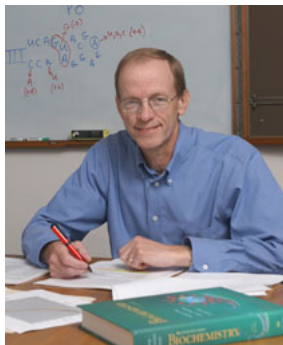


Syracuse University

College of Arts & Sciences

Philip N. Borer



Emeritus

Chemistry

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Research Interests

Biochemistry; nucleic acid structure and interaction, biosensors, nuclear magnetic resonance

Education

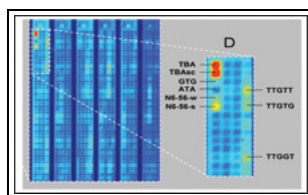
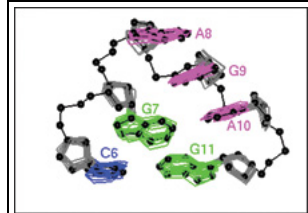
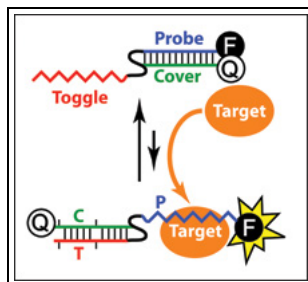
- B.S., 1967, University of Toledo
- Ph.D., 1972, University of California at Berkeley
- Postdoctoral Fellow, 1973-1975, Johns Hopkins University

Courses

- CHE 106: General Chemistry
- CHE 107: General Chemistry Laboratory
- CHE 546: Molecular Spectroscopy and Structure
- CHE 600: Perspectives in Biochemistry
- BCM 430/630: Journal in Molecular Pharmacology and Structural Biology
- BCM 484/684: Biomolecular Modeling

Research Focus

Layout of three images.



Drug discovery and diagnostics based on nucleic acid switches that respond to ligand interactions

Targets of particular interest for drug discovery include proteins from HIV and proteins involved in bleeding disorders, angiogenesis, cancer and other proliferative diseases. Biosensors are designed to detect the presence of environmental contaminants, terrorist threats, and proteins involved in chromatin remodeling.

Three-dimensional structures of RNA and RNA-protein complexes from HIV and other drug targets

3D structures are determined primarily by NMR methods. Of special interest are drug leads bound to protein targets where the leads have been discovered using high throughput screens based on molecular switch sensors.

Aptamer discovery and validation

Aptamers are DNA/RNA molecules that have affinities for their targets similar to antibodies. We are developing high throughput screens to simplify aptamer discovery. Microarray methods are used to measure the affinity of aptamers for their targets and to evaluate

off-target effects.

We manage the department's NMR facility and share equipment with the neighboring campuses of the SUNY College of Environmental Science and Forestry (ESF) and the SUNY Upstate Medical University. Students in my lab collaborate with members of the SU Chemistry and Biology departments, as well as other laboratories on University Hill. They are also exposed to entrepreneurial activity through Syracuse University's business incubator center.

Selected Publications

- Borer, P. N. and Hudson, B. S. (2009) *US Patent 7,521,546 "Branched and Multi-Chain Nucleic Acid Switches for Sensing and Screening."*
- DeCiantis, C. L.; Jensen, D. K.; Hudson, B. S.; Borer, P. N. A Nucleic Acid Switch Triggered by the HIV-1 Nucleocapsid Protein. *Biochemistry* **2007**, *46*, 9164-73.
- Boudreau, E. A.; Pelczer, I.; Borer, P. N.; Heffron, G. J.; LaPlante, S. R. Changes in Drug ¹³C NMR Chemical Shifts as a Tool for Monitoring Interactions with DNA. *Biophysical Chem.* **2004**, *109*, 333-344.
- Yuan, Y.-Q.; Kerwood, D. J.; Paoletti, A. C.; Shubsda, M. F.; Borer, P. N. The Stem of SL1 RNA in HIV-1: Structure and Nucleocapsid Protein Binding for a 1x3 Internal Loop. *Biochemistry* **2003**, *42*, 5259-5269.
- Shubsda, M. F.; Paoletti, A. C.; Hudson, B. S.; Borer, P. N. Affinities of Packaging Domain Loops in HIV-1 RNA for the Nucleocapsid Protein. *Biochemistry* **2002**, *41*, 5276-5282.

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