



# UNCMD-PhD Newsletter

## CONTENTS

<i>Dr. Deshmukh</i>	1
<i>MSTP Grant Renewal</i>	1
<i>MD-PhD Milestones</i>	2
<i>Class of 2013</i>	3
<i>Semester in Pictures</i>	4
<i>Spring Schedule</i>	6
<i>References</i>	7

## Who else but Dr. Deshmukh?

Mohanish Deshmukh is assuming the role of Director of Basic Research

To the delight of nearly everybody in the program, Dr. Mohanish Deshmukh recently joined the MD-PhD leadership team as Director of Basic Research. He will also be directing our successful F30 fellowship program. He has been a member of our Admissions committee since 2006 and brings invaluable basic science expertise to the program.

He is known by MD-PhD students at UNC to be an excellent scientist, an incredible teacher, a caring mentor, and an asker of challenging questions during Monday night seminars.

Dr. Deshmukh received his PhD from Carnegie Mellon University in 1994 where he studied yeast ribosome assembly and function. He then went to Dr. Eugene Johnson's lab at Washington University in St. Louis for his postdoctoral research where he pursued his interests in apoptosis, focusing on this

pathway in mammalian neurons. He joined UNC's Neuroscience Center and the Department of Cell and Developmental Biology in 2000, becoming a full Professor in 2011.

Dr. Deshmukh has a very active research program where he investigates the mechanism of apoptosis in a variety of models including neurons, embryonic stem cells and cancer cells. His lab also conducts translational research with projects that focus on strategies for preventing neurodegeneration (with a patent filed for using a microRNA for neuronal pro-



Dr. Mohanish Deshmukh

(Continued on page 5)

### MD-PHD PROGRAM

60 Bondurant, CB 7000  
Chapel Hill, NC 27599-7000  
(919) 843-6507  
mdphd@med.unc.edu

### MD-PHD STAFF

Gene Orringer, MD, *dir.*  
Kim Rathmell MD PhD, *assoc dir.*  
M Deshmukh PhD, *assoc dir.*  
Alison Regan, *asst. dir.*  
Carol Herion, *program asst.*

### NEWSLETTER STAFF

Christian Parobek  
Andrew Morgan  
Photography: various

## Our MSTP Competitive Renewal *by Dr. Orringer et al.*

January 25, 2013 - that was the date that the competitive renewal of our Medical Scientist Training Program (MSTP) grant arrived at the NIH. We originally received MSTP funding on July 1 1999, and we are now in our 14th year as an MSTP institution. We have previously submitted two successful renewal applications (one in 2003 and the second in 2008), and we spent much of the past six months working on this, our third competitive renewal. This document turned out to be 1085 pages long and ~11 pounds in weight. However, unlike our previous MSTP applications, this one did not go to the NIH in a large FedEx box. Instead, we uploaded it as

a series of 24 individual pdf files, after which the entire document was then sent to the NIH by a single computer key stroke. Just amazing - a document that we spend six months agonizing over was gone in less than a heartbeat!

We indicated that our goal for the next five years would be:

***To train outstanding physician-scientists who will be ready to tackle multifaceted clinical and biological questions that will enable them to transform the nation's health in the years to come.***

(Continued on page 5)



# Milestones in the life of an MD-PhD

## Recent F30s awarded

**Anne Starling (G4): Epidemiology of Perfluorinated Compounds in Pregnancy and Risk of Preeclampsia (NIEHS)**

**Katharine Liang (G3): AAV vectors for retinal delivery in a mouse model of age-related retinopathy (NIA)**

*This brings our program's total number of F30 awards to 27 — still higher than any other MD-PhD program.*



Following in Sabrina Heman-Ackah's (G1) footsteps, **Casey Rimland (MS1)** was accepted to the NIH/OxCam Program. She plans to develop iPS lines at Dr. Ludovic Vallier's lab in Cambridge, then use

these to study immune response and fibrosis in animal models of cirrhosis with Dr. Tom Wynn at the NIAID. She compares the Cambridge lifestyle to Harry Potter for science—complete with robes and dining halls. See [link](#) for more info about NIH/OxCam.

