

Julius Adler - Curriculum Vitae

Personal: Born April 30, 1930, in Edelfingen, Germany. Came to the United States in 1938. Naturalized 1943.

Universities attended: Harvard University, 1948 to 1952. A.B., 1952. Major: Biochemical Sciences. University of Wisconsin-Madison, 1952 to 1957; M.S. in Biochemistry under Henry A. Lardy, 1954; Ph.D. in Biochemistry (with minor in Organic Chemistry) under Henry A. Lardy, 1957.

Postdoctoral experience: Fellow with Arthur Kornberg in the Department of Microbiology, Washington University School of Medicine, 1957 to 1959; Fellow with A. Dale Kaiser in the Department of Biochemistry, Stanford University School of Medicine, 1959 to 1960.

Faculty positions: Assistant Professor in the Departments of Biochemistry and Genetics, University of Wisconsin-Madison, 1960 to 1963; Associate Professor in the Departments of Biochemistry and Genetics, University of Wisconsin-Madison, 1963 to 1966; Professor in the Departments of Biochemistry and Genetics, University of Wisconsin-Madison, 1966 to 1996; Edwin Bret Hart Professor, 1972-present. Steenbock Professor of Microbiological Sciences, 1982-1992; Professor Emeritus (Active), 1996-present.

Memberships: American Academy of Arts and Sciences; American Association for the Advancement of Science; American Chemical Society; American Philosophical Society; American Society for Biochemistry and Molecular Biology; American Society for Microbiology; Association for Chemoreception Sciences; Gesellschaft für Biologische Chemie; National Academy of Sciences of the U.S.A.; Society for General Microbiology; Society for Neuroscience.

Lectureships and Awards:

Edwin Bret Hart Professor, 1972-present.

Jean Weigle Memorial Lecturer, California Institute of Technology, 1975.

Elected to American Academy of Arts and Sciences, 1976.

Plenary Lecturer, Tenth International Congress of Biochemistry, Hamburg, 1976.

J. Howard Mueller Memorial Lecturer, Harvard University, 1977.

Harvey Society Lecturer, 1977.

CIBA-GEIGY Lecturer, Rutgers University, 1977.

Pasteur Award Medal of the Illinois Society for Microbiology, 1977.

Distinguished Lecturer Series, Cornell University, 1978.

Elected to National Academy of Sciences of the U.S.A., 1978.

Stanhope Bayne-Jones Lecturer, Johns Hopkins University, 1978.

J. Manheimer Lecturer, University of Pennsylvania, 1979.

Selman A. Waksman Award in Microbiology, National Academy of Sciences, 1980.

V. D. Mattia Lecturer, Roche Institute of Molecular Biology, 1981.

Steenbock Professor of Microbiological Sciences, 1982-92.

Hartman Muller Memorial Lecturer, University of Zurich, 1984.

Otto-Warburg-Medal of the German Society for Biological Chemistry, Berlin, 1986.

Elected to Gesellschaft für Biologische Chemie, 1986.

Honorary doctoral degree from the University of Tübingen, 1987.

R. H. Wright Award in Olfactory Research, Simon Fraser University, Canada, 1988.

Hilldale Award, University of Wisconsin-Madison, 1988.

Behring Lecturer, Philipps University of Marburg, Germany, 1989.
Elected to American Philosophical Society, 1989.
Elected Fellow of the American Association for the Advancement of Science, 1991.
Introductory speaker, international symposium on Behavior of Microorganisms, Weizmann Institute, Rehovot, Israel, 1991.
George Streissinger Memorial Lecturer, University of Oregon, 1994.
Elected Fellow of the American Academy of Microbiology, 1994.
Introductory speaker, international symposium on Motility and Signal Transduction in Bacteria, Hakone, Japan, 1994.
Abbott-American Society for Microbiology Lifetime Achievement Award, 1995.
Elected to Nordrhein-Westfälische Akademie der Wissenschaften, 1995.
Honorary symposium on Behavior and Signaling in Microorganisms, 1995.
Honorary doctoral degree from the University of Regensburg, 1995.
William C. Rose Award, American Society for Biochemistry and Molecular Biology, 1996.
Elected Fellow of the Wisconsin Academy of Sciences, Arts, and Letters, 1996.
Philip Handler Lecturer in Biochemistry, Duke University, 1996.

