

# Dudley Howard Williams

## Curriculum Vitae and Bibliography

**STATEMENT OF CAREER**

**NAME:** Dudley Howard Williams

**DATE OF BIRTH:** 25 May 1937

**NATIONALITY:** British

**EDUCATION:**

<b>INSTITUTION</b>	<b>YEARS</b>	<b>QUALIFICATIONS GAINED OR POSITION OCCUPIED</b>
University of Leeds	1955-1958	B.Sc. (1st Class Hons.)
University of Leeds	1958-1961	Ph.D.

**SUBSEQUENT CAREER**

Stanford University (USA)	1961-1964	Postdoctoral Fellow (Fulbright Scholar)
University of Cambridge	1964-1966	Senior Assistant in Research
Churchill College, Cambridge	1964-	Fellow
Churchill College, Cambridge	1964-1973	College Lecturer in Chemistry
University of Cambridge	1964	M.A.
University of Cambridge	1966-1974	Assistant Director of Research
University of California Irvine	1967	Visiting Professor
Churchill College, Cambridge	1968-1973	Director of Studies in Chemistry
University of Cambridge	1972	Sc.D.
University of Cape Town	1972	Visiting Lecturer
University of Sydney	1972	Nuffield Visiting Lecturer
University of Florida	1973	Visiting Professor
University of Cambridge	1974-1996	Reader in Organic Chemistry
University of Wisconsin	1975	Visiting Professor
University of Copenhagen	1976	Visiting Professor
Australian National University	1980	Visiting Research Fellow
University of California, Irvine	1986	Visiting Professor
University of Cambridge	1988-2002	Deputy Director, Camb. Centre Mol. Rec.
University of California, Irvine	1989	Visiting Professor
Churchill College, Cambridge	1989	Elected Extraordinary Fellow
University of Queensland	1994	Visiting Professor
University of Cambridge	1996-	Professor in Biological Chemistry
University of California, Irvine	1997	Visiting Professor

***AWARDS, LECTURESHIPS, AND SOCIETIES***

The Meldola Medal (Royal Institute of Chemistry, 1966).  
The Corday-Morgan Medal and Prize (The Chemical Society, 1968).  
Fellow of the Royal Sociey of Chemistry (1969).  
Tilden Medal and Lecturer (The Royal Society of Chemistry, 1983).  
Elected Fellow of The Royal Society (1983).  
The Royal Society of Chemistry 1984 Award for Structural Chemistry.  
The 1985 Arun Guthikonda Memorial Award Lectureship, Columbia University, New York.  
The 1989 Rorer Lecturer, Ohio State University.  
Distinguished Visiting Lecturer, Texas A and M University, 1986.  
Member of Academia Europaea.  
The 1990 Bader Award for Organic Chemistry, Royal Society of Chemistry.  
Pacific Coast Lecturer, 1991.  
University of Auckland Foundation Lecturer, 1991.  
Steel Lecturer, University of Queensland, 1994.  
Leo Friend Award of the American Chemical Society, 1996.  
Byvoet Symposium Lecturer, Holland, 1998.  
Burgenstock Symposium Lecturer, Switzerland, 1999.  
Lee Kuan Yew Distinguished Visitor, Singapore, 2000.  
Wageningen Symposium Lecturer, Holland, 2000.  
Elected Honorary Fellow of the Singapore National Institute of Chemistry, 2000.  
Paul Ehrlich Lecture (awarded for “an outstanding contribution in the field of Medicinal Chemistry”), France, 2001.  
Marvin Carmack Distinguished Lecturer, Indiana University, 2001.  
Merck Distinguished Lecturer, Royal Society of Chemistry, November, 2001.  
James Sprague Lecturer, University of Wisconsin, Madison, 2002.  
Erasmus Lecturer, University of Neuchatel, Switzerland, 2002.  
Merck Research Lectureship 2003, Royal Society of Chemistry.

