

# NICHOLAS J. ANTHIS, D.Phil.

*AAAS Science & Technology Policy Fellow*

Middle East Regional Cooperation Program, USAID

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## SUMMARY

- Postdoctorally trained biophysical/biomedical scientist with interests in policy, education, and science communication
- Science policy expertise in federal support of scientific research; international development and cooperation; health and biomedical science; and innovation, commercialization, and small businesses R&D
- Thirteen years of research experience; 16 peer-reviewed publications on protein structure, dynamics, and function and cell adhesion, migration, and signaling
- Ran a successful blog on science, policy, and politics
- Proven leadership in scientific and non-scientific settings; at home in varied work environments, including working with a multidisciplinary scientific grant program
- Analytical, strategic, resourceful, independently motivated, team player and leader, effective communicator

## EXPERTISE

### ***Science Policy, Business, Administration***

Project management, program evaluation, portfolio analysis, event planning and execution, scientific review, information management, partnerships, international development, Small Business Innovation Research (SBIR) programs, team leadership, scientific communication

### ***Scientific Techniques***

NMR spectroscopy, protein expression and purification, DNA cloning and mutagenesis, X-ray crystallography, fluorescence spectroscopy, calorimetry (ITC), tissue culture, cell migration, protein analysis, assay development

### ***Data Analysis & Scripting***

MATLAB, Origin, HTML and CGI scripting, Python, AWK

### ***Molecular Graphics, Structure Calculation, & NMR Data Analysis***

PyMOL, NMRPipe, Xplor-NIH, Sparky, XIPP, CCPN Analysis, Bruker pulse programming language

### ***Other Proficiencies***

Microsoft Excel, PowerPoint, and Word; Linux, MacOS, and Windows operating systems; Adobe Illustrator

## POSTDOCTORAL CAREER

### ***Middle East Regional Cooperation Program, Bureau for the Middle East, U.S. Agency for International Development, Washington, DC (Sep 2014-present)***

#### ***AAAS Science & Technology Policy Fellow***

I serve on a team that awards cooperative Arab/Israeli applied science grants in areas such as agriculture, water, health, and the environment. I review proposals, conduct site visits (across the Middle East), and manage our health and biomedical science portfolio. As an AAAS S&T Policy Fellow, I participate in a comprehensive professional development curriculum focused on building science policy knowledge and related skills. I co-organized a meeting in Amman, Jordan, for USAID-funded scientists across the Middle East region, focusing on expanding the impact of their scientific work (including communication, policy, and commercialization).

### ***Office of Translational Alliances and Coordination, NHLBI, NIH, Bethesda, Maryland (Sep 2015-Feb 2016)***

#### ***AAAS Science & Technology Policy Fellow on Detail***

As an AAAS S&T Policy Fellow, I pursued a short-term detail at NHLBI/OTAC, where I performed an evaluation of commercial and clinical outcomes of Small Business Innovation Research (SBIR) grants.

### ***Laboratory of Chemical Physics, NIDDK, National Institutes of Health, Bethesda, Maryland (Nov 2009-Sep 2014)***

#### ***Postdoctoral Fellow***

Research Supervisor: G. Marius Clore, M.D., Ph.D.

Theme: Visualizing transient and otherwise invisible states of proteins by NMR and other biophysical methods.

## EDUCATION

### ***University of Oxford, Oxford, United Kingdom (Sep 2005-Oct 2009)***

Doctor of Philosophy (D.Phil.)      Subject: Biochemistry      Funding: Rhodes Scholarship      College: Lincoln  
Research Supervisor: Iain D. Campbell, Ph.D., F.R.S.      Thesis Title: Structural Studies of Integrin Activation

### ***Texas A&M University, College Station, Texas (Sep 2001-May 2005)***

Bachelor of Science (B.S.)      Major: Biochemistry      Minors: Chemistry, Mathematics      GPR: 3.99  
Honors: Summa Cum Laude, University Honors, Foundation Honors, University Undergraduate Research Fellow

