Introduction to the session:
"COMPUTING WITH BIOMOLECULES"

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As one of the sessions in PSB'97, this session is unique in that it was set up to provide an opportunity to present works that deal with the use, as computational units, of molecules that either occur naturally in living systems or that are manufactured in imitation of molecules that occur in living systems. In other words, the work presented in this session deals with what might be described as applications of biology and biochemistry to computing and to the broader understanding of the nature of computation. Thus this session intends to deal with applications in the direction opposite to that of the other sessions in PSB series.

More specifically, this session consists of three presentations. They concern biomolecular behaviors that may be incorporated into computations, used as computations, or viewed as computations.

The first paper concerns an incorporation of the protein bacteriorhodopsin into an artificially constructed light sensitive receptor which provides visual input to computational processes. This work links naturally occurring biomolecular behavior with conventional silicon hardware.

The second paper provides a new conceptual approach to the use of DNA molecules and enzymes to implement algorithmic computations. The naturally occurring actions of restriction enzymes and ligases on DNA molecules are shown to provide a basis for universal test tube 'wet' computing.

Using newly created formal models, the third paper reports the computational generative capabilities of three mobile behaviors exhibited by subsegments of DNA molecules. This work, which was inspired by considerations of genome evolution, establishes relationships in generative power among the operations of inversion, transposition, and duplication.

(Presentation #1:)
Towards a BacterioRhodopsin-Silicon Neuromorphic Photosensor
by C.H. Martin, Z.P. Chen, and R.R. Birge
> W.M. Keck Center for Molecular Electronics and the Department of
> Chemistry, Syracuse University, Syracuse, New York 13244, USA

(Presentation #2:)
Test Tube Systems with Cutting/Recombination Operations
by Rudolf Freund (`rudi@logic.tuwien.ac.at`)
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> Schwartzspanierstr. 17, 1090 Wein, Austria

(Presentation #3:)
On Some Operations Suggested by Genome Evolution
by Jurgen Dassow (`dassow@irb.cs.uni-magdeburg.de`)
> Faculty of Computer Science, University of Magdeburg, P.O.Box 4120,
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Finally, we would like to thank all of those who contributed to making this session possible by submitting their work or reviewing submissions.