, J. A.	825, 829
Mikkelsen, J.	435	Rubin, R. P.	151	Tordi, M. G.	797
Miller, L.	143	Ryder, N. S.	765	Toyota, S.	561
Miyata, T.	321			Trechsel, U.	339
Monaco, M.	489	Saggerson, E. D.	161, 169	Tuttobello, L.	797
Moore, C. B.	569	Sander, E. G.	101		
Mukhopadhyay, N. K.	785	Sandfalk, R.	181	Vahouny, G.	19
Mullaney, I.	239	Sanghvi, A.	19	Vamecq, J.	683
Murthy, M. S. R.	657	Sarkar, B.	35	Van Dam, K.	543
		Saunders, J. E.	771	Van Hoof, F.	683
Ngai, P. K.	695	Saunders, N. A.	217	Van der Bend, R. L.	543
Noland, B. J.	19	Scaduto, R. C. Jr.	303	Verhoeven, A. J.	457
Noll, T.	255	Scallen, T. J.	19	Vernon, R. G.	651
Norton, P. M.	579	Schlösser, M.	625	Viña, J.	675
Norum, K. R.	617	Seltman, H.	19	Viña, J. R.	675
Nyström, L.	609	Sener, A.	345	Virji, M. A.	709
		Senior, M. B.	587	Vogel, K.	181
Ogata, E.	715	Serrano, L.	551	Voorheis, H. P.	195
Onishi, S.	561	Sharp, R. B.	587		
Osmundsen, H.	329	Shaw, E.	645	Walker, A.	665
Österlund, E.	609	Shaw, L.	723	Walker, B.	645
Owen, M. J.	195, 281	Shuttleworth, C. A.	465	Walls, H. E.	489
		Sidjimov, A.	451	Walsh, M. P.	695
Palmer, R. M.	117	Silvestrini, M. C.	797	Wardell, E. M.	625
Pande, S. V.	657	Sjöquist, J.	353	Westerhoff, H. V.	543
Parkes, C.	509	Slingsby, C.	143	Wikstrom, P.	645
Pasqualini, J. R.	203	Small, W. C.	43	Williams, M. I.	101
Paulsson, M.	181	Smith, S.	435	Winyard, P. G.	517
Pearson, C. K.	1	Somasundaran, M.	321	Woolley, D. E.	83
Pearson, J. D.	503	Srimal, S.	321		
Penning, T. M.	587	Stern, A.	435	Yamakawa, T.	561
Peterlik, M.	441	Stobart, A. K.	379	Yamazaki, F.	635
Petersen, J.	227, 543	Stone, O. L.	109	Yoffe, J. R.	83
Pettigrew, D. W.	101	Stone, S. R.	497	Young, J. D.	777
Phillips, N. I.	481	Stowell, K. M.	595	Yubisui, T.	273
Pittner, R. A.	525	Strawich, E.	423		
Plana, M.	69	Stymne, S.	379	Zammit, V. A.	389, 747
Premakumar, R.	43	Sullivan, M. H. F.	821		
		Surolia, N.	363		