THE iNFORMER
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Announcements

PREPARING YOUR APPLICATION PACKAGE

Building 10, Lipsett Amphitheater
Aug 28, 2013 2:00 pm - 4:00 pm
https://www.training.nih.gov/events/view/_2/1159/Academic_Job_Search_Preparing_Your_Application_Package

ACADEMIC JOB INTERVIEWS

Building 50, Room 1227
Sep 23, 2013 2:00 pm - 4:00 pm
https://www.training.nih.gov/events/view/_2/1161/Academic_Job_Interviews

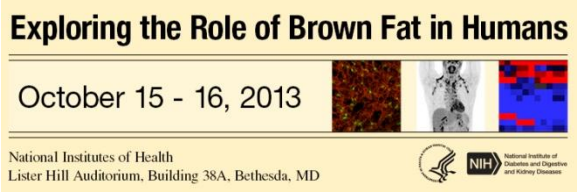
HOW TO ASK FOR WHAT YOU NEED IN THE LAB AND IN LIFE

Natcher Conference Center, Room D
Sep 17, 2013 10:00 am - 12:00 pm
https://www.training.nih.gov/events/view/_2/1171/Speaking_Up_How_to_Ask_for_What_You_Need_in_the_Lab_and_in_Life

AAAS SCIENCE & TECHNOLOGY FELLOWSHIPS

http://fellowships.aaas.org/04_Become/04_Application.shtml
The deadline to apply is November 1, 2013, 5:00 p.m. EST

NIDDK Conferences/Seminars



http://www2.niddk.nih.gov/News/Calendar/HumanBAT2013.htm

http://www2.niddk.nih.gov/News/Calendar/Wound2013.htm

The forest *and* the trees – OITE Workplace Dynamics Series I and II

Christine C. Krieger

While the rainforests comprise less than 1% of the world's surface area, they contain some of the greatest ecological diversity. Judging from the cacophony rising from the group of fellows assembled to take the Workplace Dynamics Seminars, the same could be said of scientists, who comprise less than 10% of the US labor force but are as varied as species of frogs littering the jungle.

The Workplace Dynamics seminars are the first part of the Leadership training series offered by OITE. The first two seminars, "Self-Awareness" and "Communication, Learning, & Influencing Others," are based on the Myers-Briggs Type Indicator (MBTI) personality types. In the "Self-Awareness" seminar, an MBTI assessment is taken beforehand, and you, along with about fifty other people, go through the results of your test. The second seminar focuses on your interactions with others. You are assigned to groups based on your personality and work/discuss questions involving your preferences in the workplace.

Even those who have already taken an MBTI assessment would find the first seminar insightful. Not only does Julie Gold, the OITE Leadership and Professional Development Coach, provide rich, concrete examples comparing and contrasting each personality indicator, but having this discussion in a group setting allows you to see how other people interpret the same information. Hearing the type of questions other people ask and how they ask them is a fascinating glimpse into other people's thought processes.

Those who enjoy interacting with people who tend to agree with their personal views would really appreciate the second seminar. Much of the discussion centers around your preferred work environment or learning style, and having your viewpoints validated by those around you is comforting. However, the most interesting part of the session is hearing what other groups have to say and discussing ways in which those with opposing styles can find a compromise in the workplace. Through the second session, you learn that the MBTI assessment is more than a test, but a tool. Even though you have a preference, you can consciously choose which personality type is appropriate to display depending on the situation.

The diversity of personalities attending the Workplace Dynamics seminars underscores the importance of learning how to accept people whose perspectives vastly differ from your own. One might think that the advanced education and extensive training postdocs must receive to reach this level would have a homogenizing effect on personalities, or that only certain personality types are drawn to the sciences. Yet the opposite appears to be true. Even at the NIH, where the sample is already skewed towards scientists attracted to the biological/biomedical field, every personality type is well represented. What our advanced education and extensive training should do is endow us with the mental flexibility to accommodate the multiple ways our compatriots use to achieve everyone's common goal, scientific progress.

So be proud of who you are and the niche you created for yourself, but do not forget that the power of the jungle comes from each species finding a balance with the other. Embrace the diversity of the people working around you, and perhaps you can avoid extinction.