Publications:

A. EARLY WORK

1. Parks, Robert E., Jr., Julius Adler, and John H. Copenhaver, Jr. The Efficiency of Oxidative Phosphorylation in Mitochondria from Diabetic Rats. *J. Biol. Chem.* 214, 693-698 (1955).
2. Lardy, Henry A., and Julius Adler. Synthesis of Succinate from Propionate and Bicarbonate by Soluble Enzymes from Liver Mitochondria. *J. Biol. Chem.* 219, 933-942 (1956).
3. Friedberg, Felix, Julius Adler, and Henry A. Lardy. The Carboxylation of Propionic Acid by Liver Mitochondria. *J. Biol. Chem.* 219, 943-950 (1956).
4. Adler, Julius, Shu-Fang Wang, and Henry A. Lardy. The Metabolism of Itaconic Acid by Liver Mitochondria. *J. Biol. Chem.* 229, 865-879 (1957).
5. Wang, Shu-Fang, Julius Adler, and Henry A. Lardy. The Pathway of Itaconate Metabolism by Liver Mitochondria. *J. Biol. Chem.* 236, 26-30 (1961).
6. Adler, Julius, Maurice J. Bessman, I. R. Lehman, H. K. Schachman, E. S. Simms, and Arthur Kornberg. Chemical Structure of Enzymatically Synthesized Deoxyribonucleic Acid (DNA). *Fed. Proc.* 17, 700 (1958).
7. Schachman, H. K., I. R. Lehman, Maurice J. Bessman, Julius Adler, E. S. Simms, and Arthur Kornberg. Physical Chemical Characterization of Enzymatically Synthesized Deoxyribonucleic Acid (DNA). *Fed. Proc.* 17, 1202 (1958).
8. Bessman, Maurice J., I. Robert Lehman, Julius Adler, Steven B. Zimmerman, Ernest S. Sims, and Arthur Kornberg. Enzymatic Synthesis of Deoxyribonucleic Acid. III. The Incorporation of Pyrimidine and Purine Analogues into Deoxyribonucleic Acid. *Proc. Natl. Acad. Sci. USA* 44, 633-640 (1958).

9. Adler, Julius, I. Robert Lehman, Maurice J. Bessman, Ernest S. Sims, and Arthur Kornberg. Enzymatic Synthesis of Deoxyribonucleic Acid. IV. Linkage of Single Deoxynucleotides to the Deoxynucleoside Ends of Deoxyribonucleic Acid. *Proc. Natl. Acad. Sci. USA* 44, 641-647 (1958).
 10. Lehman, I. Robert, Steven B. Zimmerman, Julius Adler, Maurice J. Bessman, Ernest S. Simms, and Arthur Kornberg. Enzymatic Synthesis of Deoxyribonucleic Acid. V. Chemical Composition of Enzymatically Synthesized Deoxyribonucleic Acid. *Proc. Natl. Acad. Sci. USA* 44, 1191-1196 (1958).
 11. Schachman, Howard K., Julius Adler, Charles M. Radding, I. Robert Lehman, and Arthur Kornberg. Enzymatic Synthesis of Deoxyribonucleic Acid. VII. Synthesis of a Polymer of Deoxyadenylate and Deoxythymidylate. *J. Biol. Chem.* 235, 3242-3249 (1960).
 12. Adler, Julius, and A. Dale Kaiser. Mapping of the Galactose Genes of *Escherichia coli* by Transduction with Phage P1. *Virology* 19, 117-126 (1963).
 13. Sherman, John R., and Julius Adler. Galactokinase from *Escherichia coli*. *J. Biol. Chem.* 238, 873-878 (1963).
 14. Sherman, John R. Rapid Enzyme Assay Technique Utilizing Radioactive Substrate, Ion-Exchange Paper, and Liquid Scintillation Counting. *Anal. Biochem.* 5, 548-554 (1963).
 15. Falaschi, Arturo, Julius Adler, and H. Gobind Khorana. Chemically Synthesized Deoxypolynucleotides as Templates for Ribonucleic Acid Polymerase. *J. Biol. Chem.* 238, 3080-3085 (1963).
 16. Adler, Julius, and Bonnie Templeton. The Amount of Galactose Genetic Material in I_{dg} Bacteriophage with Different Densities. *J. Mol. Biol.* 7, 710-720 (1963).
 17. Sly, William S., Harrison Echols, and Julius Adler. Control of Viral Messenger RNA after Lambda Phage Infection and Induction. *Proc. Natl. Acad. Sci. USA* 53, 378-385 (1965).
- B. BEHAVIOR OF BACTERIA
18. Adler, Julius. Chemotaxis in *Escherichia coli*. In *Sensory Receptors*, Cold Spring Harbor Symp. Quant. Biol. 30, 289-292 (1965).
 19. Adler, Julius. Chemotaxis in Bacteria. *Science* 153, 708-716 (1966).
 20. Adler, Julius. Effect of Amino Acids and Oxygen on Chemotaxis in *Escherichia coli*. *J. Bacteriol.* 92, 121-129 (1966).
 21. Armstrong, John B., Julius Adler, and Margaret M. Dahl. Nonchemotactic Mutants of *Escherichia coli*. *J. Bacteriol.* 93, 390-398 (1967).
 22. Adler, Julius, and Margaret M. Dahl. A Method for Measuring the Motility of Bacteria and for Comparing Random and Non-Random Motility. *J. Gen. Microbiol.* 46, 161-173 (1967).

