Energy Landscapes in CASP

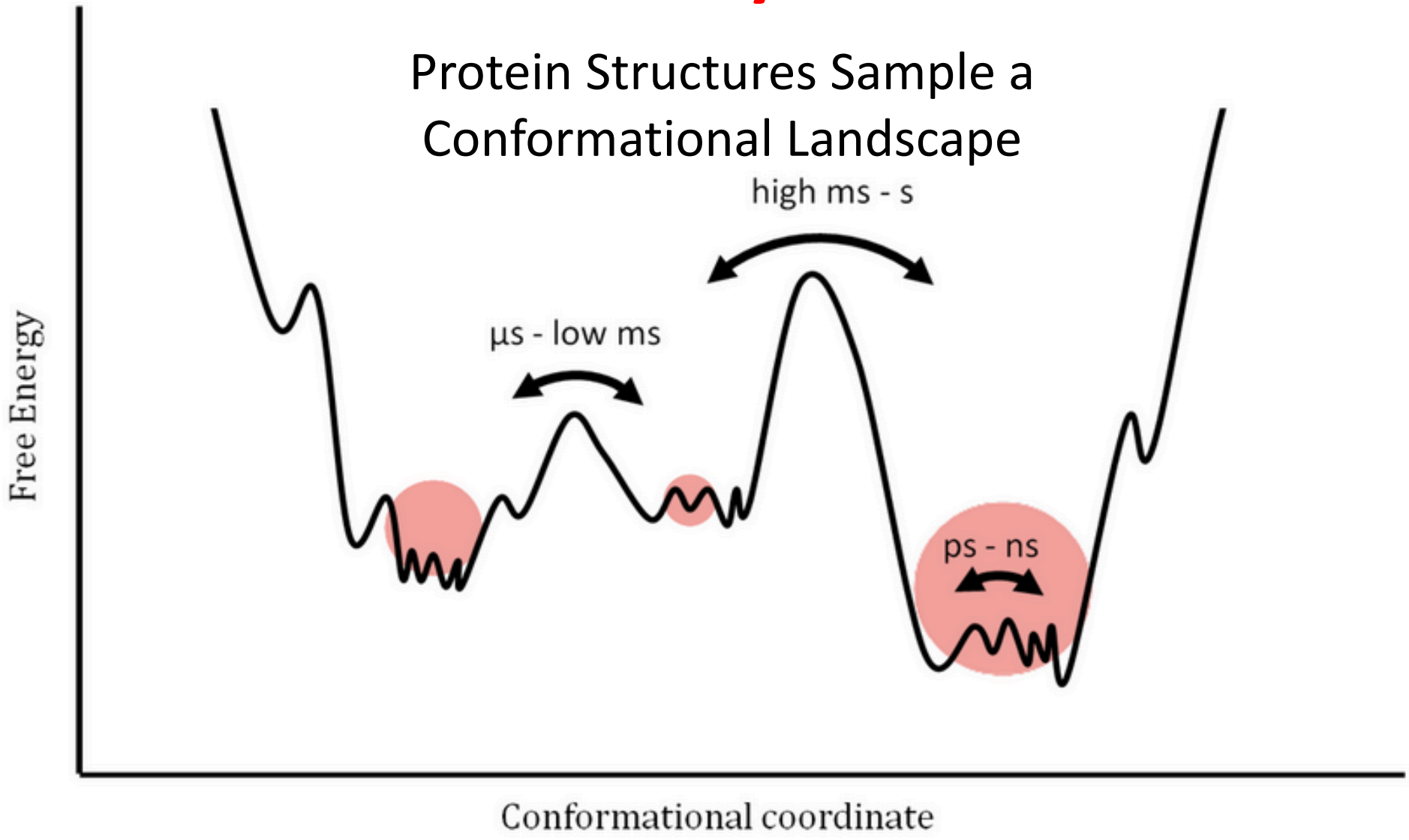
Gaetano T. Montelione

CASP Webinar

October 4, 2018

Protein Dynamics

Protein Structures Sample a Conformational Landscape



www.mdpi.com

doi:10.1016/j.jmb.2006.11.085 J. Mol. Biol. (2007) 366, 1661–1671

JMB

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Conformational Transitions of Adenylate Kinase: Switching by Cracking