For more information.....

OITE Leadership Series
https://www.training.nih.gov/leadership_training

Center for Creative Leadership
http://www.ccl.org/leadership/index.aspx

Myers-Briggs Type Indicator
http://myersbriggs.org/my-mbti-personality-type/mbti-basics/

Making the right moves
http://www.hhmi.org/educational-materials/lab-management

Scientific misconduct is on the rise – What is being done?

By Joseph P. Tiano

The history of scientific research is littered with infamous cases of scientific misconduct; for example, the Piltdown Man (1912), Nazi doctors performing medical experiments on prisoners (1940s), and the Tuskegee Syphilis Study (1932-72). The problem still persists; in fact it is on the rise. A study published last year in *The Proceedings of the National Academies of Sciences* reported that scientific misconduct accounted for 67% of paper retractions in the life sciences. Forty-three percent of those retractions were due to fraud (the other 24% was plagiarism) – a 10-fold increase from 1975.

There are many different types of scientific misconduct, ranging from the standard definition of fabrication, falsification, and plagiarism to the more audacious methods of double publication and self-review. Self-review, first reported in September 2012, is when a scientist serves as a peer reviewer for their own paper. The scientist submits their paper for scientific review, suggesting a peer reviewer with an e-mail address that they own. They then write a positive review for their own paper. Unfortunately, the types of scientific misconduct are numerous and expanding; and they have consequences far exceeding the loss of credibility.

A few examples from the last decade highlight the myriad of negative consequences that result from scientific misconduct. The most (in)famous case of scientific misconduct in the life sciences belongs to Woo-Suk Hwang of Seoul National University. He published two no-longer-seminal papers in *Science* in 2004 and 2005 reporting the generation of the first human embryonic stem cell line using somatic cell nuclear transfer. Not only was the data fabricated but two lab members provided the oocytes for the experiments. Both papers were retracted and he was officially dismissed from the University in 2006. However, he continues to research and publish papers, prompting the questions of "what is an appropriate punishment for scientific misconduct" and "can a researcher found guilty of scientific misconduct still be trusted?"

The most widely publicized case of scientific misconduct turned out to be nothing but fodder for the media – no misconduct occurred. On November 17, 2009 hackers stole thousands of e-mails from the University of East Anglia's Climatic Research Unit and posted them online. Bloggers cried fraud, the media picked up the story and in less than 24-hours "Climategate" was born. This non-scandal is being highlighted here because it exemplifies 1) how quickly scientific misconduct can morph and spread in today's internet-driven society,
2) how the public's opinion on science and scientists can be swayed by (alleged) scientific misconduct and 3) how the political system can be influenced by reports of scientific controversy. Following climategate, even after it was reported that no scientific misconduct occurred, the public's opinion on climate change and climate scientists quickly soured. A Gallup poll showed that between 2009 and 2010 the percentage of people who thought climate change was caused by "human activities" dropped from 58% to 50%, those who thought "most scientists believe global warming is occurring" dropped from 65% to 52% and those who thought that "scientists are unsure about global warming" increased from 26% to 36%. Peer-reviewed literature supports these poll results; 13% of American adults said climategate made them more certain global warming is not happening and reduced their trust in climate scientists. Even more damaging was that prominent U.S. politicians cited (and continue to do so) climategate as evidence that global warming is not occurring to support legislation opposing reforms to greenhouse gas emissions and calling for the U.S. Environmental Protection Agency to be eliminated. Climategate should not be looked at as an isolated incident but rather as a lesson of what the life sciences could experience in the future.

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Perhaps the most damaging case of scientific misconduct in the life sciences was Andrew Wakefield's 1998 paper in *The Lancet* linking the measles-mumps-rubella (MMR) vaccine to autism. He was found guilty of serious professional misconduct for secretly accepting money from lawyers preparing a lawsuit against MMR vaccine manufactures and for falsifying the medical histories of the patients in his study. Although his paper was retracted in 2010 (partially retracted in 2004) it still received over 100 citations since then. More startling is that various news agencies and medical journals found an association (not causation) between Wakefield's fraudulent MMR vaccination-autism claims and a decrease in MMR vaccination rates and corresponding increase in measles cases in Britain and the U.S. Scientific misconduct has real-life implications that go far beyond the laboratory to negatively affect people.