23. Adler, Julius, and Bonnie Templeton. The Effect of Environmental Conditions on the Motility of *Escherichia coli*. *J. Gen. Microbiol.* 46, 175-184 (1967).
24. Schade, Sylvia Z., and Julius Adler. Purification and Chemistry of Bacteriophage I. *J. Virol.* 1, 591-598 (1967).
25. Schade, Sylvia Z., Julius Adler, and Hans Ris. How Bacteriophage c Attacks Motile Bacteria. *J. Virol.* 1, 599-609 (1967).
26. Armstrong, John B., and Julius Adler. Genetics of Motility in *Escherichia coli*: Complementation of Paralyzed Mutants. *Genetics* 56, 363-373 (1967).
27. Armstrong, John B., and Julius Adler. Complementation of Nonchemotactic Mutants of *Escherichia coli*. *Genetics* 61, 61-66 (1969).
28. Armstrong, John B., and Julius Adler. Location of Genes for Motility and Chemotaxis on the *Escherichia coli* Genetic Map. *J. Bacteriol.* 97, 156-161 (1969).
29. Adler, Julius. Chemoreceptors in Bacteria. *Science* 166, 1588-1597 (1969).
30. Hazelbauer, Gerald L., Robert E. Mesibov, and Julius Adler. *Escherichia coli* Mutants Defective in Chemotaxis toward Specific Chemicals. *Proc. Natl. Acad. Sci. USA* 64, 1300-1307 (1969).
31. DePamphilis, Melvin L., and Julius Adler. Purification of Intact Flagella from *Escherichia coli* and *Bacillus subtilis*. *J. Bacteriol.* 105, 376-383 (1971).
32. DePamphilis, Melvin L., and Julius Adler. Fine Structure and Isolation of the Hook-Basal Body Complex of Flagella from *Escherichia coli* and *Bacillus subtilis*. *J. Bacteriol.* 105, 384-395 (1971).
33. DePamphilis, Melvin L., and Julius Adler. Attachment of Flagellar Basal Bodies to the Cell Envelope: Specific Attachment to the Outer, Lipopolysaccharide Membrane and the Cytoplasmic Membrane. *J. Bacteriol.* 105, 396-407 (1971).
34. DePamphilis, Melvin L. Dissociation and Reassembly of *Escherichia coli* Outer Membrane and of Lipopolysaccharide, and Their Reassembly onto Flagellar Basal Bodies. *J. Bacteriol.* 105, 1184-1199 (1971).
35. DePamphilis, Melvin L. Isolation of Bacteriophages T2 and T4 Attached to the Outer Membrane of *Escherichia coli*. *J. Virol.* 7, 683-686 (1971).
36. DePamphilis, Melvin L. Purification of Intact Bacterial Flagella and Their Components, pp. 25-55. Also, Negative Staining for Electron Microscopy, pp. 265-288. In *Methods in Molecular Biology*, Vol. 5, Subcellular Particles, Structures and Organelles, edited by A. I. Laskin, and G. A. Last. Marcel Dekker, New York, 1974.
37. Hazelbauer, Gerald L., and Julius Adler. Role of the Galactose Binding Protein in Chemotaxis of *Escherichia coli* toward Galactose. *Nature (London), New Biol.* 230, 101-104 (1971).