***INDUSTRIAL AND PUBLIC APPOINTMENTS***

Consultant to SmithKline Beecham, UK, 1966-1998.  
Consultant to Kratos Inc., Manchester, 1970-1988.  
Consultant to Lepetit, Milan, 1983-1986.  
Member of the Editorial Advisory Board for “Methods in Stereochemical Analysis” (J. Wiley and Sons, Inc.), 1981.  
Consultant to Napp Laboratories, 1984-1989.  
Consultant to The Upjohn Company, Kalamazoo, USA, 1984-1992.

Member of the Royal Society Sectional Committee for Chemistry, 1985-1988.

Member of SERC Chemistry Committee, 1981-1985.

Member of the Royal Society Research Grant Board for Chemistry, 1987-1989.

Consultant to Xenova Limited, London, 1987-1989.

Chairman of the 1989 Gregynog European Symposium on Bio-organic Chemistry.

Member of the Scientific Advisory Board, Xenova, London, 1989-1993.

Member of the Editorial Board of *Accounts of Chemical Research*, Amer. Chem. Soc., 1988-1992.

Member of the Editorial Board of *Protein Science*, J. of the Protein Society of the USA, 1990-1992.

Member of the Editorial Board of *The Journal of Antibiotics*, Tokyo, 1990-2005.

Member of the Advisory Board of the "Tables Rondes Roussel Uclaf" and of the "Symposia Pharmaco-Cliniques Roussel Uclaf", Paris, 1990-1995.

Member of the Organising Committee, Gregynog Eur. Symposia on Bio-organic Chemistry, 1989-2003.

Chairman, Scientific Advisory Board of Xenova plc, 1993-1999.

Consultant to Astra, U.K. (Astra Charnwood), 1995-1997.

Consultant to Unilever, Port Sunlight, U.K., 1995-1998.

Member of the Royal Society Research Grant Board for Chemistry, 1996-1998.

Member of the Scientific Advisory Board, RiboTargets, Cambridge, UK, 1997-2000.

Member of the Scientific Advisory Board, TerraGen, Vancouver, Canada, 1999-2000.

Member of the International Advisory Board of "Current Organic Chemistry", 2000-2003.

Consultant to RiboTargets, Cambridge, UK, 2000-2002.

Member of the International Carbohydrate Symposium Advisory Committee (July, 2004, University of Warwick).

#### **UNIVERSITY, COLLEGE, AND SOCIETIES**

Approximately 500 Invited Lectures, presented at major universities, and/or conferences (including some 60 main or plenary lectures), and/or major companies based upon organic chemistry, and/or chemistry-based learned societies of the following countries:

United Kingdom, Eire, France, Belgium, Holland, Denmark, Norway, Sweden, Germany, Italy, Singapore, Spain, Switzerland, Poland, United States, Canada, South Africa, Bulgaria, former Yugoslavia, Australia, New Zealand, Japan, Israel, India and Pakistan.

Normal teaching duties to all three (or later, four) undergraduate years, including the organisation of practical classes, in the period 1964 - present. Supervised the Ph.D. theses of ca. 70 graduate students, and the work of ca. 40 post-doctoral fellows and visiting scholars. Former member of the Departmental Teaching Committee, the Appointments Committee of the Faculty Board of Physics and Chemistry, and the Biotechnology Syndicate. Former member of the Faculty Board of Physics and Chemistry (1991-1999), Degree Committee of the Faculty Board of Physics and Chemistry (1991-1999), and associated Discretionary Payments Committee (1995-1999) and Appointments Committee (1993-1997). Chairman of the Chemistry Appeal Steering Committee and Member

of the Chemistry Appeals Advisory Board (1995-2000). Over the period 1964-2005, a recipient of numerous major grants from SERC, EPSRC, BBSRC, and the Wellcome Trust for the provision of post doctoral fellowships, and instrumentation in mass spectrometry and nuclear magnetic resonance for the University Chemical Laboratory and Cambridge Centre for Molecular Recognition (CCMR). Deputy Chairman of CCMR, 1988-2002. Member of the Management Committee of the East Anglian Structural Biology Initiative (2000-2003).

Supervision of undergraduates for Churchill College in the period 1964-1996 and, at various times, member of the College's Council, Fellowship Electors, Finance Committee, Building Committee, and Committee for Statutes, Ordinances, and Regulations, and Fellows' Research Committee. Member of Churchill College Investment Advisory Committee.

