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CURRICULUM VITAE - Robert S. Cantor

Education:

1971-1975 B.S., Physics
Yale University, New Haven, CT

1975-1979 Ph.D., Chemistry (with Prof. John S. Waugh)
Thesis: "Topics in the Theory of Spin Dynamics"
Massachusetts Institute of Technology, Cambridge, MA

Positions:

1979-1981 Postdoctoral Fellow (with Prof. P. G. deGennes)
Department of Condensed Matter Physics, Collège de France, Paris, France

1981-1982 Postdoctoral Associate (with Prof. Ken A. Dill)
Dept. of Chemistry, University of Florida, Gainesville, Florida

1982-1983 NIH Postdoctoral Fellow (with Prof. Ken A. Dill)
1983-1984 Assistant Research Chemist
Department of Pharmaceutical Chemistry, University of California, San Francisco

1984-1990 Assistant Professor
1990-1997 Associate Professor
1997-present Professor
Department of Chemistry, Dartmouth College, Hanover, NH

1995 (Mar.-June) Visiting Scholar
Laboratoire Léon Brillouin, CEA Saclay, France

1998 (Oct.-Dec.) Visiting Professor
Dept. of Chemistry, Technical University of Denmark

2002 (Sept.-Dec.); 2003 (Mar.-June) Visiting Professor
Center for Membrane Physics, University of Southern Denmark, Odense

2002-2007 International Faculty, University of Southern Denmark, Odense

Refereed Publications:

1. J. S. Waugh, M. M. Maricq and R. S. Cantor, *J. Mag. Res.* **29**, 183-190 (1978); "Rotational spin echoes in solids".

2. R. S. Cantor and J. S. Waugh, *J. Chem. Phys.* **73**, 1054-1063 (1980); "Pulsed spin locking in pure nuclear quadrupole resonance".

3. R. S. Cantor, *Macromolecules* **14**, 1186-1193 (1981); "Non-ionic diblock copolymers as surfactants between immiscible solvents".

4. K. A. Dill and R. S. Cantor, *Macromolecules* **17**, 380-384 (1984); "Statistical thermodynamics of short-chain molecule interphases. 1. Theory".

5. R. S. Cantor and K. A. Dill, *Macromolecules* **17**, 384-388 (1984); "Statistical thermodynamics of short-chain molecule interphases. 2. Configurational properties of amphiphilic aggregates".

6. K. A. Dill, D. E. Koppel, R. S. Cantor, J. D. Dill, D. Bendedouch and S.-H. Chen, *Nature* **309**, 42-45 (1984); "Molecular conformations in surfactant micelles".

7. K. A. Dill and R. S. Cantor, in Physics of amphiphiles: micelles, vesicles and microemulsions, V. deGiorgio and M. Corti, eds. (North-Holland Press, 1985); 376-393; "The statistical thermodynamics of surfactant aggregates".

8. R. S. Cantor and K. A. Dill, *Macromolecules* **18**, 1875-1882 (1985); "Statistical thermodynamic theory for the melting of *n*-alkanes from their rotator phases".

9. R. S. Cantor and K. A. Dill, *Langmuir* **2**, 331-337 (1986); "Theory for the equation of state of phospholipid monolayers".

10. R. S. Cantor and P. M. McIlroy, *J. Chem. Phys.* **90**, 4423-4430 (1989); "Statistical thermodynamics of flexible-chain surfactants in monolayer films. I. Theory of fluid phases".

11. R. S. Cantor and P. M. McIlroy, *J. Chem. Phys.* **90**, 4431-4440 (1989); "Statistical thermodynamics of flexible-chain surfactants in monolayer films. II. Calculations for a modified cubic lattice model".

12. R. S. Cantor and P. M. McIlroy, *J. Chem. Phys.* **91**, 416-426 (1989); "Statistical thermodynamics of monolayers of flexible-chain amphiphiles: adding nearest-neighbor correlations to a Scheutjens-Fleer approach".

13. R. S. Cantor, *J. Chem. Phys.* **91**, 6306-6317 (1989); "Statistical thermodynamics of flexible-chain surfactants in monolayer films: Mixtures of different chain lengths".

14. R. S. Cantor, in Macromolecular Liquids, MRS Symposium Proceedings **177**, C. R. Safinya, S. A. Safran and P. A. Pincus, eds. (Materials Research Society, 1990), 345-350; "Statistical thermodynamics of phase transitions in surfactant monolayer films".

