

CURRICULUM VITAE

June 10, 2018 (fwk)

NAME: Peter Mazur

TITLE: Research Professor

ADDRESS (final):

Laboratory: Department of Biochemistry and Cellular and Molecular Biology
Fundamental and Applied Cryobiology
Walters Life Sciences Bldg., Room M 407
The University of Tennessee
Knoxville, TN 37996-0840

Home: 125 Westlook Circle
Oak Ridge, Tennessee 37830

LIFE: Born – March 3, 1928
Deceased – Dec 30, 2015

MARITAL STATUS: Married, Drusilla Stevens Mazur 5/53 (deceased 5/82)
One son, Timothy, born 5/55
Married, Sara Jo Bolling Frame 6/84 (deceased 4/03)

EDUCATION: A.B., Biology, Harvard, 1949 magna cum laude
Ph.D., Biology, Harvard, 1953

MILITARY SERVICE: 1953-57, 1st Lieutenant, U.S. Air Force Research
and Development Command

PROFESSIONAL EXPERIENCE:

1957-59	Postdoctoral Research, Department of Biology, Princeton University
1959-1998	Biology Division, Oak Ridge National Laboratory, Oak Ridge, Tennessee
1966-75	Group Leader, Cell Physiology
1967	Visiting Lecturer, Duke University
1970	Long-range Planning Office, Oak Ridge National Laboratory
1972-present	Adjunct Professor of Biomedical Sciences, The University of Tennessee Graduate School of Genome Sciences and Technology
1974-75	Scientific Director, Biophysics and Cell Physiology, Biology Division,
1976-1998	Group Leader, Fundamental and Applied Cryobiology
1988-1992	Adjunct Professor, Department of Biological Sciences, State University of New York at Binghamton
1998-2015	Research Professor, Department of Biochemistry and Cellular and Molecular Biology, University of Tennessee, Knoxville.

FELLOWSHIPS AND HONORS:

Phi Beta Kappa, 1949
John Harvard Fellow, 1951
Lalor Fellow, 1952
National Science Foundation Postdoctoral Fellow, 1957-59, Princeton University
Fellow, AAAS, 1962
Chairman, Ciba Foundation Symposium "The Frozen Cell," 1969
American Society for Microbiology Foundation Lecturer, 1971-72
Sigma Xi National Lecturer, 1980
Martin Marietta Energy Systems "Author of the Year," 1985
Martin Marietta Corporation Jefferson Cup Award, 1985
Corporate Fellow, Martin Marietta Energy Systems, 1985; Chairman, ORNL Corporate Fellows
Council, 1994 - 1996
Nominated for Japan Prize, 1992
Who's Who in the World, 1987-present
R&D 100 Award, 1993
Distinguished Service Award, American Association of Tissue Banks, 1993
Nominated for National Medal of Technology, 1995
Who's Who in America, 1996-present
Chancellor's Associates, The University of Tennessee
Cosmos Club, Washington, DC
Award from The Jackson Laboratory, honoring scientific achievements and contributions to
producing the first mammal born from a frozen embryo, Sept., 1997.
Honorary ScD, Wilson College, May, 1998
Fellow of the Society for Cryobiology, 2005
Papers 11, 33, 34, and 57 named as Citation Classics by the Institute For Scientific Information

SOCIETIES:

American Society for Cell Biology
Society of General Physiologists
Society for Cryobiology - Board of Governors, 1965-74; 1979-1996; 2010-; President, 1973-74

COMMITTEES AND EDITORIAL BOARDS:

AIBS Advisory Committee to Biology and Medicine Branch, Office of Naval Research, 1963-66
AIBS Advisory Committee to Environmental Biology Branch, NASA, 1966-70
Advisory Board, American Type Culture Collection, 1966-70
Harvard University Board of Overseers Visiting Committee to Biology, 1972-77
Member of the Space Science Board of the National Academy of Sciences, 1975-77;
Chairman, Exobiology Committee, 1975-77
Editorial Board, *Cryobiology*, 1967-present
Member, Advisory Committee on Blood Program Research, American National Red Cross, 1976-
1979.
Member, Germplasm Resources Committee, National Academy of Sciences, 1976-78
Member, National Science Foundation Advisory Committee for Polar Programs,
Subcommittee on Biology and Medicine, 1978-81