## More Announcements

**Have you heard about *Iris*, UNC's revitalized literary and arts magazine? The magazine existed 20 years ago in print form, and is making its return online, allowing for multimedia, text, and visual arts submissions. Medical students and faculty are encouraged to submit. See [link](#) for more details. First submission deadline is February 28th.**

**The MedUNCedoos will be having their spring concert in April, details TBD.**

## Recent PhD Defenses

Justin Low Aug 8

Functional and Therapeutic Insights from a Secondary Structure Model of HIV-1

Isaac Chan Sept 13

Hedgehog Signaling In Hepatocellular Carcinoma

Jeff Federspiel Dec 12

Observational Methods in Cardiovascular Outcomes Research

## Weddings & Babies

***No babies to report this time around; however, the last six months have been ripe with engagements and marriages.***

Katharine Liang (G3) got married on September 8, 2012

Chris O'Connor (G3) married Melody Chou on October 21, 2012

Liz Hoffman (MS4) is getting married in April to Jed Ferguson (past UNC MD/PhDer, now a urology resident at UNC)

Anne Starling (G4) recently got engaged to Peter Maniloff, a PhD student in Environmental Economics at Duke's Nicholas School of the Environment

Kurt Host (MS1) just got engaged to Alyssa Pace

Michael Clark (MS2) got engaged to Stephanie Glass in December

Bisset Lee, a Masters of Education Counseling student at UNC recently said "yes" to Christian Parobek (G1)



# Who will it be in 2013?

The application process is once again in full swing. The coming weeks will welcome 50 incredibly qualified applicants who have already made it through pre-screening and the committee review. The 2013 interview season marks the 15th year that UNC's MD-PhD program has hosted a formal recruitment.

The current applicants are the most competitive yet. They hail from 41 states (Fig. 1) including Alaska and Hawaii (data not shown). They attended more than 150 unique undergraduate institutions within the United States. Applicants also obtained degrees from colleges in Puerto Rico, Canada, England, Finland, and Switzerland.

Dr. O and the program leadership are looking to fill a class of 10 people with diverse research interests and experiences. This number might increase in the coming years, pending a successful renewal (and expansion) of the MSTP grant (see page 1).