38. Adler, Julius. Chemoreception in Bacteria, pp. 70-80. In *Olfaction and Taste IV*, edited by D. Schneider. Wissenschaftliche Verlagsgesellschaft, Stuttgart, 1972.
39. Mesibov, Robert, and Julius Adler. Chemotaxis Toward Amino Acids in *Escherichia coli*. *J. Bacteriol.* 112, 315-326 (1972).
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41. Adler, Julius. A Method for Measuring Chemotaxis and Use of the Method to Determine Optimum Conditions for Chemotaxis by *Escherichia coli*. *J. Gen. Microbiol.* 74, 77-91 (1973).
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43. Mesibov, Robert, George W. Ordal, and Julius Adler. The Range of Attractant Concentrations for Bacterial Chemotaxis and the Threshold and Size of Response over This Range. Weber Law and Related Phenomena. *J. Gen. Physiol.* 62, 203-223 (1973).
44. Adler, Julius, Gerald L. Hazelbauer, and Margaret M. Dahl. Chemotaxis Toward Sugars in *Escherichia coli*. *J. Bacteriol.* 115, 824-847 (1973).
45. Ordal, George W., and Julius Adler. Isolation and Complementation of Mutants in Galactose Taxis and Transport. *J. Bacteriol.* 117, 509-516 (1974).
46. Ordal, George W., and Julius Adler. Properties of Mutants in Galactose Taxis and Transport. *J. Bacteriol.* 117, 517-526 (1974).
47. Tso, Wung?Wai, and Julius Adler. Negative Chemotaxis in *Escherichia coli*. *J. Bacteriol.* 118, 560-576 (1974).
48. Larsen, Steven H., Julius Adler, J. Jay Gargus, and Robert W. Hogg. Chemomechanical Coupling without ATP: The Source of Energy for Motility and Chemotaxis in Bacteria. *Proc. Natl. Acad. Sci. USA* 71, 1239-1243 (1974).
49. Larsen, Steven H., Robert W. Reader, Edward N. Kort, Wung?Wai Tso, and Julius Adler. Change in Direction of Flagellar Rotation Is the Basis of the Chemotactic Response in *Escherichia coli*. *Nature (London)* 249, 74-77 (1974).
50. Adler, Julius. Chemoreception in Bacteria. *Antibiot. Chemother.* 19, 12-20 (1974).
51. Adler, Julius. Chemotaxis in Bacteria, pp. 107-131. In *Biochemistry of Sensory Functions*, edited by L. Jaenicke. Springer-Verlag, Berlin, 1974.
52. Adler, Julius. Chemotaxis in Bacteria, pp. 91-100. In *Primitive Sensory and Communication Systems: The Taxes and Tropisms of Micro?Organisms and Cells*, edited by M. J. Carlile. Academic Press, London, 1975.