Editorial Board, *Cryo-Letters*, 1979-82

Board of Trustees, Wilson College, Chambersburg, Pennsylvania, 1984-1993

Ad Hoc Committee on Cooperative Mars Exploration and Sample Return, Space Science Board, National Academy of Sciences, 1987-1988

GRANTS AND CONTRACTS AWARDED (Since 1985)

1. National Institute on Aging, September 1985, 5 yrs.
“Establishment of a bank of frozen embryos from NIH mouse and rat colonies”
2. National Science Foundation, April 1986, 5 yrs.
“Permeability, osmotic, and cryobiological factors pertinent to the preservation by freezing of eggs (embryos) of genetic lines of *Drosophila*”
3. Veterans Administration, October 1986, 2 yrs.
“Frozen embryo bank, genetic models of alcoholism”
4. National Institute on Alcohol Abuse and Alcoholism, Oregon Health Sciences University, June 1988, 3 yrs. “Cryopreservation of mouse embryos to aid in the genetic selection of lines for ethanol thermal sensitivity”
5. National Institute on Alcohol Abuse and Alcoholism, Oregon Health Sciences University, April 1989, 3 yrs. “Cryopreservation of mouse embryos to aid in the genetic selection of lines for ethanol activity sensitivity”
6. U.S. Department of Agriculture, October 1989, 2 yrs., “Fundamental cryobiology of bull and ram spermatozoa”
7. National Institute of Child Health and Human Development, Methodist Hospital of Indiana, February 1990, 3 yrs, R01, “Fundamental cryobiology of human spermatozoa”
8. National Institute of Child Health and Human Development, NIH, April 1994, 3 yrs., R01
“Fundamental cryobiology of mouse spermatozoa”
9. National Institute of Allergy and Infectious Diseases, September 1995, 3 yrs., R01
“Cryobiological preservation of *Anopheles* embryos”
10. State of Tennessee, July, 1998, 1 yr. \$27,550, Honey Bee Cryopreservation.
11. National Center for Research Resources, NIH. 3 yrs. \$388,210 (R24) subcontract with Dr. John Critser, Indiana Univ.) “Storage of Mouse Strains Using Sperm Cryopreservation.”
12. National Institute of Allergy and Infectious Diseases, NIH, January 1999, 3 yrs., R01,
“Cryobiological preservation of *Anopheles* embryos”, \$529,229.
13. National Center for Research Resources, NIH, August 2003, 4 yrs., R01, “Aquaporins, Ice Formation in Cell, and Cryopreservation”, \$1,492,675.
14. National Center for Research Resources, NIH, September 30, 2007, 3 yrs, R01 “Factors Affecting Ice Formation in Cells”, \$1,326,465.
15. National Center for Research Resources, NIH, September 21, 2011, 4 yrs, R01 “Factors Affecting Ice Formation in Cells”, \$1,029,153

PUBLICATIONS

A. FULL PAPERS

(No. of full papers: 176. No. of citations: 15,010. h-index: 56 [Google Scholar])