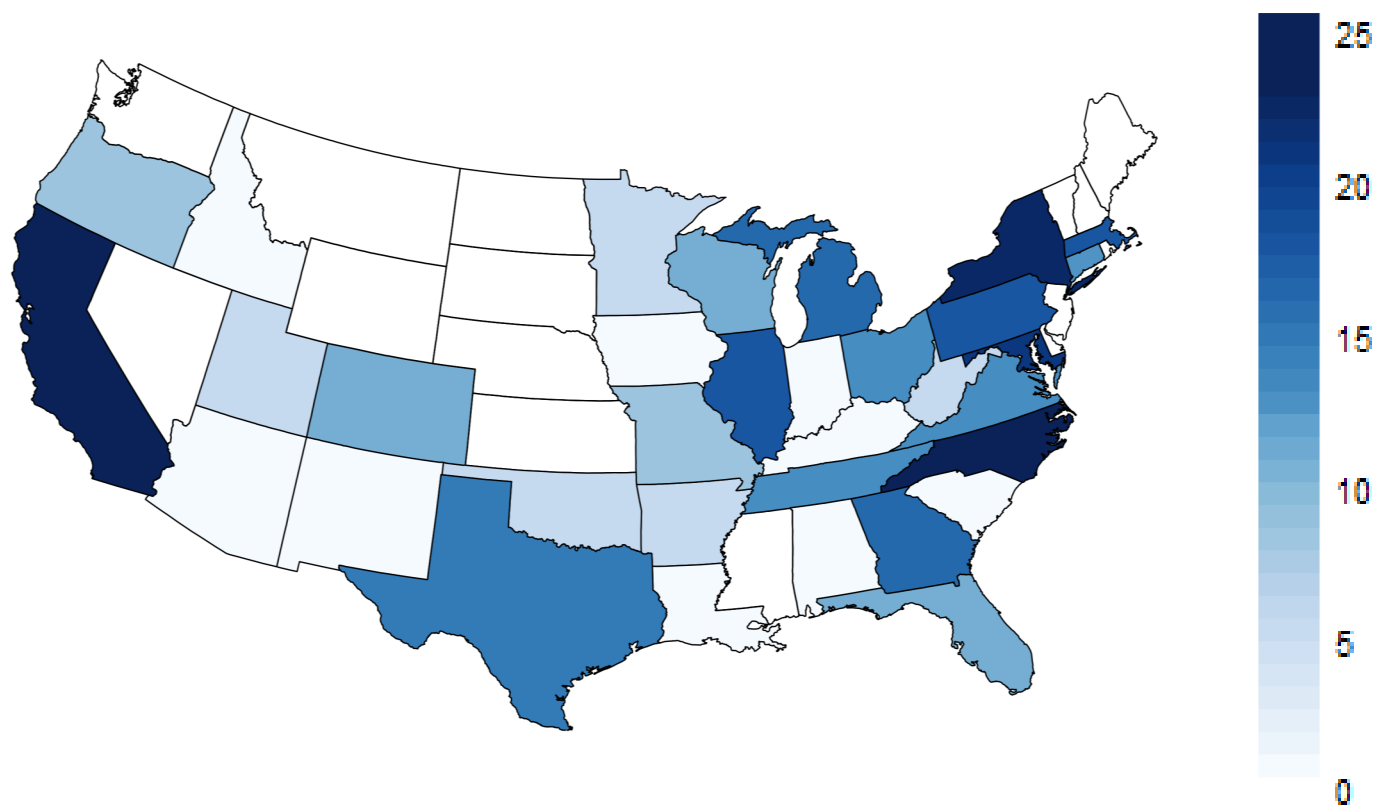
## 2013

### Recruitment Dates:

- January 26-28
- January 31 (local)
- February 2-4

For the 2012-2013 cycle, UNC's MD-PhD program had nearly 350 applications. Please welcome the 50 students who are coming to interview.

Thanks to Alison, Carol, Team WildTypes, Cell Yeah! and the Dream Team for organizing and planning recruitment weekends.



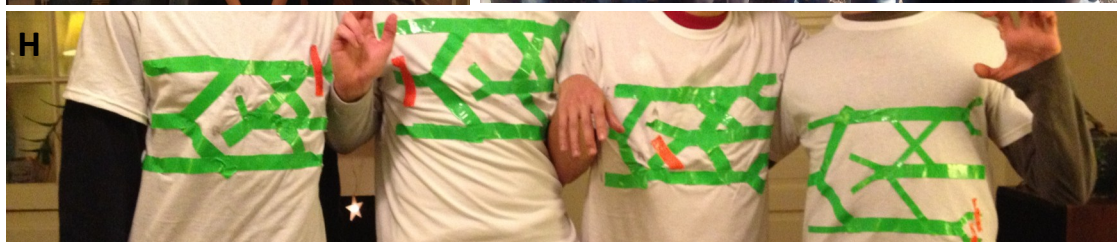
**FIGURE 1: The spatial distribution of 2013 applicants by hometown. Nearly 350 applicants representing 150+ colleges, 41 states including Alaska and Hawaii, and 5 foreign countries applied for admission into the class of 2012. (Credit: Andrew Morgan)**