53. Adler, Julius, and Wung?Wai Tso. "Decision"-Making in Bacteria: Chemotactic Response of *Escherichia coli* to Conflicting Stimuli. *Science* 184, 1292-1294 (1974).
54. Adler, Julius, and Wolfgang Epstein. Phosphotransferase-System Enzymes as Chemoreceptors for Certain Sugars in *Escherichia coli* Chemotaxis. *Proc. Natl. Acad. Sci. USA* 71, 2895-2899 (1974).
55. Adler, Julius. Chemotaxis in Bacteria. *Annu. Rev. Biochem.* 44, 341-356 (1975).
56. Kort, Edward N., Michael F. Goy, Steven H. Larsen, and Julius Adler. Methylation of a Membrane Protein Involved in Bacterial Chemotaxis. *Proc. Natl. Acad. Sci. USA* 72, 3939-3943 (1975).
57. Springer, Martin S., Edward N. Kort, Steven H. Larsen, George W. Ordal, Robert W. Reader, and Julius Adler. Role of Methionine in Bacterial Chemotaxis: Requirement for Tumbling and Involvement in Information Processing. *Proc. Natl. Acad. Sci. USA* 72, 4640-4644 (1975).
58. Adler, Julius. Chemotaxis in Bacteria. *J. Supramol. Struct.* 4, 305-317 (1976).
59. Adler, Julius. The Sensing of Chemicals by Bacteria. *Sci. Am.* 234, 40-47 (1976).
60. Adler, Julius. Chemotaxis in Bacteria, pp. 419-435. In *Surface Membrane Receptors: Interface Between Cells and Their Environment*, edited by R. A. Bradshaw, W. A. Frazier, R. C. Merrell, D. I. Gottlieb, and R. A. Hogue-Angeletti. Plenum Press, New York, 1976.
61. Adler, Julius. Introductory Remarks: Some Aspects of the Structure and Function of Bacterial Flagella, pp. 29-33. In *Cold Spring Harbor Conferences on Cell Proliferation, Vol. 3, Cell Motility. Book A: Motility, Muscle and Non?muscle Cells*, edited by R. Goldman, T. Pollard, and J. Rosenbaum. Cold Spring Harbor Laboratory, New York, 1976.
62. Szmelcman, Sevec, and Julius Adler. Change in Membrane Potential during Bacterial Chemotaxis. *Proc. Natl. Acad. Sci. USA* 73, 4387-4391 (1976).
63. Springer, Martin S., Michael F. Goy, and Julius Adler. Sensory Transduction in *Escherichia coli*: A Requirement for Methionine in Sensory Adaptation. *Proc. Natl. Acad. Sci. USA* 74, 183-187 (1977).
64. Kleene, Steven J., Myron L. Toews, and Julius Adler. Isolation of Glutamic Acid Methyl Ester from an *Escherichiacoli* Membrane Protein Involved In Chemotaxis. *J. Biol. Chem.* 252, 3214-3218 (1977).
65. Springer, Martin S., Michael F. Goy, and Julius Adler. Sensory Transduction in *Escherichia coli*: Two Complementary Pathways of Information Processing that Involve Methylated Proteins. *Proc. Natl. Acad. Sci. USA* 74, 3312-3316 (1977).
66. Goy, Michael F., Martin S. Springer, and Julius Adler. Sensory Transduction in *Escherichia coli*: Role of a Protein Methylation Reaction in Sensory Adaptation. *Proc. Natl. Acad. Sci. USA* 74, 4964-4968 (1977).
67. Muskavitch, Marc A., Edward N. Kort, Martin S. Springer, Michael F. Goy, and Julius Adler. Attraction by Repellents: An Error in Sensory Information Processing by Bacterial Mutants. *Science* 201, 63-65 (1978).