1. Mazur, P., and William H. Weston 1956 The effects of spray-drying on the viability of fungous spores. *J. Bacteriol.* **71**: 257–266.
 2. Mazur, P. 1956 Studies on the effects of subzero temperatures on the viability of spores of *Aspergillus flavus*. I. The effect of rate of warming. *J. Gen. Physiol.* **39**: 869–888.
 3. Mazur, P., Morris A. Rhian, and Bill Mahlandt 1957 Survival of *Pasteurella tularensis* in sugar solutions after cooling and warming at subzero temperatures. *J. Bacteriol.* **73**: 394–397.
 4. Mazur, P., Morris A. Rhian, and Bill G. Mahlandt 1957 Survival of *Pasteurella tularensis* in gelatin-saline after cooling and warming at subzero temperatures. *Arch. Biochem. Biophys.* **71**: 31–51.
 5. Mazur, P. 1960 The effects of subzero temperatures on micro-organisms. In *Recent Researches in Freezing and Drying* (A. S. Parkes and A. U. Smith, editors). Oxford, Blackwell Scientific Publications, pp. 65–77.
 6. Mazur, P. 1960 Physical factors implicated in the death of micro-organisms at subzero temperatures. *Annal. N.Y. Acad. Sci.* **85**: 610–629.
 7. Mazur, P. 1961 Physical and temporal factors involved in the death of yeast at subzero temperatures. *Biophys. J.* **1**: 247–264.
 - 8a. Mazur, P. 1961 Manifestations of injury in yeast cells exposed to subzero temperatures. I. Morphological changes in freeze-substituted and in "frozen-thawed" cells. *J. Bacteriol.* **82**: 662–672.
 - 8b. Mazur, P. 1961 Manifestations of injury in yeast cells exposed to subzero temperatures. II. Changes in specific gravity and in the concentration and quantity of cell solids. *J. Bacteriol.* **82**: 673–684.
 9. Mazur, P. 1963 Studies on rapidly frozen suspensions of yeast cells by differential thermal analysis and conductometry. *Biophys. J.* **3**: 323–353.
 10. Mazur, P. 1963 Mechanisms of injury in frozen and frozen-dried cells. In *Culture Collections: Perspectives and Problems* (S. M. Martin, editor). University of Toronto Press, pp. 59–70.
 - 11. Mazur, P. 1963 Kinetics of water loss from cells at subzero temperatures and the likelihood of intracellular freezing. *J. Gen. Physiol.* **47**: 347–369.
- Named "Citation Classic" by the Institute for Scientific Information.

12. Albright, Joseph F., T. Makinodan, and P. Mazur 1963 Preservation of antibody-producing cells at low temperatures: a method of storage that allows complete recovery of activity. *Proc. Soc. Exper. Biol. and Med.* **114**: 489–493.
13. Mazur, P. 1964 Basic problems in cryobiology. In *Advances in Cryogenic Engineering* (K. D. Timmerhaus, editor). New York, Plenum Press, Vol. 9, pp. 28–37.
14. Mazur, P. 1965 Causes of injury in frozen and thawed cells. *Fed. Proc.* **24**, No. 2, Part III, S175–S182.
15. Mazur, P. 1965 The role of cell membranes in the freezing of yeast and other single cells. *Annal. N.Y. Acad. Sci.* **125**: 658–676.
16. Mazur, P. 1966 Theoretical and experimental effects of cooling and warming velocity on the survival of frozen and thawed cells. *Cryobiology* **2**: 181–192.
17. Fuchtbauer, W., and P. Mazur 1966 Kinetics of the ultraviolet induced dimerization of thymine in frozen solutions. *Photochem. Photobiol.* **5**: 323–335.
18. Anderson, N. G., J. G. Green, and P. Mazur 1966 Centrifugal freezing. I. A system for rapid freezing of aqueous cell suspensions. *National Cancer Institute Monograph* **21**: 415–430.
19. Mazur, P. 1966 Physical and chemical basis of injury in single-celled micro-organisms subjected to freezing and thawing. In *Cryobiology* (H. T. Meryman, editor). London, Academic Press, pp. 213–315.
20. Leibo, S. P., and P. Mazur 1966 Effect of osmotic shock and low salt concentration on survival and density of bacteriophages T4B and T4Bo₁. *Biophys. J.* **6**: 747–772.
21. Mazur, P. 1967 Physical-chemical basis of injury from intracellular freezing in yeast. In *Cellular Injury and Resistance in Freezing Organisms* (E. Asahina, editor). Institute of Low Temperature Science, Hokkaido University, Sapporo, Japan, pp. 171–189.
22. Mazur, P. 1967 Factors affecting cell injury in cryosurgical freezing. *Bulletin Millard Fillmore Hospital*, **14**: 123–128.
23. Mazur, P. 1968 Survival of fungi after freezing and desiccation. In *The Fungi*, (G. C. Ainsworth and A. S. Sussman, editors), Academic Press, N.Y., Vol. III, pp. 325–394.
24. Mazur, P. 1968 Physical-chemical factors underlying cell injury in cryosurgical freezing. In *Cryosurgery* (R. W. Rand, A. P. Rinfret, and H. V. Leden, editors), C. C. Thomas, Publ., Springfield, Ill., pp. 32–51.
25. Mazur, P., and J. J. Schmidt 1968 Interactions of cooling velocity, temperature, and warming velocity on the survival of frozen and thawed yeast. *Cryobiology* **5**: 1–17.
26. Mazur, P. 1968 Physical and chemical changes during freezing and thawing of cells, with special reference to blood cells. *Bibliotheca Haematologica* No. 29, Part 3, pp. 764–777 (Proc. 11th Cong. Int. Society Blood Transfusion, Sydney, 1966, L. Hollander, editor).