Paul C. Whitford[1], Osamu Miyashita[2], Yaakov Levy[3] and José N. Onuchic[1]*

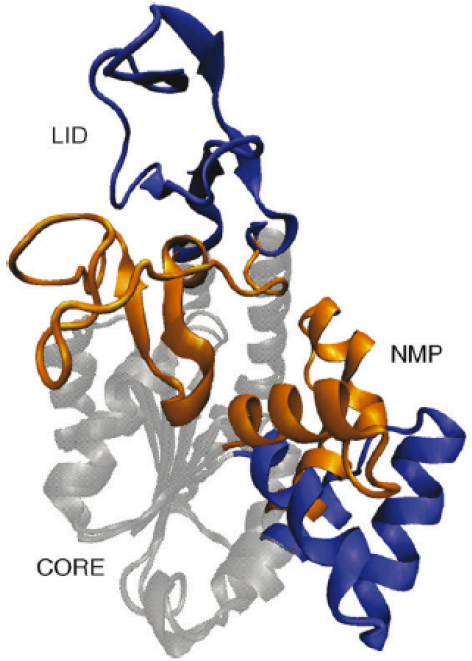

Figure 1. Functionally Relevant Conformations of AKE. Structure of the open (blue)[42] and closed (orange)[5] forms of AKE, with the CORE domain spatially aligned (grey). ATP binds in the pocket formed by the LID and CORE domains. AMP binds in the pocket formed by the NMP and CORE domains. Figure prepared with Visual Molecular Dynamics.[43]

doi:10.1006/jmbi.2001.4695 available online at http://www.idealibrary.com on IDEAL® *J. Mol. Biol.* (2001) **309**, 961–974

JMB

Ligand-induced Structural Changes to Maltodextrin-Binding Protein as Studied by Solution NMR Spectroscopy

Johan Evenäs, Vitali Tugarinov, Nikolai R. Skrynnikov, Natalie K. Goto Ranjith Muhandiram and Lewis E. Kay*