Scientific misconduct hurts scientists and the public on multiple levels. Time and money are wasted chasing hypotheses based on fabricated data and scientific misconduct accusations erode the public's trust. Not only does the public, through their taxes, fund a majority of research but they generously volunteer by the thousands for clinical trials that are instrumental in bringing science "from the bench to the bedside." Compared to other professions, scientists enjoy a tremendously high level of public trust and they cannot afford to become complacent and squander that trust.

Scientists, journals and governments have taken active steps to prevent scientific misconduct. In 2008 the non-profit CrossRef launched its revolutionary plagiarism detection software called CrossCheck, which compares submitted manuscripts to a database of over 25 million published articles. Participants include major publishers Elsevier, Springer and Nature Publishing Group. In some instances journals using CrossCheck are rejecting 6-10% of submitted papers because of plagiarism. In lieu of an official database tracking paper retractions – which does not exist. In August 2010 Adam Marcus, managing editor of *Anesthesiology News*, and Ivan Oransky, executive editor of *Reuters Health*, started a blog called Retraction Watch, which serves as an informal repository for retractions. Many universities have implemented mandatory ethics training and classes for graduate students, postdoctoral fellows and professors. The National Institutes of Health – the major life sciences funding source in the U.S. – mandates that all graduate students and postdoctoral fellows being supported by their funding take ethics training.

Additional steps can still be taken. Several feasible ideas have been proposed to combat scientific misconduct, none of which have yet been initiated. A way to increase research transparency would be for journals to publish reviewer comments online with the final version of the paper, similar to how supplementary information is presented. To increase the incentive for journals to be more diligent in their review process and to provide authors with a means of judging journal integrity, journals can adopt two proposed indices, similar to the impact factor. The retraction index is a measure of how often papers are retracted from a particular journal, with higher numbers reflecting more retractions. The transparency index is a concept that would translate various transparency metrics (review protocol, appeals protocol, use of plagiarism detection software, etc.) into a single number reflecting a journals overall transparency. The retraction index is unambiguous and easily calculated while the transparency index would be difficult to translate into a single number. These are a few of the "simple" steps that can be taken to thwart scientific misconduct.

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Several ambitious ideas have also been proposed to combat scientific misconduct. Two of these ideas are research auditing and overhauling the reward system for researchers. Research auditing is the examination of laboratory notebooks for inconsistencies with published data. Although this seems like a monumental undertaking it is standard practice in industry so the procedures are already in place. Lastly, the reward system for scientists is a breeding ground for scientific misconduct. Scientists work in a realm of "winner takes all" and "publish or perish" in which jobs, grants and awards go to those with high impact publications – making fraud enticing. Re-evaluating the reward system to more evenly disperse resources should drive down the incentive to commit scientific misconduct.

Scientific misconduct hurts science, scientists and the public. Large inroads have been paved towards the goal of preventing scientific misconduct but there is still a long way to go.

For more information.....

Netherlands Heart Journal, Fraud and misconduct in science: the stem cell seduction
http://www.ncbi.nlm.nih.gov/pmc/articles/PMC2626656/
Nature, 'Climategate' science speaks out
http://www.nature.com/news/2010/100217/full/463860a.html
Nature, Climate science: Time to raft up
http://www.nature.com/nature/journal/v488/n7413/full/488583a.html
Gallup poll on the publics opinion of climate science and climate scientists
http://thinkprogress.org/climate/2012/04/12/463353/gallup-public-understanding-of-climate-science-continues-rebounding/?mobile=nc

Peptide nucleic acids: A versatile tool for sequence selective RNA recognition*

Pankaj Gupta and Eriks Rozners

*This work was done at Department of Chemistry, Binghamton University. The State University of New York, Binghamton, NY 13902

Peptide nucleic acid (PNA) is a powerful biomolecular tool with a wide range of important applications.[1] PNA is a non-ionic mimic of DNA, in which the entire negatively-charged sugar-phosphate backbone is replaced with a neutral one consisting of repeated N-(2-aminoethyl)glycine units linked by peptide bonds. This achiral, uncharged, and rather flexible peptide backbone is still capable of sequence-specific binding to DNA as well as RNA obeying the Watson-Crick hydrogen bonding rules with extraordinary thermal stability.[2] It is chemically stable and resistant to hydrolytic (enzymatic) cleavage and thus not expected to be degraded inside a living cell. The unique chemical, physical and biological properties of PNA have been exploited to produce powerful biomolecular tools, antisense and antigene agents, molecular probes and biosensors. At the DNA level, the unique ability of PNA to bind DNA by duplex invasion can be used to arrest transcription within a gene sequence or to provide an artificial open complex to promote transcription (antigene strategy).