27. Mazur, P. 1969 Freezing injury in plants. *Ann. Rev. Plant Physiol.* **20**: 419–448.
28. Mazur, P., J. Farrant, S. P. Leibo, and E. H. Y. Chu 1969 Survival of hamster tissue-culture cells after freezing and thawing. Interactions between protective solutes and cooling and warming rates. *Cryobiology* **6**: 1–9.
29. Leibo, S. P., and P. Mazur 1969 Freezing of bacteriophage T4: Temperature and rate effects as a function of salt concentration. *Cryobiology* **38**: 558–566.
30. Mazur, P. 1970 Chairman's opening remarks. In *The Frozen Cell*, Ciba Foundation Symposium, (G. E. W. Wolstenholme and Maeve O'Connor, editors), J. & A. Churchill, London, pp. 1–3.
31. Mazur, P., S. P. Leibo, J. Farrant, E. H. Y. Chu, M. G. Hanna, Jr., and L. H. Smith 1970 Interactions of cooling rate, warming rate and protective additive on the survival of frozen mammalian cells. In *The Frozen Cell*, Ciba Foundation Symposium, (G. E. W. Wolstenholme and Maeve O'Connor, editors), J. & A. Churchill, London, pp. 69–88.
32. Leibo, S. P., and P. Mazur 1970 Mechanisms of freezing damage in bacteriophage T4. In *The Frozen Cell*, Ciba Foundation Symposium, (G. E. W. Wolstenholme and Maeve O'Connor, editors), J. & A. Churchill, London, pp. 235–246.
- 33. Leibo, S. P., J. Farrant, P. Mazur, M. G. Hanna, Jr., and L. H. Smith 1970 Effects of freezing on marrow stem cell suspensions: Interactions of cooling and warming rates in the presence of PVP, sucrose, or glycerol. *Cryobiology* **6**: 315–332.
- 34. Mazur, P. 1970 Cryobiology: The freezing of biological systems. *Science* **168**: 939–949.
35. Leibo, S. P., and P. Mazur 1971 The role of cooling rates in low-temperature preservation. *Cryobiology* **8**: 447–452.
36. Mazur, P., S. P. Leibo, and E. H. Y. Chu 1972 A two-factor hypothesis of freezing injury -- evidence from Chinese hamster tissue culture cells. *Exp. Cell Research* **71**: 345–355.
37. Bank, H., and P. Mazur 1972 Relation between ultrastructure and viability of frozen-thawed Chinese hamster tissue-culture cells. *Exp. Cell Research* **71**: 441–454.
38. Whittingham, D. G., S. P. Leibo, and P. Mazur 1972 Survival of mouse embryos frozen to -196° and -269° C. *Science* **178**: 411–414.
39. Bank, H., and P. Mazur 1973 Visualization of freezing damage. *J. Cell Biol.* **57**: 729–742.
40. Whittingham, D. G., S. P. Leibo, and P. Mazur 1973 Maternal influences on mouse embryos and preservation of mutant strains by freezing. *Science* **181**: 288.
41. Mazur, P., and S. P. Leibo 1973 Response of mammalian cells to freezing and thawing. In *Cryoconservation des Cellules Normales et neoplasiques*. Institut National de la Sante et de la Recherche Medicale, Villejuif, France, pp. 17–25.