Open
β-cyclodextrin-bound
1dmb

Closed
maltotriose-bound
3mbp

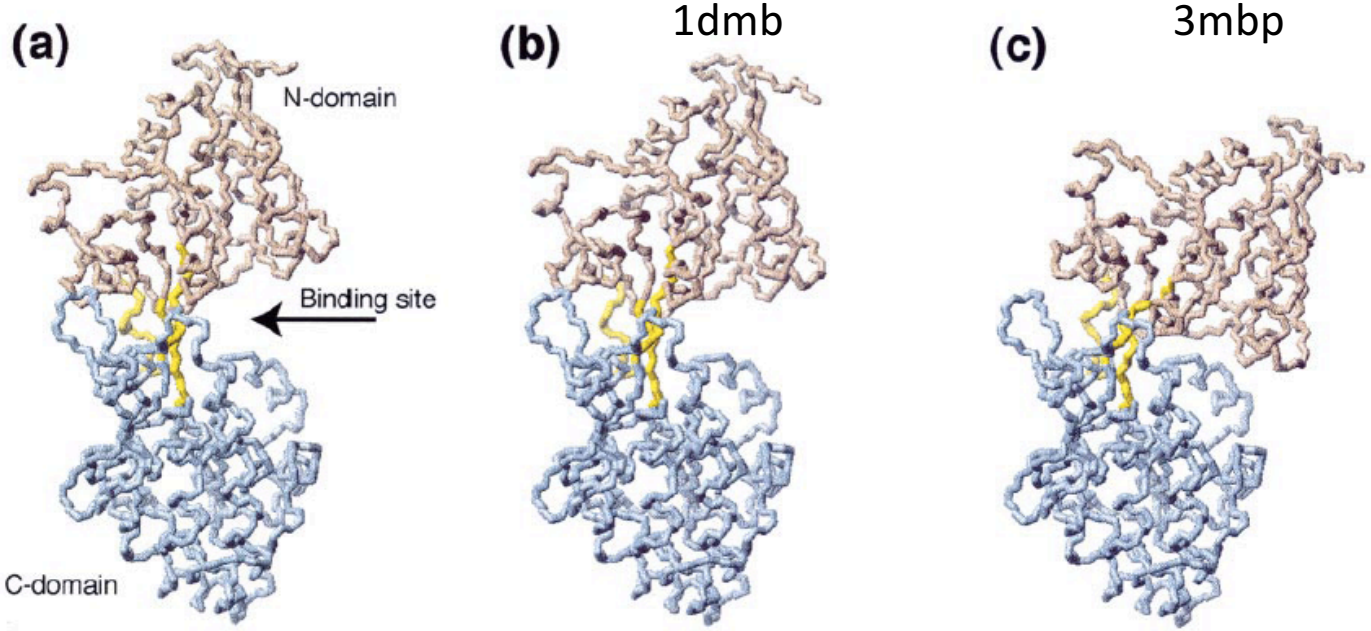

Figure 5. Structural models of the solution conformations of MBP. Backbone representations of the models are shown for the (a) apo state, (b) the β-cyclodextrin-bound state and the (c) maltotriose-bound state of MBP with the C-domain (114-258, 316-370) of each structure aligned. The Figure is produced so that the horizontal and vertical axes

Multiple helical conformations of the helix-turn-helix region revealed by NOE-restrained MD simulations of tryptophan aporepressor, TrpR

Balasubramanian Harish,[1] G.V.T. Swapna,[2] Gregory J. Kornhaber,[2] Gaetano T. Montelione,[2,3]* and Jannette Carey [1]*

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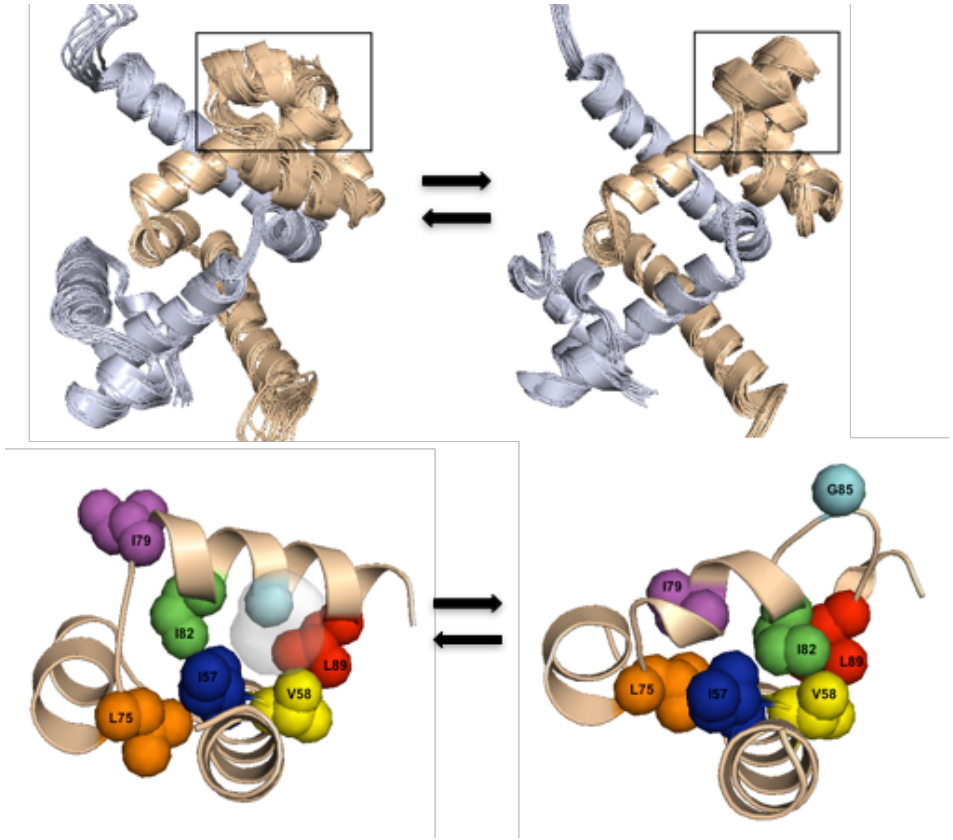
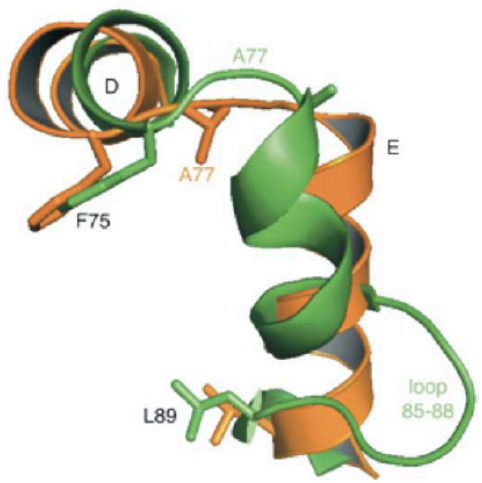




