



Fig. 4 — Heat capacity vs. temperature curve of a protein consisting of two structural domains of different stability (λ -repressor, after Pabo et al., (1979) *Proc. Natl. Acad. Sci. USA* 76, 1608).

Nucleic Acid and Lipid Transitions are also Characterized by Cooperativity of Structural Domains

Small proteins having 50 to 100 amino acids unfold as one cooperative unit. However, small nucleic acids, such as transfer ribonucleic acids which consist of approximately 80 nucleotides organized in a well defined three-dimensional structure in solution, behave differently when exposed to increasing temperature. Clearly energetically separated intermediate states can be identified which coincide perfectly with structural domains of the molecule⁷⁾. The reason why proteins must incorporate a larger number of structural units (amino acids) into a stable domain may result from the fact that the average interaction enthalpy, ΔH , is approximately 30 kJ/mol of nucleotide in nucleic acids, whereas it is only 1-3 kJ/mol of amino acid in proteins.

We have seen that the thermodynamic parameters for proteins and nucleic acids relate to the difference between the random coil state of the macromolecule and the well defined three-dimensional structure.

The best understood thermodynamic quantities of lipid systems relate to temperature induced transitions between two lipid phases of a different degree of order within a two dimensional layer (Figs. 1b, c). Highly purified lipid systems exhibit phase transitions which appear to be of first order and which incorporate more than 1000 lipid molecules into one cooperative unit. It is obvious that these transitions offer a great challenge to theoreticians to elaborate treatments which match the experimental findings⁸⁾.

Microcalorimetry: Traditional Tool with Future Potential

The brief introduction into thermodynamic characterisation of biological systems has tried to demonstrate a) the usefulness of such a treatment and b) the outstanding suitability of high sensitivity scanning microcalorimetry in providing model free energy parameters and furthering our insight into the domain structure of biological macromolecules. Continuing research in this field will contribute to our understanding of the thermodynamic basis of biological systems, which, in contrast to chemistry and physics, has been unduly neglected in biology.

REFERENCES

1. Degiorgio V., *Physics of Amphiphiles, Micelles and Microemulsions*, *Europhys. News* 16 (1985) 6.
2. Sturtevant J.M., *Physical Methods of Chemistry* (eds. A. Weissberger and B.W. Rossiter) Vol. 1 Part V (Academic Press, NY) 1971, pp. 227-253.
3. Privalov P.L., *Pure Appl. Chem.* 52 (1980) 479-497.
4. Freire E. and Biltonen R., *Biopolymers* 17 (1978) 463.
5. Gill S.J., Richey B., Bishop G. and Wyman J., *Biophysical Chemistry* 21 (1985) 1-14.
6. Privalov P.L., *Adv. Prot. Chem.* 35 (1982) 1-104.
7. Hinz H.-J., Filimonov V.V. and Privalov P.L. *Eur. J. Biochem.* 72 (1977) 79-86.
8. Nagle J.F., *Ann. Rev. Phys. Chem.* 31 (1980) 157-195.

1986 Hewlett-Packard Europhysics Prize

The 1986 Hewlett-Packard Europhysics Prize has been awarded to:

Professor Ferenc Mezei
of Budapest, Grenoble and Berlin (West)
for his invention and implementation of
Neutron Spin Echo Spectroscopy (*Europhys. News* 16 (1985) 4).

GRADUATE SUMMER COURSES ON COMPUTATIONAL PHYSICS

Lausanne, Beginning 1-10 September 1986

The Computational Physics Group of EPS has been organizing for the past ten years a Summer School and Workshop on Computing Techniques in Physics. This school which takes place in Czechoslovakia every second year, elicits a good response especially from eastern countries.

In 1984 the Board of CPG decided to organize another Summer School in Lausanne, Switzerland, tending much more towards a graduate course. This Graduate Summer Course on Computational Physics will start in 1986 with its first course on "Finite Elements in Physics". During eight days (1-10 September 1986), 48 lectures will be given including a basic course and going on to practical applications.

The course will be published as a whole volume in *Computer Physics Reports*. For 1988 a second Graduate Summer Course is foreseen on "Numerical Methods for Parallel Computers".

Further information is available from the Secretariat of the course:

Mme C. Antille, Centre de Recherches en Physique des Plasmas - EPFL
21, av. des Bains, CH - 1007 LAUSANNE, Switzerland

EPS Divisions, Sections and Group

Astronomy and Astrophysics Division
Solar Physics Section
Atomic and Molecular Physics Division
Atomic Spectroscopy Section
Chemical Physics
Electronic and Atomic Collisions
Molecular Physics
Computational Physics Group
Condensed Matter Division
Liquids Section
Low Temperature Physics Section
Macromolecular Physics
Magnetism
Metal Physics
Semiconductors and Insulators
Surfaces and Interfaces
High Energy & Particle Physics Division
Interdiv. Group on Physics for Development
Nuclear Physics Division
Optics Division
Plasma Physics Division
Quantum Electronics Division

Europhysics News is the official journal of the European Physical Society which comprises 29 National Societies, Academies and Group, over 3500 Individual Members and 73 Associate Members. Governing bodies of EPS are the General Meeting, Council and an elected Executive Committee responsible for detailed policy. EPS promotes the collaboration of physicists throughout Europe, organising and harmonising conferences and publications, improving physics education, encouraging physics applications, awarding scholarships to sponsored schools in Erice. EPS publishes in addition to *Europhysics News*, *Europhys. Conf. Abs.*, *Eur. Ed. News*, *Europhys. Lett.* (in partnership with national societies), *Eur. J. Phys.* (in partnership with The UK Inst. of Phys.). Individual Members receive *Europhysics News* free of charge (price to institutions: Sw.Fr. 90.-/a), rebates on the price of many publications and on conference fees. Annual EPS membership fee for Individual Members belonging to an EPS member society is: Sw.Fr. 44.-; independent members: Sw.Fr. 132.-; members of a Collaborating Society: Sw.Fr. 55.- (\$ 26).

Editor: E.N. Shaw

Editorial Board:

K. Appert, A. Baratoff, B. Jacrot,
G.R. Macleod, M. Mayor, J. Muller

Editorial and Advertising Office at the EPS
Secretariat

Address: EUROPEAN PHYSICAL SOCIETY
P.O. Box 69,
CH-1213 Petit-Lancy 2
Switzerland

Telephone: Geneva (22) 93 11 30

Telex: 423 455 dema ch

Cables: europhys genève

Printed by: Pflinter frères sa
CH-1213 Petit-Lancy/Switzerland