42. Leibo, S. P., and P. Mazur 1973 Factors affecting the survival of tissue- culture cells and erythrocytes subjected to extracellular freezing. In *Progress in Refrigeration Science and Technology*, Vol. **3**, pp. 939–943. Avi Publishing Co., Westport, Conn. Proceedings of the XIII International Congress of Refrigeration.
43. Mazur, P., S. P. Leibo, and R. H. Miller 1974 Permeability of the bovine red cell to glycerol in hyperosmotic solutions at various temperatures. *J. Membrane Biology* **15**: 107–136.
44. Mazur, P., R. H. Miller, and S. P. Leibo 1974 Survival of frozen-thawed bovine red cells as a function of the permeation of glycerol and sucrose. *J. Membrane Biology* **15**: 137–158.
45. Leibo, S. P., P. Mazur, and S. C. Jackowski 1974 Factors affecting survival of mouse embryos during freezing and thawing. *Exp. Cell Research* **89**: 79–88.
46. Towill, L. E., and P. Mazur 1975 Studies on the reduction of 2,3,5-triphenyltetrazolium chloride as a viability assay for plant tissue cultures. *Can. J. Bot.* **53**: 1097–1102.
47. Mazur, P. 1975 Fundamental aspects of freezing injury in living cells. In *Proceedings, 1st International Congress of the International Association of Microbiological Societies*, Tokyo, Japan, September 1–7, 1974, Vol. 5, Science Council of Japan, 1975, pp. 577–586.
48. Mazur, P. 1976 Freezing and low temperature storage of living cells. In *Proceedings of the Workshop on Basic Aspects of Freeze Preservation of Mouse Strains*. Jackson Laboratory, Bar Harbor, Maine, September 16–18, 1974, Otto Muhlbock, Editor, Gustav Fischer Verlag, Publ., Stuttgart, pp. 1–12.
49. Towill, L. E., and P. Mazur 1976 Osmotic shrinkage as a factor in freezing injury in plant tissue cultures. *Plant Physiol.* **57**: 290–296.
50. Miller, R. H., and P. Mazur 1976 Survival of frozen-thawed human red cells as a function of cooling and warming velocities. *Cryobiology* **13**: 404–414.
51. Mazur, P., and R. H. Miller 1976 Permeability of the human erythrocyte to glycerol in 1 and 2 M solutions at 0° or 20°C. *Cryobiology* **13**: 507–522.
52. Mazur, P., and R. H. Miller 1976 Survival of frozen-thawed human red cells as a function of the permeation of glycerol and sucrose. *Cryobiology* **13**: 523–536.
53. Mazur, P., J. A. Kemp, and R. H. Miller 1976 Survival of fetal rat pancreases frozen to –78 and –196°C. *Proc. Nat. Acad. Sci. U.S.* **73**: 4105–4109.
54. Souzu, H., and P. Mazur 1976 Correlation between the survival of slowly frozen human red cells and the composition of the unfrozen portion of the extracellular medium at various subzero temperatures. I. Hemolysis by freezing in 2 M glycerol. In *Low Temperature Science*, Series B, Institute of Low Temperature Science, Hokkaido University, **34**: 19–25 (in Japanese).
55. Mazur, P. 1977 Mechanisms of injury and protection in cells and tissues at low temperatures. In *Les Colloques de l'Institut National de la Sante et la recherche Medicale*, Cryoimmunologie, INSERM, June 17–19, 1976 (Simatos, D., Strong, D. M., Turc, J. M., editors), Vol. 62, pp. 37–60.

