

BIOLOGICAL CHEMISTRY

*Founded in 1877 by Felix Hoppe-Seyler as
Zeitschrift für Physiologische Chemie*

Felix Hoppe-Seyler (1825–1895) was a pioneer of biochemistry, remembered not only for his discovery of hemoglobin and his contributions to the chemical characterization of many other biological compounds and processes but also for having been the mentor of Friedrich Miescher and Albrecht Kossel. In his preface to the first issue of *Zeitschrift für Physiologische Chemie*, Felix Hoppe-Seyler coined the term *Biochemistry* ('Biochemie') for the then newly emerging discipline.

EDITOR-IN-CHIEF
B. Brüne, Frankfurt/Main

EXECUTIVE EDITORS

*J. Buchner, Munich
S. Ludwig, Münster
H. Sies, Düsseldorf
B. Turk, Ljubljana
A. Wittinghofer, Dortmund*

EDITORIAL BOARD

*A.G. Beck-Sickinger, Leipzig
M. Bogyo, Stanford
E. Cadenas, Los Angeles
I. Dikic, Frankfurt/Main
C. Dobson, Cambridge
A. Driessens, Groningen
K. Gevaert, Ghent
C. Hammann, Bremen
F.U. Hartl, Martinsried
D. Häussinger, Düsseldorf
J. Hiscott, Port St. Lucie
L.-O. Klotz, Jena
V. Magdolen, Munich
M. Müschen, San Francisco
S. Narumiya, Kyoto
C.M. Overall, Vancouver
G. Pejler, Uppsala
N. Pfanner, Freiburg
R. Pike, Melbourne
J. Potempa, Krakow
K. Sandhoff, Bonn
W. Schaffner, Zürich
I. Simning, Heidelberg
C. Sommerhoff, Munich
S. Spiegel, Richmond
G. Tiegs, Hamburg*

ASSOCIATE EDITORS (GBM STUDY GROUPS)

*C. Blattner, Karlsruhe
O. Einsle, Freiburg
K. Giehl, Giessen
R. Hell, Heidelberg
M. Helm, Mainz
J. Herrmann, Kaiserslautern
R. Heumann, Bochum
R. Horstkorte, Halle/Saale
C. Hunte, Freiburg
S. Knauer, Essen
I. Koch, Frankfurt/Main
O. Pötz, Reutlingen
P. Rehling, Göttingen
D. Schneider, Mainz
C. Seidel, Düsseldorf
R. Sterner, Regensburg
C. Villmann, Würzburg*



Biological Chemistry is associated
with the Gesellschaft für Biochemie und
Molekularbiologie e.V. (GBM)

DE GRUYTER

ABSTRACTED/INDEXED IN Academic OneFile (Gale/Cengage Learning), ASFA1: Biological Sciences & Living Resources, Biochemistry & Biophysics Citation Index, Biological Abstracts, BIOSIS Previews, CAB Abstracts, Calcium and Calcified Tissue Abstracts, Chemical Abstracts and the CAS databases, CSA Illustrata - Natural Sciences, CSA Neurosciences Abstracts, Current Contents/Life Sciences, Elsevier BIOBASE/Current Awareness in Biological Sciences (CABS), EMBASE - the Excerpta Medica database, EMBiology, Index Medicus/MEDLINE, Journal Citation Reports/Science Edition, Reaction Citation Index, Reference Update, Science Citation Index, Science Citation Index Expanded (SciSearch), Scopus, SIIC Data Bases, Zoological Record.

The Journal is associated with the Gesellschaft für Biochemie und Molekularbiologie e.V. 

The publisher, together with the authors and editors, has taken great pains to ensure that all information presented in this work (programs, applications, amounts, dosages, etc.) reflects the standard of knowledge at the time of publication. Despite careful manuscript preparation and proof correction, errors can nevertheless occur. Authors, editors and publisher disclaim all responsibility for any errors or omissions or liability for the results obtained from use of the information, or parts thereof, contained in this work.

The citation of registered names, trade names, trademarks, etc. in this work does not imply, even in the absence of a specific statement, that such names are exempt from laws and regulations protecting trademarks etc. and therefore free for general use.

ISSN 1431-6730 · e-ISSN 1437-4315 · CODEN BICHF3

All information regarding notes for contributors, subscriptions, Open access, back volumes and orders is available online at www.degruyter.com/bc.