Recently, PNAs have been used to recognize biologically relevant double-helical RNAs by major-groove Hoogsteen triple-helix formation.[3-6] Since the discovery that RNA can catalyze chemical reactions, the number and variety of non-coding RNAs and the important roles they play in biology have been growing steadily. Most notable recent examples of important regulators of gene expression are short interfering RNAs, microRNAs, riboswitches and the RNA motifs involved in splicing machinery. The ability to selectively recognize, and inhibit the function of a regulatory RNA molecule would be highly useful for both fundamental biological studies and practical applications in biotechnology and medicine. However, the discovery of small molecules that bind double helical RNA sequence selectively has proven to be a challenging process.[7]

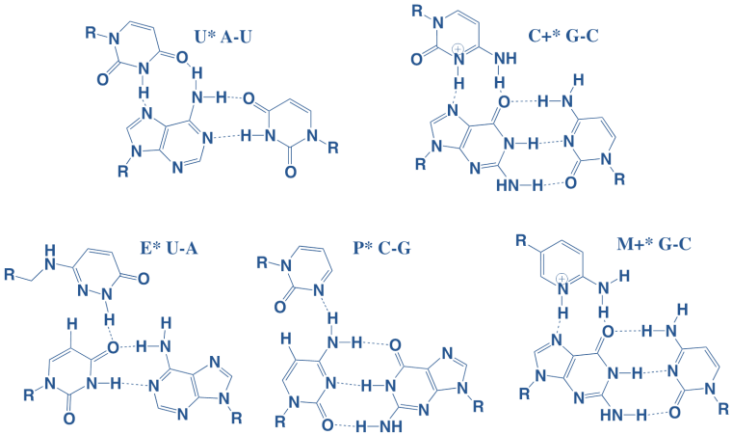

Fig. 1 *Standard and modified Hoogsteen triplets recognition of purines and pyrimidines.*

A limitation of triple-helical recognition was the requirement for long homopurine tracts, as only the Hoogsteen T(U)*A-T(U) and C+*G-C triplets could be used (Figure 1). With the aim of further enhancing their properties, we have explored nucleobase modification of PNA.[8] We found that modification of PNA with 2-pyrimidinone (P) and 3-oxo-2,3-dihydropyridazine (E) nucleobases allowed efficient and selective recognition of isolated C-G and U-A inversions, respectively, in polypurine tracts of double-helical RNA at pH 6.25.[4] However, the high affinity of PNA at pH 5.5 was greatly reduced at pH 6.25, and no binding could be observed at physiologically relevant salt and pH 7.4. The remaining problem was the unfavorable protonation of cytosine, which was required for formation of the Hoogsteen C+*G-C triplets.

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Because the pKa of cytosine is around 4.5, cytosine is hardly protonated under physiological pH, which greatly decreases the stability of the triple helix. We provided an efficient solution to this problem and demonstrated that sequence-selective recognition of the RNA duplex can be achieved at physiologically relevant conditions by replacing cytosine with a more basic (pKa = 6.7) heterocycle, 2-aminopyridine (M).[6] Confirming our hypothesis, 2-aminopyridine modification strongly enhanced the binding affinity of resulting PNA under physiologically relevant conditions.

Finally, we chose microRNA-215, which is implicated in cancer development and drug resistance, as an initial target to check if 2-aminopyridine-modified PNA could bind to biologically relevant double-helical RNA. Triple-helical binding to such sites could be used to detect microRNAs and interfere with their function, which would find broad applications in fundamental science, medicine, and biotechnology. We chose a model RNA that contains the purine-rich recognition site present in pri-microRNA-215. Consistent with results obtained with other 2-aminopyridine-modified PNAs, RNA hairpin modeling microRNA-215 was also recognized with high affinity (K_a= 1.2x10^7 M^{-1}) and 1:1 stoichiometry under physiologically relevant conditions[6] (Figure 2).