68. Adler, Julius. Chemotaxis in Bacteria, pp. 195-230. In *The Harvey Lectures*, Academic Press, New York, 1978.
69. Goy, Michael F., and Martin S. Springer. In Search of the Linkage between Receptor and Response: The Role of a Protein Methylation Reaction in Bacterial Chemotaxis, pp. 3-34. In *Receptors and Recognition, Series B, Vol. 5, Taxis and Behavior: Elementary Sensory Systems in Biology*, edited by G. L. Hazelbauer. Chapman and Hall, London, 1978.
70. Goy, Michael F., Martin S. Springer, and Julius Adler. Failure of Sensory Adaptation in Bacterial Mutants That Are Defective in a Protein Methylation Reaction. *Cell* 15, 1231-1240 (1978).
71. Adler, Julius, Michael F. Goy, Martin S. Springer, and Sevec Szmelcman. On the Mechanism of Sensory Transduction in Bacterial Chemotaxis, pp. 123-137. In *Membrane Transduction Mechanisms*, edited by R. A. Cone, and J. E. Dowling. Raven Press, New York, 1979.
72. Kondoh, Hisato, Carl B. Ball, and Julius Adler. Identification of a Methyl-Accepting Chemotaxis Protein for the Ribose and Galactose Chemoreceptors of *Escherichia coli*. *Proc. Natl. Acad. Sci. USA* 76, 260-264 (1979).
73. Adler, Julius. The Role of Methylation of Proteins in Chemotaxis, pp. 505-509. In *Developments in Neuroscience, Vol. 5, Transmethylation*, edited by E. Usdin, R. T. Borchardt, and C. R. Creveling. Elsevier North Holland, New York, 1979.
74. Toews, Myron L., and Julius Adler. Methanol Formation in vivo from Methylated Chemotaxis Proteins in *Escherichiacoli*. *J. Biol. Chem.* 254, 1761-1764 (1979).
75. Reader, Robert W., Wung?Wai Tso, Martin S. Springer, Michael F. Goy, and Julius Adler. Pleiotropic Aspartate Taxis and Serine Taxis Mutants of *Escherichia coli*. *J. Gen. Microbiol.* 111, 363-374 (1979).
76. Adler, Julius. The Behavior of Bacteria: On the Mechanism of Sensory Transduction in Bacterial Chemotaxis. *Johns Hopkins Med. J.* 144, 121-126 (1979).
77. Springer, Martin S., Michael F. Goy, and Julius Adler. Protein Methylation in Behavioural Control Mechanisms and in Signal Transduction. *Nature (London)* 280, 279-284 (1979).
78. Toews, Myron L., Michael F. Goy, Martin S. Springer, and Julius Adler. Attractants and Repellents Control Demethylation of Methylated Chemotaxis Proteins in *Escherichia coli*. *Proc. Natl. Acad. Sci. USA* 76, 5544-5548 (1979).
79. Kleene, Steven J., Ann C. Hobson, and Julius Adler. Attractants and Repellents Influence Methylation and Demethylation of Methyl-Accepting Chemotaxis Proteins in an Extract of *Escherichia coli*. *Proc. Natl. Acad. Sci. USA* 76, 6309-6313 (1979).
80. Kondoh, Hisato. Tumbling Chemotaxis Mutants of *Escherichia coli*: Possible Gene-Dependent Effect of Methionine Starvation. *J. Bacteriol.* 142, 527-534 (1980).

81. Kondoh, Hisato, Barbara R. Paul, and Martha M. Howe. Use of λ Mu Bacteriophages to Isolate Specialized Transducing Bacteriophages Carrying Genes for Bacterial Chemotaxis. *J. Virol.* 35, 619-628 (1980).
82. Hedblom, Mary L., and Julius Adler. Genetic and Biochemical Properties of *Escherichia coli* Mutants with Defects in Serine Chemotaxis. *J. Bacteriol.* 144, 1048-1060 (1980).
83. Black, Roy A., Ann C. Hobson, and Julius Adler. Involvement of Cyclic GMP in Intracellular Signaling in the Chemotactic Response of *Escherichia coli*. *Proc. Natl. Acad. Sci. USA* 77, 3879-3883 (1980).
84. Adler, Julius. Movement by Bacteria: On the Mechanism of Sensory Transduction in Bacterial Chemotaxis, pp. 496-507. In *Plant Growth Substances*, Vol. 10, *Plant Growth Substances 1979*, edited by F. Skoog. Springer-Verlag, Berlin, 1980.
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86. Repaske, David R., and Julius Adler. Change in Intracellular pH of *Escherichia coli* Mediates the Chemotactic Response to Certain Attractants and Repellents. *J. Bacteriol.* 145, 1196-1208 (1981).
87. Eisenbach, Michael, and Julius Adler. Bacterial Cell Envelopes with Functional Flagella. *J. Biol. Chem.* 256, 8807-8814 (1981).
88. Hobson, Ann C., Roy A. Black, and Julius Adler. Control of Bacterial Motility in Chemotaxis, pp. 105-121. In *Symposia of the Society for Experimental Biology*, Number XXXV, *Prokaryotic and Eukaryotic Flagella*, edited by W. B. Amos, and J. G. Duckett. Cambridge University Press, Cambridge, 1982.
89. Black, Roy A., Ann C. Hobson, and Julius Adler. Regulation of the Level of Methylation of a Protein Involved in Bacterial Chemotaxis, pp. 91-98. In *Biochemistry of S-Adenosylmethionine and Related Compounds*, edited by E. Usdin, R. T. Borchardt, and C. R. Creveling. Macmillan Press, Bath, 1982.
90. Adler, Julius. The Behavior of Rats, Bacteria, and Man, pp. 367-383. In *Biochemistry of Metabolic Processes*, edited by D. L. F. Lennon, F. W. Stratman, and R. N. Zahlen. Elsevier Science Publishing Co., New York, 1983.
91. Black, Roy A., Ann C. Hobson, and Julius Adler. Adenylate Cyclase Is Required for Chemotaxis to Phosphotransferase System Sugars by *Escherichia coli*. *J. Bacteriol.* 153, 1187-1195 (1983).
92. Hedblom, Mary L., and Julius Adler. Chemotactic Response of *Escherichia coli* to Chemically Synthesized Amino Acids. *J. Bacteriol.* 155, 1463-1466 (1983).
93. Adler, Julius. Bacterial Chemotaxis and Molecular Neurobiology. In *Molecular Neurobiology*, Cold Spring Harbor Symp. Quant. Biol. 48, 803-804 (1983).
94. Szupica, Christopher J., and Julius Adler. Cell Envelopes of Chemotaxis Mutants of *Escherichia coli* Rotate Their Flagella Counterclockwise. *J. Bacteriol.* 162, 451-453 (1985).