Organiser of courses on Spectroscopic Methods in Organic Chemistry for the Royal Institute of Chemistry, 1965-67, and course presenter for the American Chemical Society Course "Frontiers of Organic Chemistry" at University of Wisconsin, Madison, and Stanford University, California, 1984-2001.

**Publications****BOOKS**

1. Interpretation of Mass Spectra of Organic Compounds.  
Holden-Day, San Francisco, 1964  
by H. Budzikiewicz, C. Djerassi and D.H. Williams
2. Structure Elucidation of Natural Products by Mass Spectrometry.  
Vol. 1. Alkaloids.  
Holden-Day, San Francisco, 1964  
by H. Budzikiewicz, C. Djerassi and D.H. Williams.
3. Structure Elucidation of Natural Products by Mass Spectrometry.  
Vol. 2. Steroids, Sugars, Terpenes.  
Holden-Day, San Francisco, 1964  
by H. Budzikiewicz, C. Djerassi and D.H. Williams.
4. Application of NMR in Organic Chemistry - Illustrations from the Steroid Field.  
Holden-Day, San Francisco, 1964  
by N.A. Bhacca and D.H. Williams.
5. Spectroscopic Methods in Organic Chemistry.  
McGraw-Hill, London, 1966  
by I. Fleming and D.H. Williams.
6. Spectroscopic Problems in Organic Chemistry.  
McGraw-Hill, London, 1967  
by I. Fleming and D.H. Williams.
7. Mass Spectrometry of Organic Compounds.  
Holden-Day, San Francisco, 1967  
by H. Budzikiewicz, C. Djerassi and D.H. Williams.
8. Principles of Organic Mass Spectrometry.  
McGraw-Hill, London, 1973  
by I. Howe and D.H. Williams.
9. Spectroscopic Methods in Organic Chemistry.  
McGraw-Hill, London, 1980 (3rd Edition)  
by D.H. Williams and I. Fleming.
10. Mass Spectrometry - Principles and Applications.  
McGraw-Hill, New York, 1981  
by I. Howe, D.H. Williams and R.D. Bowen.
11. Spectroscopic Methods in Organic Chemistry.  
McGraw-Hill, London, 1987 (4th Edition)  
by D.H. Williams and I. Fleming.
12. Spectroscopic Methods in Organic Chemistry.  
McGraw-Hill, London, 1995 (5th Edition), and 2007 (6<sup>th</sup> Edition).  
by D.H. Williams and I. Fleming.
13. Testing Truths  
by D.H. Williams, Silverwood Books, 2013, ISBN 9781781320792  
(Published posthumously)