Harish et al. Proteins 2017, 85: 731

Biochemistry

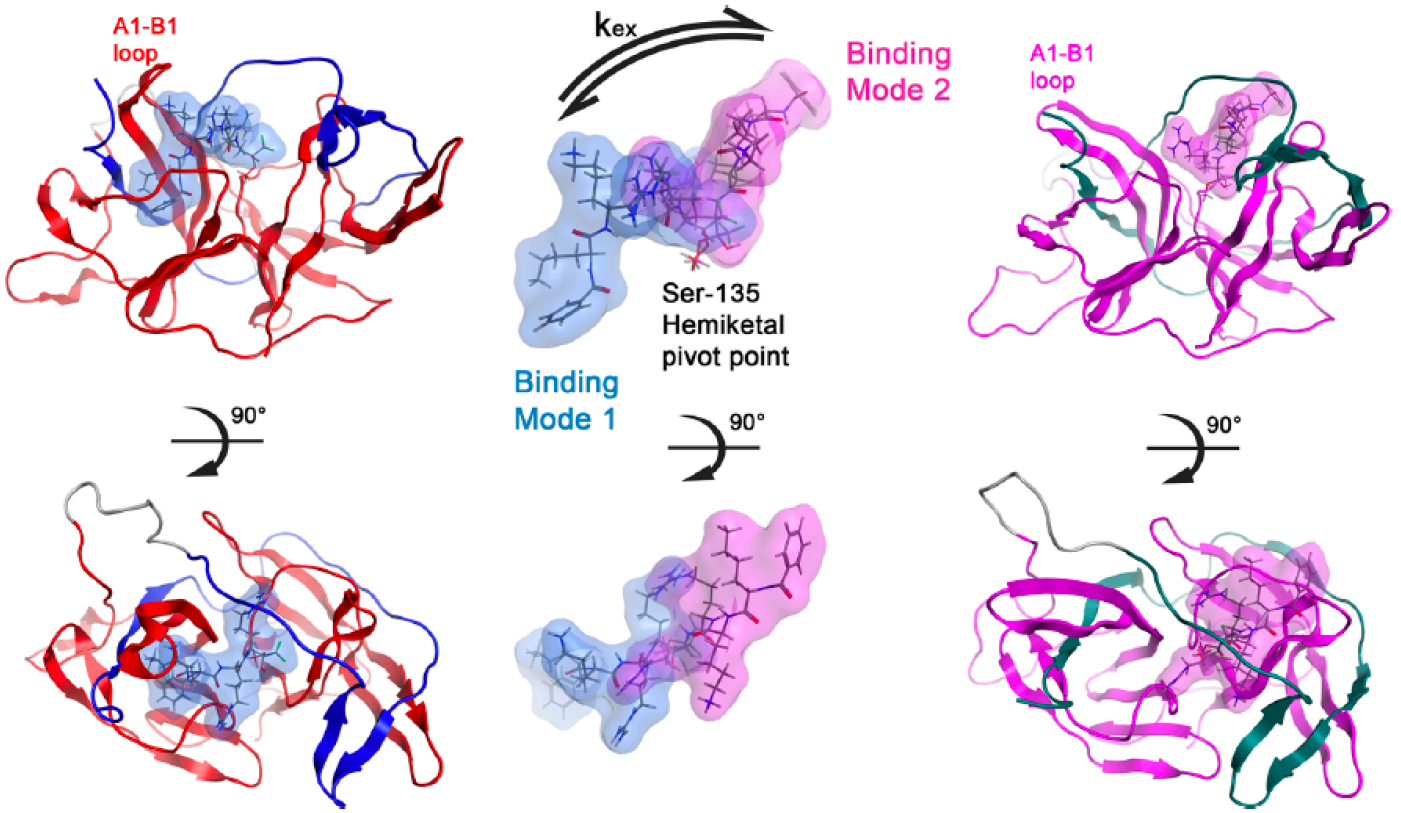