**HONORS, AWARDS, & FELLOWSHIPS**

- 2014 Science & Technology Policy Fellowship, AAAS**  
2012 Industrie Sapio Grant, Chianti/INSTRUCT Workshop on BioNMR
- 2011 NIDDK Nancy Nossal Fellowship Award**  
2011 Fellows Award for Research Excellence (FARE), NIH Fellows Committee  
2009 Recognized by *The Open Laboratory: The Best Science Writing on Blogs 2009*  
2008 Paper of the Week, *Journal of Biological Chemistry*  
2006 Recognized by *The Open Laboratory: The Best Writing on Science Blogs 2006*  
2006 Highly Accessed Article, *Molecular Cancer*  
2006 Top Five Science Blogger, *Nature*
- 2005 Rhodes Scholarship**  
2005 Earl Rudder Memorial Outstanding Student Award, Texas A&M University  
2005 Phi Beta Kappa Membership  
2005 Resolution of Commendation, Tarrant County  
2005 Certificate of Commendation, Fort Worth Independent School District  
2005 Best Opinion Column, *The Battalion*  
2005 Senior Merit Award, Texas A&M College of Agriculture and Life Sciences  
2005 Outstanding Senior, Gamma Sigma Delta Texas A&M Chapter  
2004 Best Honors Thesis in the Biological Sciences, Texas A&M Undergraduate Research Fellows Program
- 2003 Barry M. Goldwater Scholarship**  
2003 Sigma Aldrich Outstanding Junior, Texas A&M Department of Biochemistry and Biophysics  
2003 College of Agriculture and Life Sciences Outstanding Junior, Texas A&M University  
2003 L.T. Jordan Institute Fellowship, Texas A&M University  
2003 Summer University Undergraduate Research Fellowship, Texas A&M University  
2002 Sophomore Scholarship Award, Gamma Sigma Delta Texas A&M Chapter

**RESEARCH TRAINING*****Protein NMR Research with G. Marius Clore, M.D., Ph.D. (Nov 2009-Sep 2014)*****NIH, NIDDK, Laboratory of Chemical Physics**

Employed cutting-edge NMR methods (paramagnetic relaxation enhancement, relaxation dispersion, saturation transfer) to explore transient states and other biological systems traditionally inaccessible to structural biology. Other techniques include fluorescence, calorimetry, small-angle X-ray scattering. Main projects focused on calcium signaling, particularly how transient, invisible states of calmodulin contribute to its function. Recent work focuses on understanding protein aggregation in Huntington's disease. First-author publications in *JACS* and *Protein Science* and a review in *Quarterly Reviews of Biophysics*, plus several contributing authorships.

***Structural Biology Research with Iain D. Campbell, Ph.D., F.R.S. (Sep 2005-Oct 2009)*****University of Oxford, Department of Biochemistry**

Used NMR, X-ray crystallography, and other methods to analyze protein-protein interactions in focal adhesions, with the ultimate goal of better understanding cellular adhesion and migration, processes necessary for normal growth, development, and functioning, but also involved in a variety of pathogenic conditions, most notably cancer. Solved a protein-protein complex structure by crystallography. Broad expertise in a variety of molecular, structural, and biophysical methods. Coordinated multiple scientific collaborations. First-author publications in *EMBO Journal*, *JBC*, and *Structure*, plus several contributing authorships.

***Molecular Biology Research with George E. Davis, M.D., Ph.D. (May 2002-May 2005)*****Texas A&M University College of Medicine, Department of Pathology and Laboratory Medicine**

Used tissue culture and DNA methods to study blood vessel development, especially vascular cell migration. Dissected a GPCR signaling pathway initiated by a lipid growth factor. Publications in *The Journal of Cell Biology* and *Molecular Cancer*. Wrote a senior honors thesis. Presented research at the 2004 annual American Society for Cell Biology conference in Washington, DC.

***Assay Development Research with Michael Crouch, Ph.D. (Jun 2003-Aug 2003)*****TGR BioSciences, Adelaide, South Australia**

Developed assay for measuring intracellular calcium levels for studying cell signaling

***Molecular Genetics Research with Gary R. Kunkel, Ph.D. (Jan 2002-May 2002)*****Texas A&M University, Department of Biochemistry and Biophysics**