# Another Photogenic Semester



**FIGURE 1:** (A) Dr. Orringer gave UNC SOM's 2012 Berryhill Distinguished Lecture (photo credit: Brian Strickland). (B) Team Cell Yeah! collected cans for charity at the NC State Fair. (C) Michael Iglesia (G2) "injects a DNA sample into a container so it can be analyzed." His picture appeared on the front cover of the DTH on October 10, 2012 (photo credit: Jason Wolonick; Courtesy of Daily Tar Heel). (D) Chris Dibble (G4) and Michael Durando (G5) at a Cell Yeah! social. (E) In October, Christian Parobek (G1) presented at an infectious diseases genomics conference in the UK. (F) Team Wildtypes' service event landscaping at the NC Botanical Gardens. (G) MS1s continued a rich tradition of studying the brachial plexus ... on Halloween. (H) For Board-studying purposes. (I) Katherine Liang (G3) and Jason Melehani (G1) at Team Wildtypes' service event. (J) Team Cell Yeah! at Drs. Billy Kim and Jen Jen Yeh's house.



Do you own a camera?  
Do you do cool stuff with  
other mudphuds? You  
can donate your pics.  
Email Christian Parobek  
or Andrew Morgan.





## Who else but Dr. Deshmukh?

(Continued from page 1)

tection) as well as for triggering apoptosis in brain tumors.

Prior to joining our leadership team, Dr. Deshmukh was the Director of Graduate Studies in the Department of Cell and Developmental Biology. Indeed, he is strongly committed to graduate training and education. Dr. Deshmukh has trained 5 PhD students (with 5 PhD students currently in the lab) and three of these students, Yolanda Huang, Adam Kole (MS4), and Ayumi Nakamura (G1) are from our MD-PhD program.

Dr. Deshmukh is very involved in teaching activities throughout our Medical School. He is the Course Director for the Advanced Cell Biology graduate level course and participates in medical and graduate teaching in multiple classes including the Molecules to Cells, Super Cell, Developmental Neurobiology and Cellular and Molecular Neurobiology courses. Scores of students can

attest that he brings commitment and passion to his teaching and mentoring activities.

Perhaps the best proof of his teaching ability is what his students say. In 2004, Dr. Deshmukh received a Teaching Excellence Award from UNC Medical School, and last year he was recognized by the Mentor of the Year Award from the Neurobiology Curriculum graduate students. Recently, after Dr. Deshmukh lectured medical students on apoptosis, a member of the class was overheard saying, "That's the first time apoptosis has ever been interesting to me."

Drs. Orringer, Rathmell, and Alison Regan are delighted to welcome Dr. Deshmukh as the fourth member of the MD-PhD leadership team. Dr. O said, "Dr. Deshmukh is an outstanding teacher, an inspiring mentor, and a gifted writer . . . as a neuroscientist, he adds a whole new dimension that we have not had previously."

*Adapted from the recently submitted MSTP renewal grant, by Andrew Morgan and Christian Parobek*

## Our MSTP Competitive Renewal

(Continued from page 1)

In the application, we described the 19 different entities (i.e., 6 departments from the School of Medicine, 4 from Public Health, 1 from Pharmacy, and 4 from the College of Arts and Sciences as well as the 4 cross-cutting, PhD-granting curricula) where our students have earned their PhDs as graduate students. We also included a total of 128 faculty members (11 Assistant Professors; 32 Associate Professors; and 85 Full Professors). This group, a subset of the large number of research-intensive faculty members spread all across the UNC campus, was selected on the basis of their research and its relevance to the training of physician-scientists, their grant support, their mentoring experience, and their participation in and commitment to the activities of the MD-PhD Program.

We firmly believe that the rich, diverse, and extremely collaborative environment that exists here at UNC enables our students to pursue cutting-edge research in broad, cross-disciplinary programs that range

from molecular and systems biology, to informatics and epidemiology. A vital aspect of our training program is the outstanding pool of faculty mentors who are deeply committed to train our students and to help them become exceptional physician-scientists.