Article

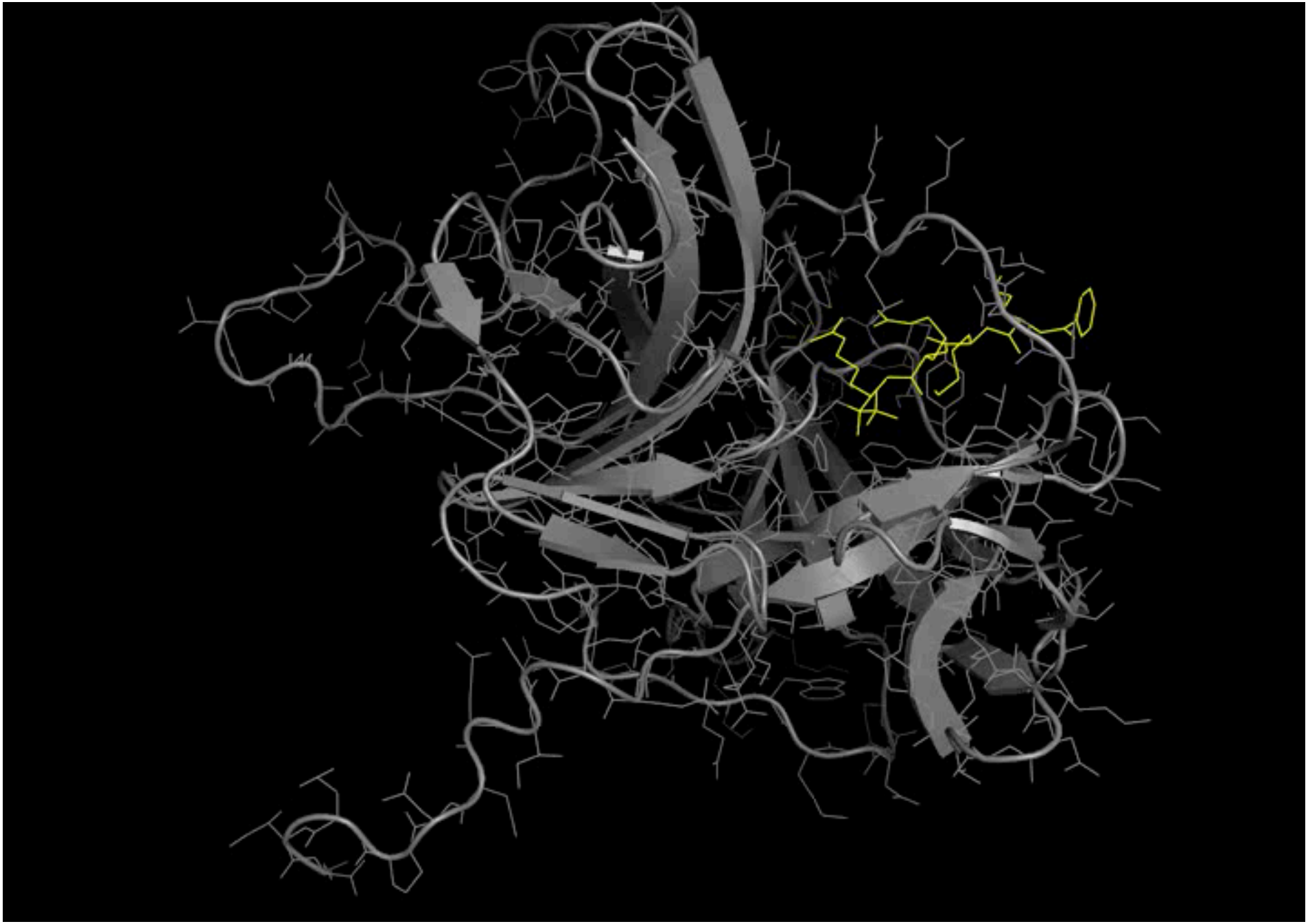
Cite This: Biochemistry 2018, 57, 1591−1602