RESPONSIBLE EDITOR(S) Professor Dr. Bernhard Brüne, Goethe-University, Faculty of Medicine, Biochemistry I, Theodor-Stern-Kai 7, D-60590 Frankfurt/Main, Germany, Tel.: +49-69-6301 7424, Email: B.Bruene@biochem.uni-frankfurt.de

JOURNAL MANAGER Dr. Torsten Krüger, De Gruyter, Genthiner Straße 13, 10785 Berlin, Germany,
Tel.: +49 (0)30 260 05-176, Fax: +49 (0)30 260 05-298, Email: biol.chem.editorial@degruyter.com

RESPONSIBLE FOR ADVERTISEMENTS Heiko Schulze, De Gruyter, Genthiner Straße 13, 10785 Berlin, Germany. Tel.: +49 (0)30 260 05-358,
Fax: +49 (0)30 260 05-264, Email: anzeigen@degruyter.com

© 2015 Walter de Gruyter GmbH, Berlin/Boston

TYPESETTING Compuscript Ltd., Shannon, Ireland

PRINTING Franz X. Stückle Druck und Verlag e.K., Ettenheim
Printed in Germany

COVER ILLUSTRATION

The cover illustration shows the position of aspartate 496 from the subsite S2 of human dipeptidyl peptidase III (DPP III), a member of metallopeptidase family M49, in a complex with the pentapeptide tynorphin (Val-Val-Tyr-Pro-Trp) (PDB: 3T6B). In their article on pp. 359–366 in this issue, Abramić and colleagues present the results of investigations on the structural basis of human DPP III preference for diarginyl arylamide substrates by altering its S2 subsite (by site-directed mutagenesis) to mimic the situation in the yeast enzyme, which is known to be non-selective. Asp496 was identified as a critical residue for the known specificity of human DPP III (and many other mammalian orthologs) towards Arg-Arg-arylamine, and plays an important role in determining this enzyme's preferential binding of peptides with an N-terminal arginine, but also of tynorphin. Since Asp496 is one of 13 residues forming the S2 subsite of human DPP III, these results demonstrate the significant influence that one single amino acid residue from the substrate binding site can have on enzyme specificity. This phenomenon has been reported also for the papain family of cysteine peptidases, and for representatives of the M1, M3 and M4 family of metallopeptidases.

Image courtesy of Marija Abramić, Zagreb, Croatia. The structure was generated using PyMOL (© 2006 DeLano Scientific LLC) and GIMP 2.8.



Contents

Reviews

Wim van 't Hof, Silvie Hansenová Maňáková, Enno C.I. Veerman and Jan G.M. Bolscher
Sortase-mediated backbone cyclization of proteins and peptides — 283

Dae In Kim, Birendra KC and Kyle J. Roux
Making the LINC: SUN and KASH protein interactions — 295

Walter Schaffner
Enhancers, enhancers – from their discovery to today's universe of transcription enhancers — 311

Minireview

Wioletta Rut, Paulina Kasperkiewicz, Anna Byzia, Marcin Poreba, Katarzyna Groborz and Marcin Drag
Recent advances and concepts in substrate specificity determination of proteases using tailored libraries of fluorogenic substrates with unnatural amino acids — 329

Research Articles/Short Communications

Genes and Nucleic Acids

Xiao-Dong Liu, Feng Cai, Liang Liu, Yan Zhang and An-Li Yang
microRNA-210 is involved in the regulation of postmenopausal osteoporosis through promotion of VEGF expression and osteoblast differentiation — 339

Protein Structure and Function

René Schlesier and Ralf Bernd Klösgen
C-terminal truncation of a Tat passenger protein affects its membrane translocation by interfering with receptor binding — 349

Marija Abramić, Zrinka Karačić, Maja Šemanjski, Bojana Vukelić and Nina Jajčanin-Jozic
Aspartate 496 from the subsite S2 drives specificity of human dipeptidyl peptidase III — 359

Proteolysis

Désirée Wünsch, Angelina Hahlbrock, Christina Heiselmayer, Sandra Bäcker, Christian Schrenk, Franziska Benne, Oliver Schilling and Shirley K. Knauer
Evolutionary divergence of Threonine Aspartase1 leads to species-specific substrate recognition — 367

Florian Veillard, Barbara Potempa, Yonghua Guo, Miroslaw Ksiazek, Maryta N. Sztukowska, John A. Houston, Lahari Koneru, Ky-Anh Nguyen and Jan Potempa
Purification and characterisation of recombinant His-tagged RgpB gingipain from *Porphyromonas gingivalis* — 377