56. Kemp, J. A., P. Mazur, Y. Mullen, R. H. Miller, W. Clark, and J. Brown 1977 Reversal of experimental diabetes by fetal rat pancreas. I. Survival and function of fetal rat pancreas frozen to -196°C. *Transplantation Proceedings* **9(1)**: 325–328.
- 57. Mazur, P. 1977 The role of intracellular freezing in the death of cells cooled at supraoptimal rates. Proceedings of Symposium on Cryoinjury, 13th Annual Meeting, Society for Cryobiology, August 1–5, 1976 *Cryobiology* **14**: 251–272.
58. Brown, J., W. Clark, I. G. Molnar, J. Kemp, P. Mazur, and Y. S. Mullen 1977 Functional capacity and cryopreservation of fetal rat pancreas in streptozotocin diabetes. Proceedings 9th Congress, International Diabetes Federation, New Delhi, India, October 31–November 5, 1976. *Excerpta Medica*, Series 400, pp. 167–175.
59. Mazur, P. 1977 Slow-freezing injury in mammalian cells. In *The Freezing of Mammalian Embryos*. Ciba Foundation Symposium No. 52 (new series), (Katherine Elliott and Julie Whelan, editors), Elsevier, Amsterdam, pp. 19–42
60. Leef, J. L., and P. Mazur 1978 The physiological response of *Neurospora conidia* to freezing in the dehydrated, hydrated, or germinated state. *Appl. Environ. Microbiol.* **35**: 72–83.
61. Leibo, S. P., and P. Mazur 1978 Methods for the preservation of mammalian embryos by freezing. In *Methods in Mammalian Reproduction*. (J. C. Daniel, Jr., editor), Academic Press, N.Y., pp. 179–201.
62. Souzu, H., and P. Mazur 1978 Temperature dependence of the survival of human erythrocytes frozen slowly in various concentrations of glycerol. *Biophysical Journal* **23**: 89–100.
63. Rall, W. F., P. Mazur, and H. Souzu 1978 Physical-chemical basis of the protection of slowly frozen human erythrocytes by glycerol. *Biophysical Journal* **23**: 101–120.
64. Mazur, P., E. S. Barghoorn, H. O. Halvorson, T. H. Jukes, I. R. Kaplan, and L. Margulis 1978 Biological implications of the Viking mission to Mars. *Space Science Reviews* **22**: 3–34.
65. Mazur, P. 1979 Preservation of mammalian germ plasm by freezing. In *Animal Models for Research on Contraception and Fertility*. (N. J. Alexander, ed.), Proceedings of a symposium held May 8–10, 1978, Washington, D.C., under the sponsorship of the National Research Council, Harper Row, publ., pp. 528–539.
66. Margulis, L., P. Mazur, E. S. Baghoorn, H. O. Halvorson, T. H. Jukes, and I. R. Kaplan 1979 The Viking Mission: Implications for Life on Mars. *J. Mol. Evolution* **14**: 223–232.
67. Mazur, P. 1980 Limits to life at low temperatures and at reduced water contents and water activities. Proceedings of the 4th College Park Colloquium on Chemical Evolution, October 18–20, 1978, Univ. Maryland. *Origins of Life* **10**: 137–159, and in *Limits of Life* (Cyril Ponnampereuma and Lynn Margulis, eds.), D. Reidel, publ., Dodrecht, pp. 1–23.
68. Frim, J., and P. Mazur 1980 Approaches to the preservation of human granulocytes by freezing. In symposium on *Storage and preservation of Granulocytes*, Society for Cryobiology Annual Meeting, September 30–October 4, 1979. *Cryobiology* **17**: 282–286.