Convincing evidence of the success of our plan since we first received funding as an MSTP institution is reflected by the stellar record that our students have achieved in the classroom, at the bedside, in the laboratory and in the field. Their accomplishments include high impact publications, numerous grants and awards, and success in their subsequent academic pursuits, all of which were clearly spelled out in our MSTP renewal application. For all of these reasons, we are optimistic that this iteration of our MSTP grant will be successful. We have requested a modest increase in the number of slots provided in our award: given the lean economic times, what we will get from the NIH remains to be seen.

*The UNC MD-PhD Program Leadership Team*

**Gene Orringer**, Director

**Kim Rathmell**, Director for Translational Research

**Mohanish Deshmukh**, Director for Basic Research

**Alison Regan**, Assistant Director



# February/March Schedule

## 1st INTERVIEW WEEKEND:

**January 26 – January 28**

Saturday Jan 26 & Sunday Jan 27 –

Check email for details

Monday Jan 28 – Lunch 11:45-1:00

## LOCAL INTERVIEW DAY:

**January 31**

Lunch 11:45 – 1:00 at NC TraCS

## 2nd INTERVIEW WEEKEND:

**February 2 – February 4**

Saturday Feb 2 & Sunday Feb 3 –

Check email for details

Monday Feb 4 – Lunch 11:45-1:00

## UNC-DUKE JOINT SEMINAR:

**February 11**

Faculty Guest Speaker: David Rubenstein

## MONDAY NIGHT SEMINAR:

**February 25**

Faculty Guest Speakers:

Michael Jay and Shawn Hingtgen

Student warm-up: Kelly Gewain

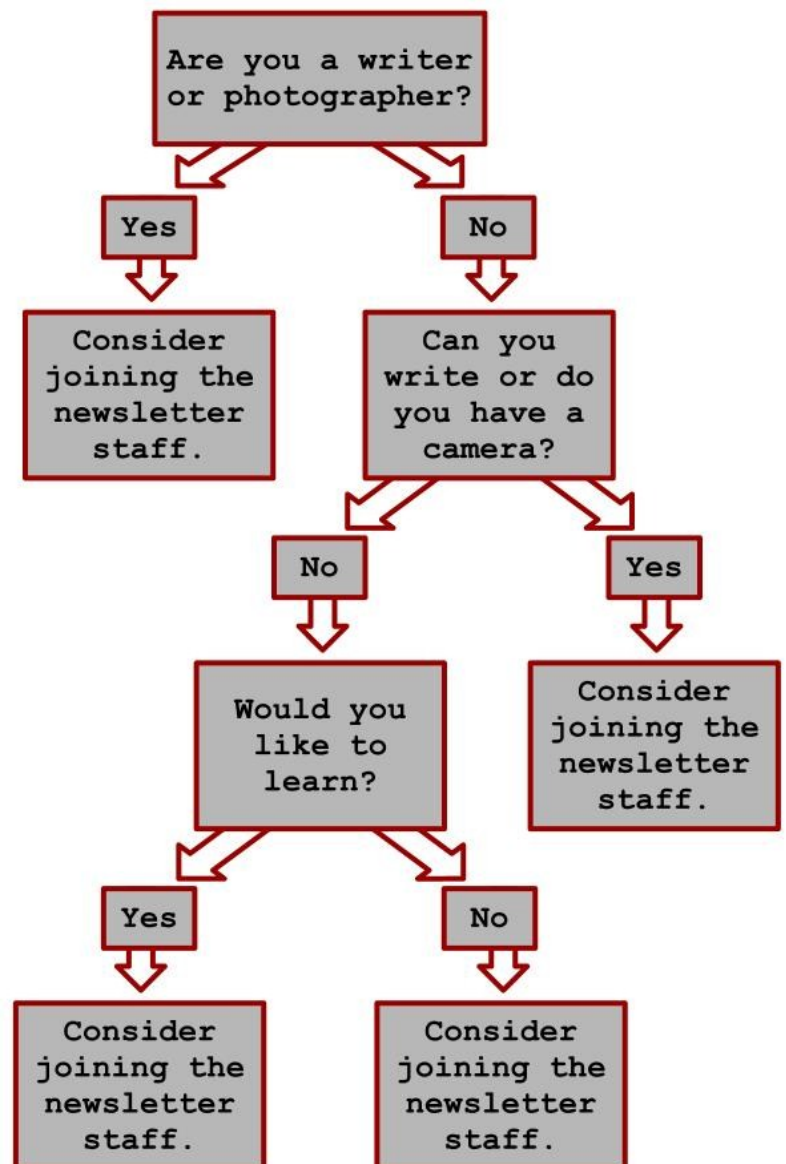
## MONDAY NIGHT SEMINAR

**March 18**

Faculty Guest Speakers: Angela Kashuba

Student warm-up: TBD

## Find Yourself on the MD-PhD Newsletter Tree:





# (recent) References

**O'CONOR, C. J.**, GRIFFIN, T. M., LIETKE, W., AND GUILAK, F. Increased susceptibility of Trpv4-deficient mice to obesity and obesity-induced osteoarthritis with very high-fat diet. *Annals of the Rheumatic Diseases* 72, 2 (Feb. 2013), 300–4.

**BOSCH, D. E.**, KIMPLE, A. J., MANNING, A. J., MULLER, R. E., WILLARD, F. S., MACHIUS, M., ROGERS, S. L., AND SIDEROVSKI, D. P. Structural Determinants of RGS-RhoGEF Signaling Critical to Entamoeba histolytica Pathogenesis. *Structure* 21, 1 (Jan. 2013), 65–75.

**GOLDSMITH, J. R.**, COCCHIARO, J. L., RAWLS, J. F., AND JOBIN, C. Glafenine-induced intestinal injury in zebrafish is ameliorated by  $\mu$ -opioid signaling via enhancement of Atf6-dependent cellular stress responses. *Disease Models & Mechanisms* 6, 1 (Jan. 2013), 146–59.

**GOLDSMITH, J. R.**, PEREZ-CHANONA, E., YADAV, P. N., WHISTLER, J., ROTH, B., AND JOBIN, C. Intestinal Epithelial Cell-Derived  $\mu$ -Opioid Signaling Protects against Ischemia Reperfusion Injury through PI3K Signaling. *American Journal of Pathology* (Jan. 2013).

KUMAR, N., PANDE, V., BHATT, R. M., **SHAH, N. K.**, MISHRA, N., SRIVASTAVA, B., VALECHA, N., AND ANVIKAR, A. R. Genetic deletion of HRP2 and HRP3 in Indian Plasmodium falciparum population and false negative malaria rapid diagnostic test. *Acta Tropica* 125, 1 (Jan. 2013), 119–21.

**RUTSTEIN, S. E.**, BROWN, L. B., BIDDLE, A. K., WHEELER, S. B., KAMANGA, G., MMODZI, P., NYIRENDA, N., MOFOLO, I., ROSENBERG, N. E., HOFFMAN, I. F., AND MILLER, W. C. Cost-effectiveness of provider-based HIV partner notification in urban Malawi. *Health Policy and Planning* (Jan. 2013).

COHEN, S. P., BUCKLEY, B. K., KOSLOFF, M., GARLAND, A. L., **BOSCH, D. E.**, CHENG, G., RADHAKRISHNA, H., BROWN, M. D., WILLARD, F. S., ARSHAVSKY, V. Y., TARRAN, R., SIDEROVSKI, D. P., AND **KIMPLE, A. J.** Regulator of G-protein Signaling-21 (RGS21) Is an Inhibitor of Bitter Gustatory Signaling Found in Lingual and Airway Epithelia. *Journal of Biological Chemistry* 287, 50 (Dec. 2012), 41706–19.

**BOSCH, D. E.**, AND SIDEROVSKI, D. P. Structural determinants of ubiquitin conjugation in Entamoeba histolytica. *Journal of Biological Chemistry* (Dec. 2012).