Used molecular biology methods to study transcription factors

**RESEARCH STUDENTS TAUGHT*****Department of Biochemistry, University of Oxford (Jan 2007-Sep 2009)***

**Benjamin Oestringer** - Undergraduate, Oct 2008-Sep 2009 (Currently: senior scientist, Immunocore Limited)

**Massimiliano Memo, Ph.D.** - Undergraduate, Sep 2007-Jun 2008 (Currently: field marketing specialist, VWR)

**Alison Takemura** - Undergraduate, Jun-Aug 2007 (Currently: graduate student, MIT)

**Misty Watson Shields, Ph.D.** - Undergraduate, Jan-May 2007 (Currently: medical student, UT Houston)

**CLASSROOM TEACHING & EDUCATIONAL TRAINING*****FAES Graduate School, National Institutes of Health (Sep 2013-May 2014)*****Lead Instructor**

Coordinated a class on Concepts in Science for the MCAT for students at NIH. Taught the General Chemistry and Organic Chemistry portions and coordinated classes for the other subjects.

***The Princeton Review (May 2013-Aug 2014)*****Tutor (Jul 2013-Aug 2014), Instructor (May 2013-Aug 2014)**

Taught and tutored in General Chemistry and Organic Chemistry for MCAT test preparation.

***Department of Biochemistry, University of Oxford (Jan 2006-Jul 2009)*****Tutor (Oct 2006-Jul 2009)**

Taught a Biophysical Chemistry course for first-year biochemistry undergraduate students—a quantitative introduction to physical chemistry fundamentals and applications to biology. Conducted additional tutorials.

**Practical Demonstrator (Jan 2006-Feb 2009)**

Taught a Protein Purification practical for second-year biochemistry undergrad students during 2006, 2007, 2008, and 2009, and a Molecular Genetics practical for second-year students during 2006.

***Partnership for Environmental Education and Rural Health (May-Dec 2004)*****PEER Undergraduate Fellow**

Worked on NSF-funded program, run by Larry Johnson, to improve math and science education in rural middle schools. Primarily prepared materials and lesson plans for teachers, but also taught middle school students.

***Wakonse South Conference (Apr 2002, 2003, 2004)***

Invited 3 times by A&M professors to attend weekend conference on pedagogical methods in higher education.

**LEADERSHIP & SERVICE*****Higher Education and Research Administration (HERA) Affinity Group (Mar 2015-present)*****Founder, President (Jul 2015-present)**

Founded group of AAAS S&T Policy Fellows focused on the higher education and scientific research enterprise. Planning seminars, workshops, and discussion groups; aim to produce policy recommendations.

***Science Diplomacy Affinity Group (Sep 2014-present)*****Deputy Chair (Jun 2015-present)**

Part of group of AAAS S&T Policy Fellows focused on science diplomacy issues. Helped organize careers panel and two major symposia on current science diplomacy topics (Cuba and Syria).

***NIH Science Policy Discussion Group (Sep 2010-Jun 2012)***

Met twice monthly to discuss issues in science policy, including health, medicine, bioethics, funding, law, and climate change. Led session on drug and addiction policy and on gene patenting and intellectual property.

***Oxford University Biochemical Society (Feb 2006-Dec 2008)*****Treasurer (Feb 2006-Jun 2008)**

Monitored finances and assisted in general programming for an academic society. Programs featured research presentations by scientists, including Nobel Laureates, presentations on science policy, and a career day.

***Subcommittee on a Common First Year Experience (Jan-May 2005)***

Met weekly to formulate a report for university president about improving the experience of freshman students.

***Honors Program Advisory Committee (Aug 2004-May 2005)***

Assisted in setting goals and policy for the Texas A&M University Honors Program.

***Honors Student Council (Sep 2001-May 2005)*****President (May 2004-May 2005), Executive VP (May 2003-May 2004), VP of Social Activities (Jan-May 2003),****Delegate to the College of Agriculture and Life Sciences (Sep 2001-May 2002)**

Organized programs to increase community and exchange of ideas within the University Honors Program and awareness of the Honors Program. Led presentations at NCHC and Great Plains honors conferences.

***Search Committee for Associate Dean for Undergraduate Research (Sep-Nov 2004)***

Interviewed and recommended candidates for the position.

**JOURNALISM, JOURNAL EDITING, BLOGGING, & THE WEB*****NickAnthis.com (Jul 2010-present)*****Personal Website**

Includes tools for NMR and molecular biology researchers, including calculators for extinction coefficients, rotational correlation times, relaxation rates, and paramagnetic relaxation enhancement rates.