### **REVIEW ARTICLES AND CONFERENCE PROCEEDINGS**

1. Physical Method of Structure Determination, *Annual Reports on the Progress of Chemistry for 1965*. The Chemical Society, London, 1966.
2. Solvent Effects in NMR Spectroscopy: Use in Structural, Stereochemical and Conformation Problems in the Steroid Field. *Proceedings of the Second International Congress on Hormonal Steroids*, Milan, 1966 (Excerpta Medica Foundation, Amsterdam, 1967).
3. Some Skeletal Rearrangement Reactions occurring upon Electron Impact. *Symposium on Some Newer Physical Methods in Structural Chemistry*, Oxford, 1966 (R. Bonnett and J.G. Davis, eds.).
4. "Solvent Shifts in NMR Spectroscopy" in (E. Mooney, ed.) *Annual Review of NMR Spectroscopy*, 1968. Academic Press, 1969, pp. 83-124 (by J. Ronayne and D.H. Williams).
5. Structure and Fragmentation Mechanisms of Organic Ions in the Mass Spectrometer. *Org. Mass Spec.*, 1969, **2**, 137 (by R.G. Cooks, I. Howe and D.H. Williams).
6. "Mass Spectrometry" in (F.C. Nachod and J.J. Zuckerman, eds.) *Determination of Organic Structures by Physical Methods*. Volume III. Academic Press, 1971.
7. "Mass Spectrometry of Organic Compounds - a Review", in *Advances in Mass Spectrometry, Volume 5*. Institute of Petroleum, London, 1971 (Proceedings of Triennial International Mass Spectrometry Conference, Brussels, 1970).
8. "Mass Spectrometry, Vol. 1" (Senior Reporter), *Specialist Periodical Reports of the Chemical Society*, London 1971.
9. Shift Reagents in NMR Spectroscopy, *Nature*, 1972, **240**, 385. (by J.K.M. Sanders and D.H. Williams).
10. "Mass Spectrometry, Vol. II" (Senior Reporter), *Specialist Periodical Reports of the Chemical Society*, London 1973.
11. Nuclear Magnetic Resonance Shift Reagents in Organic Chemistry, *Pure and Applied Chemistry*, 1974, **40**, 25. (Proceedings of International NMR Conference, Bombay, 1973).
12. Application of Mass Spectrometry to the Sequencing of Proteins, *Clinical Endocrinology*, **5**, Suppl., 1s-9s (1976). (Proceedings of "Endocrinology, 1975", (London)).
13. Some Novel Methods of Structure Determination by Mass Spectrometry, *Israel J. Chem.*, 1975, **14**, 33.
14. "Aspects of Mass Spectrometry in Organic Chemistry" in *Advances in Mass Spectrometry, Volume 7*. Institute of Petroleum, London, 1977. (Proceedings of Triennial Mass Spectrometry Conference, Florence, 1976).
15. "Applications of Mass Spectrometry to the Sequencing of Proteins" in *Proceedings of the VIII Symposium on Chromatography and Electrophoresis*, Brussels, 1977, Ciaco Press, pp.22-34.
16. A Transition State Probe. *Accounts Chem. Res.*, 1977, **10**, 280.
17. Structural and Sequencing Studies on Peptides, Proteins and Glycopeptide Antibiotics by Mass Spectrometry. *Pure and Applied Chemistry*, 1978, **50**, 219. (Proceedings of the International Mass Spectrometry Symposium on Natural Products, Weizmann Institute of Science, Rehovot, Israel, 1977).