95. Ruthe, Hans?Jurgen, and Julius Adler. Fusion of Bacterial Spheroplasts by Electric Fields. *Biochim. Biophys. Acta* 819, 105-113 (1985).
96. Adler, Julius. The Behavior of Organisms, pp. 9-13. In *Sensing and Response in Microorganisms*, edited by M. Eisenbach, and M. Balaban. Elsevier Science Publishers B.V. (Biomedical Division), Amsterdam, 1985.
97. Adler, Julius. How Motile Bacteria Sense and Respond to Chemicals, pp. 95-97. In *Annals of the New York Academy of Sciences*, Vol. 510, Olfaction and Taste IX, edited by S. D. Roper, and J. Atema. The New York Academy of Sciences, New York, 1986.
98. Martinac, Boris, Matthew Buechner, Anne H. Delcour, Julius Adler, and Ching Kung. Pressure-Sensitive Ion Channel in *Escherichia coli*. *Proc. Natl. Acad. Sci. USA* 84, 2297-2301 (1987).
99. Adler, Julius. How Motile Bacteria Are Attracted and Repelled by Chemicals: An Approach to Neurobiology. Lecture held on the occasion of the receipt of the Otto?Warburg?Medaille 1986. *Biol. Chem. Hoppe?Seyler* 368, 163-173 (1987).
100. Adler, Julius. Chemotaxis: Old and New. Lecture held on the occasion of receipt of honorary degree from Tubingen University. *Botanica Acta* 101, 93?100 (1988).
101. Sager, Brian M., Jeff J. Sekelsky, Philip Matsumura, and Julius Adler. Use of a Computer to Assay Motility in Bacteria. *Anal. Biochem.* 173, 271-277 (1988).
102. Saimi, Yoshiro, Boris Martinac, Michael C. Gustin, Michael R. Culbertson, Julius Adler, and Ching Kung. Ion Channels in *Paramecium*, Yeast and *Escherichia coli*. *Trends Biochem. Sci.* 13, 304-309 (1988).
103. Adler, Julius, Congyi Li, Andrew J. Boileau, Youlin Qi, and Ching Kung. Osmotaxis in *Escherichia coli*. In *Molecular Biology of Signal Transduction*, Cold Spring Harbor Symp. Quant. Biol. 53, 19-22 (1988).
104. Adler, Julius, and Wenyuan Shi. Galvanotaxis in Bacteria. In *Molecular Biology of Signal Transduction*, Cold Spring Harbor Symp. Quant. Biol. 53, 23-25 (1988).
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C. BEHAVIOR OF ANIMALS, ESPECIALLY DROSOPHILA

This is work in progress.