69. Jackowski, S., S. P. Leibo, and P. Mazur 1980 Glycerol permeabilities of fertilized and unfertilized mouse ova. *J. Exp. Zool.* **212**: 329–341.
70. Mazur, P. 1980 Fundamental aspects of the freezing of cells, with emphasis on mammalian ova and embryos. In *Proceedings of Plenary Sessions, 9th International Congress on Animal Reproduction and Artificial Insemination, Madrid, Spain, June 16–20, 1980, Vol. 1*, pp. 99–114.
71. Mazur, P., and R. V. Rajotte 1981 Permeability of the 17-day fetal rat pancreas to glycerol and dimethyl sulfoxide. *Cryobiology* **18**: 1–16.
72. Rajotte, R. V., and P. Mazur 1981 Survival of frozen-thawed fetal rat pancreases as a function of the permeation of dimethyl sulfoxide and glycerol, warming rate, and fetal age. *Cryobiology* **18**: 17–31.
73. Mazur, P. 1981 Fundamental cryobiology and the preservation of organs by freezing. In *Organ Preservation for Transplantation*. (A. Karow and D. Pegg, eds.), Marcel Dekker, Inc., p. 143–175.
74. Mazur, P., W. F. Rall, and N. Rigopoulos 1981 Relative contributions of the fraction of unfrozen water and of salt concentration to the survival of slowly frozen human erythrocytes. *Biophysical J.* **36**: 653–675.
75. Rall, W. F., P. Mazur, and J. J. McGrath 1983 Depression of the ice-nucleation temperature of rapidly cooled mouse embryos by glycerol and dimethyl sulfoxide. *Biophysical J.* **41**: 1–12.
76. Mazur, P., and N. Rigopoulos 1983 Contributions of unfrozen fraction and of salt concentration to the survival of slowly frozen human erythrocytes: Influence of warming rate. *Cryobiology* **20**: 274–289.
77. Frim, J., and P. Mazur 1983 Interactions of cooling rate, warming rate, glycerol concentration, and dilution procedure on the viability of frozen-thawed human granulocytes. *Cryobiology* **20**: 657–676.
78. Schneider, U., and P. Mazur 1983 Osmotic consequences of cryoprotectant permeability and its relation to the survival of frozen-thawed embryos. *Theriogenology* **21**: 68–79.
79. Mazur, P., and R. V. Rajotte 1984 The preservation by freezing to -196C of Islets of Langerhans in intact fetal pancreata in the isolated state, and in pancreatic fragments. In *Methods in Diabetes Research*, Vol. 1, (J. Larner and S. L. Pohl, eds.), J. Wiley, N.Y., pp. 235–251.
80. Mazur, P. 1984 The freezing of living cells: Mechanisms and implications. *Amer. J. Physiol.* **247**(Cell Physiol. **16**): C125–C142.
81. Mazur, P. 1984 Book review of *Effects of Low Temperature on Biological Membranes*, (G. J. Morris and A. Clarke, eds.), Academic Press. *Cryobiology* **21**: 578–580.
82. Armitage, W. J., and P. Mazur 1984 Osmotic tolerance of human granulocytes. *Amer. J. Physiology* **247**(Cell Physiol. **16**): C373–C381.
83. Armitage, W. J., and P. Mazur 1984 Toxic and osmotic effects of glycerol on human granulocytes. *Amer. J. Physiology* **247**(Cell Physiol. **16**): C382–C389.