18. Some Aspects of Potential Energy Surfaces for Unimolecular Reactions of Organic Ions in "*Chemical Applications of High Performance Mass Spectrometry*", M.L. Gross, ed., American Chemical Society, 1978 (by R.D. Bowen and D.H. Williams).
19. "Gaseous Ion Rearrangements" in (P. DeMayo, ed.) '*Rearrangements in Ground and Excited States*', (by R.D. Bowen and D.H. Williams).
20. "The Chemistry of Isolated Cations", *Angew. Chem.*, **91**, 484 (1979) (by R.D. Bowen, D.H. Williams and H. Schwarz).
21. "Antibiotics of the Vancomycin Group" in (P. Sammes, ed.), '*Topics in Antibiotic Chemistry*', Vol. 4, (1980), (by D.H. Williams, V. Rajananda, M.P. Williamson and G. Bojesen).
22. Potential Energy Profiles for Unimolecular Reactions of Organic Ions, *Phil. Trans. R. Soc. Lond. A*, **293**, 117 (1979).
23. "Peptide Sequencing by Mass Spectrometry" in *Amino Acid Analysis*, (J. Rattenbury, ed.), Ellis-Horwood, 1981.
24. "The Antibiotics Vancomycin and Ristocetin: Structures and Modes of Action" in *Biopolymer Complexes*, (J. Wiley and Sons, 1982), proceedings of Hoechst Symposium, Reisenburg, Ulm, 1981.
25. "Structural Studies on Peptides by Mass Spectrometry", *Gazz. Chim. Italia*, 1983, **113**, 27.
26. "Structural Studies on Bio-Active Molecules" (Tilden Lecture), *Chem. Soc. Reviews*, 1984, **13**, 131-156.
27. Application of Fast Atom Bombardment Mass Spectrometry to Structural Problems in Organic Chemistry, *J. Mass Spectrom. Ion. Phys.*, 1983, **53**, 37.
28. Fast Atom Bombardment Mass Spectrometry in Food Science (by R. Self, L.C.E. Taylor, C.V. Bradley, S. Santikarn and D.H. Williams), 1984.
29. Structural Studies on Some Antibiotics and on Antibiotic-Receptor Complexes, *Accts. Chem. Res.*, 1985, **17**, 364.
30. Structural and Mode of Action studies on Bio-active Molecules, *Proceedings of the "International Symposium on Biomolecular Structure and Interactions"*, Bangalore, India, 1984.
31. "Mass Spectrometry of Large Molecules" (S. Facchetti Ed.) Elsevier, Amsterdam, 1985, Chapters 4 and 9.
- \*32. "The Structure and Mode of Action of Glycopeptide Antibiotics of the Vancomycin Group" (by J.C.J. Barna and D.H. Williams), *Ann. Rev. Microbiol.*, 1984, **38**, 339.
33. "Mass Spectrometry and NMR in Structure Determination of Bio-Organic Molecules", *Proceedings of the 1985 I.U.C.C.P. Meeting "New Directions in Chemical Analysis"*, Texas A & M University, 1984 (B.L. Shapiro Ed.).
34. "Applications of F.A.B. in Bio-Organic Chemistry", *Proceedings of Symposium on S.I.M.S. and F.A.B. Mass Spectrometry*, Minneapolis, 1984 (A.C.S. publication).
35. "Structural Studies on Physiologically Active Compounds", *Proceedings of the Third International Kyoto Conference on New Aspects of Organic Chemistry*, 1985, Kyoto, Japan.
36. "A Mass Spectrometric Method for the Identification of Novel Peptides in *Xenopus laevis* Skin Secretions" (by B.W. Gibson, L. Poulter and D.H. Williams), International Research Congress on Natural Products (University of North Caroline), *Journal of Natural Products*, 1986, **49**, 26.
37. "Structural Studies on Unusual Peptides" in *Natural Products Chemistry* (Ed. by Atta-ur-Rahman) Springer-Verlag, Berlin, 1986, pp. 508-535.

38. "The Determination of Phosphorylation Sites of Peptides and Proteins by Mass Spectrometry" by B.W. Gibson, A.M. Falick, A.L. Burlingame, G.L. Kenyon, L. Poulter, D.H. Williams and P. Cohen) in (K. Walsh Ed.) *Methods in Protein Sequence Analysis*, Humana Press, 1987.
39. "Molecular Basis of Activity of Antibiotics of the Vancomycin Group" in *NMR Spectroscopy in Drug Research*, Alfred Benzon Symposium 26, pp. 101-116 (Editors, J.W. Jaroszewski, K. Schaumberg and H. Kofod), Munskgaard, Copenhagen, 1988.
40. "Molecular Basis of Activity of Antibiotics of the Vancomycin Group", *IUPAC Symposium on Natural Products*, Kyoto, Japan, 1988.
41. "Bio-organic and Biochemical Application of Mass Spectrometry: Peptides and Proteins, *Proceedings of 11th International Mass Spectrometry Conference Bordeaux*, September, 1988.
42. "Peptide Defence Systems", *Chem. Brit.*, 1988, 1002-1006.
43. "Peptide Defence Systems", Symposium of the Swiss Association of Chemists in "From Biological Activity to Structure" (U.P. Schlunegger, ed.), Springer-Verlag, Heidelberg, 1989.
44. "Identification of the Octapeptide Lophyrotomin in the European Birch Sawfly" (with P.B. Oelrichs and S.M. Thamsborg), *Proceedings of the Third International Symposium on Poisonous Plants*, Utah, July, 1989.
45. "Isolation and Identification of the Pain-Producing Peptide Moroidin from *Dendrocnide Moroides* (with P.B. Oelrichs) *Proceedings of the Third International Symposium on Poisonous Plants*, Utah, July, 1989.
46. "Molecular Recognition by Antibiotics of the Vancomycin Group. Dimerisation of the Antibiotics." (with J. Walther) in "Molecular Recognition: Chemical and Biochemical Problems". (S.M. Roberts, Ed.), Royal Society of Chemistry (Special Publication No. 78) 1989.
47. "Molecular Recognition in Peptides and Proteins", (with A. Doig), *G.N. Ramachandran Festschrift Volume*, Indian Academy of Sciences, 1990.
48. "The Natural Design of Vancomycin Family Antibiotics to Bind to their Target Peptides" (with J. Walther), *Ciba Foundation Symposium*, No. 158, Wiley and Sons, New York, 1990.
49. "Molecular Basis of the Activity of Antibiotics of the Vancomycin Group: Guides for Peptide-Peptide Binding" (with A.J. Doig, J.P.L. Cox, I.A. Nicholls and M. Gardner), *SKF Symposium on Chirality and Drug Action*, Robinson College, Cambridge, 1990.
50. "Structure of a Partially Folded State of Ubiquitin as Determined by NMR" (with D.N. Woolfson, M.M. Harding and P.A. Evans) in "Techniques in Protein Chemistry II" (J.J. Villafranca, Ed.), The Protein Society, Academic Press, 1991, pp. 283-293.
51. "The Evolutionary Role of Secondary Metabolites" (with R. Maplestone and M.J. Stone), *Proceedings of the Eighth International Symposium on Actinomycete Biology*, Madison, U.S.A., *Gene*, 1992, **115**, 151-157.
52. "Why are Secondary Metabolites Biosynthesized? Sophistication in the Inhibition of Cell Wall Biosynthesis by Vancomycin Group Antibiotics" (with R.A. Maplestone), *Proceedings of the Ciba Foundation Symposium 171 on "Secondary Metabolites: their Function and Evolution*, Wiley, Chichester, UK, 1992.
53. "An Approach to Molecular Recognition Based on Partitioning of Free Energy Contributions" (with M.S. Searle), *Proceedings of the Conference on Molecular Recognition*, University of Exeter, U.K., April 1992.