To sum up, PNA with 2-aminopyridine nucleobases allowed formation of stable and sequence-selective triple helices with double-stranded RNA at physiologically relevant conditions. The 2-aminopyridine-modified PNAs exhibited unique RNA selectivity and had two orders of magnitude higher affinity for the double-stranded RNAs than for the same DNA sequences. Taken together, these findings suggest that PNA may have unique and previously underappreciated potential for triple-helical recognition of biologically relevant RNA. Low stability at pH 7.4 has been a longstanding problem for practical applications of triple helices. The excellent performance of 2-aminopyridine-modified PNAs at pH 7.4 observed in our studies provided efficient solution to this problem that should open the door for new approaches to detection and interference with the function of double-stranded RNA molecules.

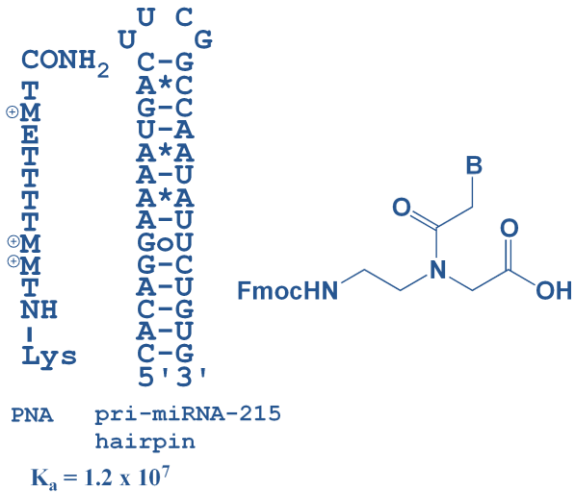

Fig. 2 *Binding of E- and M-modified PNA to RNA hairpin modeling the pri-microRNA-215 structure.*

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8. F. Wojciechowski, R.H. Hudson. *Curr. Top Med Chem*., 2007, 7, 667-679.

STEM education in the U.S.: Are we falling behind the rest of the world?

By Joseph P. Tiano

Science, technology, engineering and mathematics education, or STEM education, has received a lot of attention in the last decade – most of it negative. The negative attention is due to U.S. students' declining performance in STEM education compared to other countries. In order for the U.S. to remain competitive in the 21st century's highly technological and global economy a strong workforce proficient in science, technology, engineering and mathematics is needed.

Where does the U.S. rank in STEM education?
Many different organizations rank countries based on their education system. This usually involves administering exams to students around the world and comparing the results – with higher results being indicative of a better education system. One prominent organization is the International Association for the Evaluation of Educational Achievement (IEA) which conducts the Trends in International Mathematics and Science Study (TIMSS) every four years. The following rankings are for the science portion of the test only. In 2011 U.S. 4th and 8th grade students scored 44 and 25 points higher than the international average, but this was only worthy of 7th and 10th place, respectively, among the 63 participating countries. Furthermore, 64% of U.S. 4th graders scored high or above on international benchmarks (6th place) while only 50% of U.S. 8th graders scored high or above on international benchmarks (11th place). Two other major organizations, the Organisation for Economic Co-operation and Development (OECD) Programme for International Student Assessment (PISA) and the Council on Foreign Relations found similar results ranking the U.S. 17th and 10th, respectively, among other countries.

These results generate several questions. Why is the U.S. falling behind the rest of the world in STEM education? Why is there a drop-off in performance between 4th and 8th grade students? And probably the two most important questions; what can and what is being done to improve the U.S. education system so that the U.S. remains competitive internationally for the long-term?