***Science & Diplomacy (Sep 2015-Feb 2016)*****Associate Editor**

Reviewed and edited submissions on topics in science diplomacy.

***The Scientific Activist, <http://scienceblogs.com/scientificactivist> (Jan 2006-May 2010)*****Founder, Owner, and Blogger**

Founded a 10,000-visitor-per-month website featuring news and commentary on science and politics. Named one of the Top Five Science Blogs on the internet by *Nature* magazine.

***The Battalion, Texas A&M University's Student Newspaper (Jan-May 2005)*****Science Writer**

Wrote feature articles on local, national, and international science news. Also wrote opinion articles.

**ATHLETIC LEADERSHIP*****USTA League Tennis (Jan 2012-present)*****Team Captain**

Served as captain for many recreational league tennis teams. Advanced to the 3.0 Men's and 6.0 Mixed Doubles USTA National Championships in 2013.

***World Team Tennis (Jul 2012-Aug 2014)*****Team Captain**

Advanced to the 3.0 WTT National Championship in 2014.

**SCIENTIFIC & TECHNICAL TALKS**

- "The Middle East Regional Cooperation (MERC) Program", various locations, 2015-2016.
- "NHLBI SBIR Commercial & Clinical Outcomes: Analysis of Phase II Grantees, 2008-2010", National Institutes of Health, Bethesda, MD, 11 February 2016.
- "Visualizing sparsely populated states in calcium signaling by NMR", various locations, 2011-2014.
- "Expression and selective modification of small peptides", *Coordination Action NMR-Life: Workshop on Biomolecular NMR Sample Preparation*, Oxford, UK, 22 July 2008.
- "Probing integrin activation at the atomic level: NMR studies of protein-protein interactions involving the  $\beta$  integrin tail", *MCR Co-Operative Workshop: The Extracellular Matrix: Complex Interactions in Health and Disease*, Oxford, UK, 11 October 2007.
- "Undergraduate Research: Solving Puzzles or Solving Mysteries?" *Undergraduate Research Fellows Convocation*, Texas A&M University, College Station, TX, 11 September 2007.
- "Antiviral agents", *Lechner Lecture Series*, Texas A&M University, College Station, TX, 23 January 2002.

**SCIENTIFIC PUBLICATIONS**

17. Anthis N.J. & Clore G.M. (2015) Visualizing transient dark states by NMR spectroscopy, *Quarterly Reviews of Biophysics*, **48**, 35-116.
16. Anthis N.J. & Clore G.M. (2013) The length of the calmodulin linker determines the extent of transient interdomain association and target affinity, *Journal of the American Chemical Society* **135**, 9648-51.
15. Anthis N.J. & Clore G.M. (2013) Sequence-specific determination of protein and peptide concentrations by absorbance at 205 nm, *Protein Science* **22**, 851-8.
14. Grishaev A., Anthis N.J., Clore G.M. (2012) Contrast-matched small-angle X-ray scattering from a heavy-atom-labeled protein in structure determination: application to a lead-substituted calmodulin-peptide complex, *Journal of the American Chemical Society* **134**, 14686-9.
13. Anthis N.J., Doucleff M., Clore G.M. (2011) Transient, sparsely populated compact states of apo and calcium-loaded calmodulin probed by paramagnetic relaxation enhancement: interplay of conformational selection and induced fit, *Journal of the American Chemical Society* **133**, 18966-74.
12. Fawzi N.L.\*, Fleissner M.R.\*, Anthis N.J.\*, Kalai T., Hideg K., Hubbell W.L., Clore G.M. (2011) A rigid disulfide-linked nitroxide side chain simplifies the quantitative analysis of PRE data, *Journal of Biomolecular NMR* **51**, 105-14.
11. Anthis N.J. & Campbell I.D. (2011) The tail of integrin activation, *Trends in Biochemical Sciences* **36**, 191-8.
10. Anthis N.J., Wegener K.L., Critchley D.R., Campbell I.D. (2010) Structural diversity in integrin/talin interactions, *Structure* **18**, 1654-66.