54. "Relationships between Structure and Activity based on a Partitioning of Free Energy Contributions in the Estimation of Binding Constants" (with M.S. Searle), *Trends in QSAR and Molecular Modelling* 92, ESCOM Science Publishers, Leiden, 1993.
55. "Factorizing Free Energy Contributions to Binding in Aqueous Solution: Fundamental Relations between Enthalpies and Entropies of Association" (with M.S. Searle), *Proceedings of the 14th Reunion Bienal del Grupo Quimica Organica*, April, 1993, Palma de Mallorca, *An. Quim.*, **89**, 17, 1993.
56. "Thermodynamics of Side Chain Internal Rotations - Effects on Protein structure and Stability" (with A.J. Doig, M. Gardner, and M.S. Searle), *Techniques in Protein Chemistry IV*, Academic Press, 1993, pp. 557-566.
57. "Functional Roles of Natural Products: The Involvement of Extended Arrays of Weak Interactions in Cooperative Binding Phenomena" (with M.S. Searle, P. Groves, J.P. Mackay, M.S. Westwell, D.A. Beauregard, and M.F. Cristofaro), *Pure and Appl. Chem.*, Vol. 66, pp. 1975-1982, 1994.
58. "The Role of Weak Interactions, Dimerization and Cooperativity in Antibiotic Action and Biological Signalling" (with M.S. Searle, M.S. Westwell, J.P. Mackay, P. Groves, and D. Beauregard), *Chemtracts - Organic Chemistry*, **7**, 133-159, 1994.
59. "Rationally Designed Ligands as Models for Bacterial Cell-Wall Recognition by Vancomycin Group Antibiotics" (with M.S. Searle and P. Groves), *Proc. Indian Acad. Sci. [special volume "Frontiers in Bio-organic Chemistry"]*, celebrating the Diamond Jubilee of the Academy], **106**, No.5, 937-954, 1994.
60. "The Fight against Antibiotic-Resistant Bacteria" (with M. Westwell), *Chemtech*, American Chemical Society Publications, 1996, pp.17-23.
61. "The Glycopeptide Story - How to Kill the Deadly 'Superbugs' ", *Natural Product Reports* (published by the Royal Society of Chemistry), 1996, 469-477.
62. "Weak Interactions and Lessons from Crystallisation" (with M. Westwell), *Chemistry and Biology*, 1996, **3**, 695-701.
63. "The Vancomycin Group of Antibiotics", D.H. Williams et al., in *"Anti Infectives: Recent advances in chemistry and structure-activity relationships"* (Eds: PH Bentley, PJ O'Hanlon), 1997, Royal Society of Chemistry Information Services, Cambridge, Special Publication No. 198, Chapter 1, pages 3-14.
64. "Aspects of Weak Interactions" (with M. Westwell), *Chemical Society Reviews*, 1998, **27**, 57-63.
65. "On the Evolution of Life and Behaviour", Victoria University, Melbourne, Australia, 1999.
66. "The Vancomycin Group of Antibiotics and the Fight against Resistant Bacteria" (with B. Bardsley), *Angewandte Chemie*, 1999, **38**, 1173-1193.
67. "Sugaring the Pill", *Nature*, 1999, 567-568.
68. "Estimating Binding Constants - The Hydrophobic Effect and Cooperativity" (with B. Bardsley), *Perspectives in Drug Discovery and Design*, 1999, **17**, 43-59 (Y.C. Martin and R. DeWitte Eds.), Kluwer Academic Publishers.
69. "The Vancomycin Group of Antibiotics and the Fight against Resistant Bacteria", Proceedings of the 37emes Rencontres Internationales de Chimie Therapeutique, Tours, France, July, 2001.
70. "How can Enzymes be so Efficient?", *Chem. Commun.*, 2003, 1973-1976.
71. "Contributions to the Catalytic Efficiency of Enzymes, and the Binding of Ligands to Receptors, from Improvements in Packing within Enzymes and Receptors" (with E. Stephens, M. Zhou, and R. Zerella) in "Methods of Enzymology", 2004, **380**, 3-19.