15. R. S. Cantor, *J. Chem. Phys.* **99**, 7124-7149 (1993); "Statistical thermodynamics of curvature elasticity in surfactant monolayer films: A molecular approach".

16. R. S. Cantor, *J. Chem. Phys.* **103**, 4765-4783 (1995); "The stability of bicontinuous microemulsions: A molecular theory of the bending elastic properties of monolayers comprised of ionic surfactants and nonionic cosurfactants".

17. R. S. Cantor, *J. Chem. Phys.* **104**, 8082-8095 (1996); "Theory of lipid monolayers comprised of mixtures of flexible and stiff amphiphiles in athermal solvents: Fluid phase coexistence".

18. R. S. Cantor, *Biochemistry* **36**, 2339-2344 (1997); "The lateral pressure profile in membranes: a physical mechanism of general anesthesia".

19. R. S. Cantor, *J. Phys. Chem.* **101**, 1723-1725 (1997); "Lateral pressures in cell membranes: a mechanism for modulation of protein function".

20. R. S. Cantor, *Toxicology Lett.* **100**, 451-457 (1998); "The lateral pressure profile in membranes: a physical mechanism of general anesthesia".

21. R. S. Cantor, *Biophys. J.* **76**, 2625-2639 (1999); "Lipid composition and the lateral pressure profile in bilayers".

22. R. S. Cantor, *Chem. Phys. Lipids* **101**, 45-56 (1999); "The influence of membrane lateral pressures on simple geometric models of protein conformational equilibria".

23. R. S. Cantor, *Biophys. J.* **77**, 2643-2647 (1999); "Solute modulation of conformational equilibria in intrinsic membrane proteins: apparent 'cooperativity' without binding".

24. R. S. Cantor, *Prog. Anesth. Mech.* **6**, 80-85 (2000); "The correlation of anesthetic potency with stiffness and interfacial activity".

25. R. S. Cantor, *Biophys. J.* **80**, 2284-2297 (2001); "Breaking the Meyer-Overton rule: predicted effects of varying stiffness and interfacial activity on the intrinsic potency of anesthetics"

26. R. S. Cantor, *J. Phys. Chem. B* **105**, 7550-7553 (2001); "Bilayer partition coefficients of alkanols: predicted effects of varying lipid composition"

27. R. S. Cantor, *Biophys. J.* **82**, 2520-2525 (2002); "Size distribution of barrel-stave aggregates of membrane peptides: Influence of the bilayer lateral pressure profile"

28. R. S. Cantor, *Biochemistry* **42**, 11891-11897 (2003) "Receptor desensitization by neurotransmitters in membranes: are neurotransmitters the endogenous anesthetics?"

Invited seminars (since June, 1998):

11 June 1998. Department of Anesthesia, University of Pennsylvania, Philadelphia, PA. *"The lateral pressure profile in cell membranes: a physical mechanism of general anesthesia"*

14 June 1998. Department of Anesthesia, University of California, San Francisco. *"Remarkable results of changes in membrane composition"*

1 October 1998. Department of Pharmacology, University of Massachusetts, Worcester, MA. *"Lateral pressures: A link betweeen membrane composition and protein equilibria and a plausible mechanism of general anesthesia"*

November 1998. Seminar series at the Technical University of Denmark, Lyngby, Denmark. *"The influence of bilayer composition on the function of membrane proteins*"

9 November:
"1. The lateral pressure profile"

16 November: (two parts)
"2a. Effects of small solutes (drugs) on membrane proteins"
"2b. General anesthesia and the Meyer-Overton correlation"

23 November:
"3. Another possible indirect mechanism: hydrophobic mismatch and curvature stress"

30 November:
"4. The lateral pressure profile: effects on two kinds of protein/peptide equilibria.
a. Cooperative tilt in alpha-helical bundles
b. Peptide aggregation"

8 December 1998. Risø National Laboratory, Roskilde, Denmark. *"Lateral pressures and protein function in cell membranes: anesthetics, alcohol, polyunsaturated lipids and cholesterol"*

9 December 1998. Niels Bohr Institute / Nordita, Copenhagen, Denmark. "*The influence of cell membrane composition on protein function: anesthetics, alcohol, polyunsaturated lipids and cholesterol"*