84. Mazur, P., W. F. Rall, and S. P. Leibo 1984 Kinetics of water loss and the likelihood of intracellular freezing in mouse ova: Influence of the method of calculating the temperature dependence of water permeability. *Cell Biophysics* **6**: 197–214.
85. Mazur, P., and K. W. Cole 1985 Influence of cell concentration on the contribution of unfrozen fraction and salt concentration to the survival of slowly frozen human erythrocytes. *Cryobiology* **22**: 505–536.
86. Mazur, P. 1985 Basic concepts in freezing cells, in *Proceedings First International Conference on Deep Freezing of Boar Semen*, Uppsala, Sweden, August 25–27, 1985, (L. A. Johnson and K. Larsson, eds.), Publ. by Swedish University of Agricultural Sciences and the United States Department of Agriculture, pp. 91–112.
87. Armitage, W. J., and P. Mazur 1986 Effect of plasma on the recovery and survival of human granulocytes incubated at 37C after exposure to phosphate buffered saline or glycerol. *Cryobiology* **23**: 194–197.
88. Schneider, U., and P. Mazur 1986 Implications and applications of the long-term preservation of embryos by freezing. In *Current Therapy in Theriogenology II*, (D. Morrow, ed.), W. B. Saunders, Philadelphia, pp. 81–83.
89. Mazur, P., and U. Schneider 1986 Osmotic response of preimplantation mouse and bovine embryos and their cryobiological implications. *Cell Biophys.* **8**: 259–285.
90. Schneider, U., and P. Mazur 1987 Relative influence of unfrozen fraction and salt concentration on the survival of slowly frozen 8-cell mouse embryos. *Cryobiology* **24**: 17–41.
91. Mazur, P. 1988 Stopping biological time -- The freezing of living cells. Proceedings of Fifth World Congress on *In Vitro* Fertilization and other Assisted Reproduction (H.W. Jones, Jr. and C. Schrader, eds.). *Annals New York Acad. Sci.* **541**:514–531.
92. Mazur, P., and K. W. Cole 1989 Roles of unfrozen fraction, salt concentration, and changes cell volume in the survival of frozen human erythrocytes. *Cryobiology* **26**:1–29.
93. Mazur, P. 1989 Frozen Neanderthals. *Nature* **342**: 23.
94. Mazur, P. 1990 Equilibrium, quasi-equilibrium, and non equilibrium freezing of mammalian embryos. *Cell Biophys.* **17**: 53–92.
95. Du, J., F. W. Kleinhans, V. J. Spitzer, L. Horstman, P. Mazur, and J. K. Critser 1991 ESR-determined osmotic behavior of bull spermatozoa. In *Boar Semen Preservation II*, Supplement 1 to Reproduction in Domestic Animals (L. A. Johnson and D. Roth, eds.), Paul Parey, Publ., Berlin, pp. 105–108.
96. Noiles, E. E., N. A. Ruffing, F. W. Kleinhans, L. A. Mark, L. Horstman, P. F. Watson, P. Mazur, and J. K. Critser 1991 Critical tonicity determination of sperm using fluorescent staining and flow cytometry. In *Boar Semen Preservation II*, Supplement 1 to Reproduction in Domestic Animals, (L. A. Johnson and D. Roth, eds.), Paul Parey, Publ., Berlin, pp. 359-364.

97. Mazur, P., U. Schneider, and A. P. Mahowald 1992 Characteristics and kinetics of subzero chilling injury in *Drosophila* embryos. *Cryobiology* **29**: 39–68.
98. Mazur, P., K. W. Cole, and A. P. Mahowald 1992 Critical factors affecting the permeabilization of *Drosophila* embryos by alkanes. *Cryobiology* **29**: 210–239.
99. Watson, P. F., J. F. Critser, and P. Mazur 1992 Sperm preservation: Fundamental cryobiology and practical implications. In *Infertility*, (A.A. Templeton and J.O. Drife, eds.), Springer-Verlag, publ., pp. 101–114.
100. Gao, D. Y., P. Mazur, F. W. Kleinans, P. F. Watson, E. E. Noiles, and J. K. Critser 1992 Glycerol permeability of human spermatozoa and its activation energy. *Cryobiology* **29**: 657–667.
101. Mazur, P., K. W. Cole, J. Hall, P. D. Schreuders, and A. P. Mahowald 1992 Cryobiological preservation of *Drosophila* embryos. *Science* **258**: 1932–1935.
102. Mazur, P. 1992 Frozen living cells, tissues, and organs. In *Fundamentals of Medical Cell Biology*, Vol 6, Neurobiology, Thermobiology, and Cytobiology (E.E. Bittar, ed.), JAI Press, Greenwich, CT, pp. 265–290.
103. Watson, P.F., E.E. Noiles, M.R. Curry, P. Mazur, J.K. Critser, and R.H. Hammerstedt 1992 Response of spermatozoa to hypotonic stress reflects cryopreservation success. *Proc. 12th Int. Congr. of Animal Reproduction*, **3**: 1502–1504.
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