72. "Understanding Non-Covalent Interactions: Ligand Binding Energy and Catalytic Efficiency from Ligand-Induced contractions within Receptors and Enzymes, (with E. Stephens, D. O'Brien, and M. Zhou) in *Angew. Chem. Int. Ed.*, 2004, **43**, 6596-6616.

### **RESEARCH PAPERS**

#### **1960**

1. Calciferol and its Relatives. Part V. Epicalciferol.  
*J. Chem. Soc.*, 1960, 5176.  
 I.T. Harrison, B. Lythgoe, R.A.A. Hurst and D.H. Williams.

#### **1962**

2. A New route to 1-Oxygenated Steroids.  
*J. Org. Chem.*, 1962, **27**, 2205.  
 C. Djerassi D.H. Williams and B. Berkoz.

#### **1963**

3. A Study of the Hydrogen Transfer Reactions Accompanying Fragmentation Processes of 11-Keto Steroids. Synthesis of Deuteriated Androstan-11-ones.  
*J. Amer. Chem. Soc.*, 1963, **85**, 2061.  
 D.H. Williams, J.M. Wilson, H. Budzikiewicz and C. Djerassi.
4. Unusual Chemical Shifts in the NMR Spectra of 7- and 11-Keto Steroids.  
*J. Amer. Chem. Soc.*, 1963, **85**, 2810.  
 D.H. Williams, N.S. Bhacca and C. Djerassi.
5. Spin-spin Coupling Between Hydrogen and Angular Methyl Protons.  
*J. Amer. Chem. Soc.*, 1963, **85**, 2861.  
 D.H. Williams and N.S. Bhacca.
6. Presence of Impurity in Halothane.  
*Science*, 1963, **141**, 899.  
 E.N. Cohen, J.W. Belleville, H. Budzikiewicz and D.H. Williams.
7. Formation of Olefins on Desulphurisation of Ethylene Thioketals by Raney Nickel.  
*J. Amer. Chem. Soc.*, 1963, 4046.  
 C. Djerassi and D.H. Williams.
8. Synthesis of Tachysterol<sub>3</sub>.  
*Tetrahedron Letters*, 1963, 1413.  
 R.S. Davidson, O.H. Littlewood, T. Medcalfe, S.M. Waddington-Feather, D.H. Williams and B. Lythgoe.
9. Mass Spectra of Ethylene Ketals and Thioketals.  
*Steroids*, 1963, **2**, 475.  
 G.V. Mutzenbecher, Z. Pelah, D.H. Williams, H. Budzikiewicz and C. Djerassi.