What is being done to improve STEM education?
In 2006 in response to the declining state of the U.S.'s STEM education the US National Academies Committee on Science, Engineering and Public Policy published a list of 10 actions that federal policy makers should take to advance STEM education. Since then many programs have been initiated. President Bush signed The America Creating Opportunities to Meaningfully Promote Excellence in Technology, Education, and Science Act (America COMPETES Act) into law in 2007 and President Obama renewed it in 2011. The America COMPETES Act appropriated funds and implemented programs to increase the number of qualified teachers with bachelors and masters degrees in STEM disciplines. It strove to raise the achievement of students in STEM disciplines by increasing the number of advanced placement STEM classes available, and it established a panel of experts to provide information on promising practices to teachers and schools for teaching STEM disciplines.

The National Science Foundation funded the Innovative Technology Experiences for Students and Teachers (ITEST) program from 2003 to 2012. ITEST funded 195 research projects with the goal of developing interventions that encourage K-12 students to develop an interest in STEM disciplines, developing approaches for K-12 students and teachers to increase the United States' capacity and innovation in the STEM workforce of the future, and equipping teachers with resources to ensure their students maintain an interest in STEM disciplines and are prepared to enter the STEM workforce in the future.

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Project Lead the Way (PLTW) is a non-profit organization committed to STEM education with the mission of developing the critical-reasoning and problem-solving skills of students to ensure they are successful in future STEM jobs. PLTW accomplishes its mission by being the leading provider of rigorous and innovative STEM education curricular programs to greater than 4,000 schools across the U.S. in addition to training over 10,000 teachers in STEM education. These and other similar programs strive to increase the U.S.'s student's participation and excellence in STEM education.

What still needs to be done to improve STEM education?

Education does not change overnight so how long should it take to see viable results? What still needs to be done to improve STEM education in the U.S.? These are just a few questions remaining to be answered. The TIMSS exam administered in 2007 and 2011 provides a glimpse into the effectiveness of the America COMPETES Act. Between 2007 when the America COMPETES Act became law and 2011, U.S. 4th and 8th graders' average score for the science portion of the TIMSS exam increase by five points. More time and better measurements are needed to fully judge the effectiveness of the America COMPETES Act.

Looking ahead to the future there are many other strategies or approaches that could be put into place to improve STEM education in the U.S. – longer school years may be one of them. The average time U.S. students spend in the classroom varies between states but on average U.S. students spend 6-7 hours/day, 175-180 days/year (900-1,200 hours/year) in school. Secretary of Education Arne Duncan is a proponent of longer school years and said "whether educators have more time to enrich instruction or students have more time to learn how to play an instrument and write computer code, adding meaningful in-school hours is a critical investment that better prepares children to be successful in the 21st century." Beginning in 2013, 40 schools in five states (Colorado, New York, Connecticut, Massachusetts and Tennessee) will begin a three-year pilot program adding 300 hours (about 45 days) to the academic calendar. Proponents of the longer school year cite studies showing that test scores are higher in the same subjects at the beginning of the summer compared to the end – suggesting students lose or fail to retain knowledge following a long summer break. Proponents also point out the fact that students in countries (China and Korea) that rank ahead of the U.S. in educational proficiency spend more time studying (classroom time + afterschool tutoring) than U.S. students. Opponents point to those same studies because they also show that countries (Finland) that outperform U.S. students academically spend less time in the classroom. Whether there is a positive correlation between more classroom hours and better student performance is unclear. Furthermore, classroom time is only one factor contributing to students' learning. How those classroom hours are spent and the quality of the teachers' training also plays an important role. Agreeing on the best methods to increase the proficiency of U.S. students continues to be a challenge.

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How can you get involved?

If you have children and want them to become more involved in STEM education or if you are interested in volunteering your time to engage and inspire budding young scientists there are many opportunities to get involved. One such organization in the D.C. metro area is the Children's Science Center. The Children's Science Center will be opening a children's science museum in Northern Virginia in the near future but until then they are running a great science outreach program for kids called the "Museum Without Walls" program. For more information please visit www.thechildrenssciencecenter.org and if you are interested in volunteering – they are always looking for excited and passionate volunteers – please e-mail Volunteer@thechildrenssciencecenter.org.