10 December 1998. Dept. of Pharmaceutics, Royal Danish School of Pharmacy, Copenhagen, Denmark. "*Lateral pressures and protein function in cell membranes: anesthetics, alcohol, polyunsaturated lipids and cholesterol*"

2 August 1999. Institute of Biomembranes, University of Utrecht, Utrecht, The Netherlands. *"The influence of membrane lateral pressures on simple geometric models of protein conformational equilibria"*

4 August 1999. Summer Institute: "Biophysics and Biomolecular Modeling", Technical University of Denmark, Lyngby, Denmark. "*The influence of membrane lateral pressures on simple geometric models of protein conformational equilibria*"

11 August 1999. Summer Institute: "Biophysics and Biomolecular Modeling", Technical University of Denmark, Lyngby, Denmark. *"Solute modulation of conformation equilibria in membrane proteins: 'cooperativity' without binding*"

10 June 2000. Dept. of Anesthesia, University of California, San Francisco. "*Deviations from the*

Meyer-Overton rule: predicted effects of varying stiffness and interfacial activity on the intrinsic potency of anesthetics"

21 March 2001. Dept. of Anesthesia, University of Tennessee, Memphis. "*The influence of bilayer composition on the activity of membrane proteins: anesthetics, alcohol, polyunsaturated lipids and cholesterol"*

3 December 2001. Dept. of Physics, University of Southern Denmark, Odense. *"The interplay of bilayer composition and membrane protein activity: recent results and future directions"*

30 September 2002. Dept. of Chemistry, University of Southern Denmark, Odense. *"Modulation of protein activity by variations in bilayer composition: lateral pressures in cell membranes"*

4 December 2002. Dept. of Chemistry, Technical University of Denmark, Lyngby. *"Modulation of protein activity by variations in bilayer composition: lateral pressures in cell membranes"*

14 March 2003. Graduate Program in Molecular Biophysics, University of Texas Southwestern Medical Center. "*Nonspecific effects of bilayer compositional changes on membrane protein activity: a possible mechanism of anesthesia"*

1 April 2003. Dept. of Physics, University of Southern Denmark. *"Modulation of membrane protein activity by variations in bilayer composition: lateral pressures and the molecular mechanism of anesthesia"*

20 May 2003. Max Planck Institute for Polymer Research, Mainz, Germany. *"Receptor desensitization by neurotransmitters in membranes: are they the endogenous anesthetics?"*

Invited presentations at meetings (since June, 1998):

21 November 1998. Stat Mech Network meeting on Life, Order and Disorder. Niels Bohr Insitute, Copenhagen, Denmark. "*The Physics of Anesthesia*"

5 December 1998. Symposium: Functional cell membranes: Perspectives from biophysics. Institute of Biomedicine, University of Helsinki, Finland. *"Lateral pressures in membranes: lipid modulation of protein function*"

7 December 1998. Workshop on Alcohol and Membranes. Technical University of Denmark, Lyngby, Denmark. "*Alcohol partitioning into membranes: effects of lipid composition*"

8 December 1999. 2nd International Workshop on Anesthetic Mechanisms. Takamatsu, Japan.
1. *"The correlation of anesthetic potency with membrane interfacial excess"*
2. *"On the difference between binding and indirect mechanisms of anesthetic action: Can a lipid act as an anesthetic?"*

16 February 2000. Biophysical Society Annual Meeting, New Orleans, LA. Workshop: Properties of Polyunsaturated Lipid Membranes. "*Polyunsaturation and the lateral pressure profile in bilayers: Modulation of protein conformational equilibria*"

26-28 April 2000. Royal Netherlands Academy of Arts and Sciences: Conference on Membrane Proteins. "*Lateral pressures in membranes: modulation of protein activity through variations in bilayer composition*"

16-20 July 2000. FASEB Summer Research Conference: Molecular Biophysics of Cellular Membranes. "*Modulation of protein activity by variations in bilayer composition: lateral pressures in membranes*"

17-21 February 2001. Biophysical Society Annual Meeting, Boston, MA. *"Breaking the Meyer-Overton rule: predicted effects of varying stiffness and interfacial activity on the intrinsic potency of anesthetics"*

13-17 August 2003. International Summer School and Workshop on Colloids and Biophysics: "Hairy Interfaces and Stringy Molecules" (University of Southern Denmark, Odense). "*Modulation of membrane protein activity by variations in bilayer composition: lateral pressures and the mechanism of anesthesia*"