#### **1964**

10. Isotope Effect in Hydrogen Rearrangement Processes: the Mass Spectra of Methyl Butyrate and its  $\alpha$ -Mono-, Di- and Tri-Deutero-Analogs.  
*J. Amer. Chem. Soc.*, 1964, **86**, 284.  
 D.H. Williams, H. Budzikiewicz and C. Djerassi.
11. Mass Spectrometric Fragmentations of Isohexyl Bromide and Five Deuterated Derivatives.  
*J. Amer. Chem. Soc.*, 1964, **86**, 877.  
 D.H. Williams, C. Beard, H. Budzikiewicz and C. Djerassi.

12. Massenspektroskopie und ihre Anwendung auf Structurelle und Stereochemische Probleme. XLIV. Mit das Fragmentierungs verhalten Monocyclischer Ketone.  
*Monatsh.*, 1964, **95**, 166.  
 D.H. Williams, H. Budzikiewicz, Z. Pelah and C. Djerassi.
13. Mass Spectrometric Fragmentation Behaviour of Isohexyl Cyanide and its Deuterium Analogs.  
*J. Amer. Chem. Soc.*, 1964, **86**, 1386.  
 R. Beugelmans, D.H. Williams, H. Budzikiewicz and C. Djerassi.
14. Mass Spectrometry in Structural and Stereochemical Problems. A Study of the Hydrogen Transfer Reactions Accompanying Fragmentation Processes in 1-Keto Steroids. Synthesis of Deuteriated  $5\alpha$ -Androstan-1-ones.  
*J. Amer. Chem. Soc.*, 1964, **86**, 2623.  
 H.M. Powell, D.H. Williams, H. Budzikiewicz and C. Djerassi.
15. The Mass Spectrometric Fragmentation of  $5\alpha$ -Androstan-11-one. Synthesis of 19-d<sub>1</sub>-5-Androstan-11-one.  
*Steroids*, 1964, **3**, 259.  
 D.H. Williams and C. Djerassi.
- \* 16. Dependency of Vicinal Coupling Constants on the Configuration of Electronegative Substituents.  
*J. Amer. Chem. Soc.*, 1964, **86**, 2742.  
 D.H. Williams and N.S. Bhacca.
17. Mass Spectral and Enolization Studies on 7-Keto- $5\alpha$ -Androstanes.  
*J. Amer. Chem. Soc.*, 1964, **86**, 2832.  
 R. Beugelmans, R.H. Shapiro, Lois J. Durham, D.H. Williams, H. Budzikiewicz and C. Djerassi.
18. Mass Spectrometry in Structural and Stereochemical Problems. Fragmentation and Hydrogen Transfer Reactions of a Typical 3-Keto Steroid,  $5\alpha$ -Androstan-3-one.  
*J. Amer. Chem. Soc.*, 1964, **86**, 2837.  
 R.H. Shapiro, D.H. Williams, H. Budzikiewicz and C. Djerassi.
19. Solvent Effects in NMR Spectroscopy. Chemical Shifts Induced by Benzene in some Steroidal Ketones and Acetates.  
*Tetrahedron Letters*, 1964, 3127.  
 N.S. Bhacca and D.H. Williams.
20. The Mass Spectrometric Fragmentation of Ethylene Ketals.  
*J. Amer. Chem. Soc.*, 1964, **86**, 3722.  
 Z. Pelah, D.H. Williams, H. Budzikiewicz and C. Djerassi.

**1965**

21. Mass Spectrometry in Structural and Stereochemical Problems. The Electron-Impact Induced Fragmentation of Steroidal Dimethylamines.  
*J. Amer. Chem. Soc.*, 1965, **87**, 574.  
 Z. Pelah, D.H. Williams, H. Budzikiewicz and C. Djerassi.
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