For More Information……

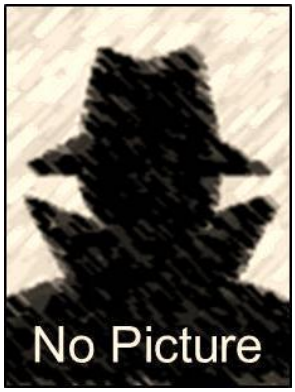
How does the U.S. rank internationally?
http://nces.ed.gov/timss/
http://timss.org/
http://ies.ed.gov/
http://nces.ed.gov/timss/figure11_6.asp
http://www.cfr.org/united-states/remedial-education-federal-education-policy/p30141?cid=otr-marketing_use-remedialeducation

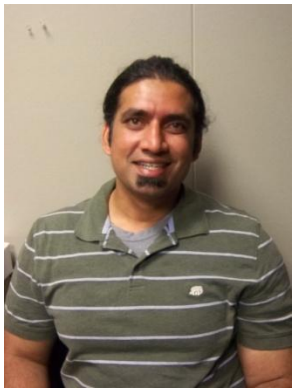
The National Summer Learning Association:
http://www.summerlearning.org
National Association for Year-Round School:
http://www.nayre.org
Coalition for a Traditional School Year:
http://schoolyear.info
National Center on Time & Learning:
http://www.timeandlearning.org

Center for Public Education:
http://www.centerforpubliceducation.org
http://www.centerforpubliceducation.org/Main-Menu/Organizing-a-school/Time-in-school-How-does-the-US-compare

America COMPETES Act and ITEST
http://www.commerce.gov/americacompetes
http://itestlrc.edc.org/about-itest
http://sites.nationalacademies.org/PGA/cosepup/index.htm

Welcome New Fellows

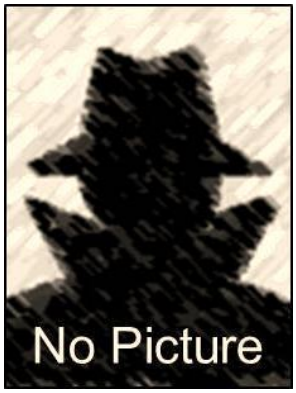


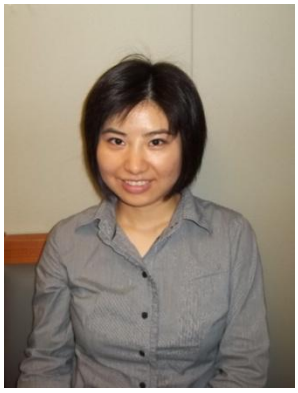


Allison Sylvetsky	**Benedetta Naglieri**	**Cale Whitworth**	**Laxminath Tumburu**
IRTA	IRTA	IRTA	Visting Fellow, India
Ph.D., Emory University	Ph.D., Columbia University	Ph.D., Johns Hopkins University	Ph.D., Wright State University
Diabetes, Endocrinology and Obesity Branch (Rother) Bldg 10	Laboratory of Molecular Biology (Weinstein) Bldg 10	Laboratory of Cellular and Developmental Biology (Oliver) Bldg 50	Molecular Medicine Branch (Miller) Bldg 10

Lu Zhu	**Nadine Ramos**	**Netra Pal Meena**	**Satish Kumar**
Visiting Fellow, China	IRTA	Visiting Fellow, India	Visiting Fellow, India
Ph.D., Chinese Academy of Sciences	Ph.D., The Ohio State University	Ph.D., IM Tech, (Institute of Microbial Technology) Chandigarh	Ph.D., National Centre for Biological Sciences, India
Laboratory of Bioorganic Chemistry (Wess) Bldg 8	Biomedical and Metabolic Imaging Branch (Gharib) Bldg 10	Laboratory of Cellular and Developmental Biology (Kimmel) Bldg 50	Laboratory of Cellular and Developmental Biology (Oliver) Bldg 50

Welcome New Fellows





Simona Rosu	**Sukanya Suresh**	**Yuanyuan Zhang**
IRTA	Visiting Fellow, India	Visiting Fellow
Ph.D., Stanford University	Ph.D., Queen's University Belfast, UK.	Ph.D., University of Minnesota
Laboratory of Cellular and Molecular Biology (Cohen-Fix) Bldg 8	Molecular Medicine Branch (Noguchi) Bldg 10	Molecular Medicine Branch, (Noguchi) Bldg 10