9. Kalli A.C., Wegener K. L., Goult, B.T., Anthis N.J., Campbell I.D., Sampson, M.S.P. (2010) The structure of the talin/integrin complex at a lipid bilayer: an NMR and MD simulation study, *Structure* **18**, 1280-8.
  8. Anthis N.J., Haling J.R., Oxley C.L., Memo M., Wegener K.L., Lim C.J., Ginsberg M.H., Campbell I.D. (2009)  $\beta$  integrin tyrosine phosphorylation is a conserved mechanism for regulating talin-induced integrin activation, *Journal of Biological Chemistry* **284**, 36700–10.
  7. Goult B.T., Bouaouina M., Harburger D.S., Bate N., Patel B., Anthis N.J., Campbell I.D., Calderwood D.A., Barsukov I.L., Roberts G.C., Critchley D.R. (2009) The structure of the N-terminus of kindlin-1: a domain important for  $\alpha$ IIb $\beta$ 3 integrin activation, *Journal of Molecular Biology* **394**, 944-56.
  6. Anthis N.J., Wegener K.L., Ye F., Kim C., Goult B.T., Lowe E.D., Vakonakis I., Bate N., Critchley D.R., Ginsberg M.H., Campbell I.D. (2009) The structure of an integrin/talin complex reveals the basis of inside-out signal transduction, *The EMBO Journal* **28**, 3623-32.
  5. Goult B.T., Bate N., Anthis N.J., Wegener K.L., Gingras A.R., Patel B., Barsukov I.L., Campbell I.D., Roberts G.C., Critchley D.R. (2009) The structure of an interdomain complex that regulates talin activity, *Journal of Biological Chemistry* **284**, 15097-106.
  3. Oxley C.L., Anthis N.J., Lowe E.D., Vakonakis I., Campbell I.D., Wegener K.L. (2008) An integrin phosphorylation switch: the effect of  $\beta$ 3 integrin tail phosphorylation on Dok1 and talin binding, *Journal of Biological Chemistry* **283**, 5420-6.
  2. Fisher K.E., Pop A., Koh W., Anthis N.J., Saunders W.B., Davis G.E. (2006) Tumor cell invasion of collagen matrices requires coordinate lipid agonist-induced G-protein and membrane-type matrix metalloproteinase-1-dependent signaling, *Molecular Cancer* **5**, 69.
  1. Saunders W.B., Bohnsack B.L., Faske J.B., Anthis N.J., Bayless K.J., Hirschi K.K., Davis G.E. (2006) Coregulation of vascular tube stabilization by endothelial cell TIMP-2 and pericyte TIMP-3, *The Journal of Cell Biology* **175**, 179-91.
- \*These authors contributed equally to this work.

#### **OTHER PEER-REVIEWED PUBLICATIONS**

4. Batts S.A., Anthis N.J., Smith T.C. (2008) Advancing science through conversations: bridging the gap between blogs and the academy, *PLoS Biology* **6**, e240.

#### **ACADEMIC THESES**

- Anthis N.J. (2009) *Structural Studies of Integrin Activation*, University of Oxford, D.Phil. thesis.
- Anthis N.J. (2004) *Sphingosine-1-Phosphate Inhibits the Migration of Vascular Smooth Muscle Cells by Activating RhoA and G<sub>α12</sub>*, Texas A&M University, undergraduate senior honors thesis.

#### **OTHER PUBLICATIONS (NON-ACADEMIC)**

- Anthis, Nick. "Why H1N1 ('Swine') Flu Is Resistant to Adamantane Drugs" *The Open Laboratory: The Best Science Writing on Blogs 2009*, Ed. SciCurious, Chapel Hill, NC: Lulu, 2010: 82-85.
- Anthis, Nick. "Why Is No One Talking About Convenience?" *Fort Worth Star-Telegram*, October 12, 2009: 13A.
- Anthis, Nick. "Bringing Academia and Blogging Closer Together" *Phenotype: the Oxford University Biochemical Society Journal*, Fall 2008: 17-18.
- Anthis, Nick. "Removing a Science Censor at NASA" *The Open Laboratory: The Best Writing on Science Blogs 2006*, Ed. Bora Zivkovic, Chapel Hill, NC: Lulu, 2007: 147-152.
- Anthis, Nick. "In the Line of Fire" *Isis Magazine* (Oxford, UK), Spring 2006: 13-15.