pubs.acs.org/biochemistry

Inhibitor Bound Dengue NS2B-NS3pro Reveals Multiple Dynamic Binding Modes

Alan C. Gibbs,*,† Ruth Steele,*,† Gaohua Liu,‡ Brett A. Tounge,† and Gaetano T. Montelione‡,§,∥



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Methods Used to Study Conformational Distributions

- Fluorescence Spectroscopy
- NMR Spectroscopy
- Small Angle X-ray Scattering
- X-ray Crystallography
- Cryo Electron Microscopy

- Molecular Modeling and Simulation

RUTGERS
School of Arts and Sciences

Postdoctoral Position
Computational NMR: Protein Structure Modeling Using Combined NMR and Bioinformatics Data

A Postdoctoral position is open in the Center for Advanced Biotechnology and Medicine (CABM) at Rutgers, The State University of New Jersey in Piscataway, New Jersey.

This funded research project involves development of new computational methods for modeling protein structures combining NMR data together with advanced modeling methods.

The researcher will work jointly with the Nanda and Montelione groups to advance methods for molecular modeling using NMR data, and in applying structural biology, protein design, and bioinformatics methods to advance our understanding of prebiotic evolution. Specific goals include determining 3D structures and dynamics of proteins from sparse NMR and evolutionary sequence co-variance data, and structural analysis of proteins produced using *de novo* design methods.

The successful candidate would have expertise in computational molecular biophysics and/or biomolecular modeling. They would participate in computational projects using energy force fields, molecular dynamics, and novel conformational sampling techniques, combining NMR, SAXS, EPR, bioinformatics, and other experimental data to produce structural models of proteins. They would also lead our program on methods development for protein NMR structure assessment and validation. The successful candidate will also be trained in NMR data collection and analysis.

Rutgers University has extensive instrumentation for X-ray crystallography, NMR (two 800 MHz, 700 MHz, three 600 MHz, and two 500 MHz instruments), and cryoEM (Talos Arctica 200 kV Electron Microscope).

Additional information regarding CABM and Rutgers University can be obtained at:

http://www-nmr.cabm.rutgers.edu/

Interested candidates should forward a c.v. and names and contact information for three potential references to:

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CABM, Rutgers University
679 Hoes Lane
Piscataway, NJ 08856
e.mail: gtm@rutgers.edu

Or you may apply for this job online at:
http://jobs.rutgers.edu/postings/52855

Rutgers University is an Equal Opportunity / Affirmative Action Employer.
Women and minority candidates are encouraged to apply.