**CHAO, G.**, HE, X., PARKER, J. S., ZHAO, W., AND PEROU, C. M. Micro-Scale Genomic DNA Copy Number Aberrations as Another Means of Mutagenesis in Breast Cancer. *PLoS ONE* 7, 12 (Dec. 2012), e51719.

MISHRA, N., SINGH, J. P. N., SRIVASTAVA, B., ARORA, U., **SHAH, N. K.**, GHOSH, S., BHATT, R., SHARMA, S., DAS, M., KUMAR, A., ANVIKAR, A. R., KAITHOLIA, K., GUPTA, R., SONAL, G., DHARIWAL, A., AND VALECHA, N. Monitoring antimalarial drug resistance in India via sentinel sites: outcomes and risk factors for treatment failure, 2009–2010. *Bulletin of the World Health Organization* 90, 12 (Dec. 2012), 895–904.

ONYIAH, J. C., SHEIKH, S. Z., MAHARSHAK, N., **STEINBACH, E. C.**, RUSSO, S. M., KOBAYASHI, T., MACKAY, L. C., HANSEN, J. J., MOESER, A. J., RAWLS, J. F., BORST, L. B., OTTERBEIN, L. E., AND PLEVY, S. E. Carbon Monoxide and Heme Oxygenase-1 Prevent Intestinal Inflammation in Mice by Promoting Bacterial Clearance. *Gastroenterology* (Dec. 2012).

PACKER, A. M., PETERKA, D. S., HIRTZ, J. J., **PRAKASH, R.**, DEISSEROTH, K., AND YUSTE, R. Two-photon optogenetics of dendritic spines and neural circuits. *Nature Methods* (Nov. 2012).

**BOSCH, D. E.**, KIMPLE, A. J., MULLER, R. E., GIGUÈRE, P. M., MACHIUS, M., WILLARD, F. S., TEMPLE, B. R. S., AND SIDEROVSKI, D. P. Heterotrimeric G-protein signaling is critical to pathogenic processes in Entamoeba histolytica. *PLoS Pathogens* 8, 11 (Nov. 2012), e1003040.

**BOSCH, D. E.**, YANG, B., AND SIDEROVSKI, D. P. Entamoeba histolytica Rho1 regulates actin polymerization through a divergent, diaphanous-related formin. *Biochemistry* 51, 44 (Nov. 2012), 8791–801.

**PRAKASH, R.**, YIZHAR, O., GREWE, B., RAMAKRISHNAN, C., WANG, N., GOSHEN, I., PACKER, A. M., PETERKA, D. S., YUSTE, R., SCHNITZER, M. J., AND DEISSEROTH, K. Two-photon optogenetic toolbox for fast inhibition, excitation and bistable modulation. *Nature Methods* (Nov. 2012).

**SHAH, N. K.** Corporate philanthropy and conflicts of interest in public health: ExxonMobil, Equatorial Guinea, and malaria. *Journal of Public Health Policy* (Nov. 2012).

CANCER GENOME ATLAS NETWORK including **CHAO, G.**, **IGLESIA, M.** Comprehensive molecular portraits of human breast tumours. *Nature* 490, 7418 (Oct. 2012), 61–70.

SARKAR, J., **SHAH, N. K.**, AND MURHEKAR, M. V. Incidence, management, and reporting of severe and fatal Plasmodium falciparum malaria in secondary and tertiary health facilities of Alipurduar, India in 2009. *Journal of Vector Borne Diseases* 49, 3 (Sept. 2012), 157–63.

**NASH, R. P.**, MCNAMARA, D. E., BALLENTINE, W. K., MATSON, S. W., AND REDINBO, M. R. Investigating the impact of bisphosphonates and structurally related compounds on bacteria containing conjugative plasmids. *Biochemical and Biophysical Research Communications* 424, 4 (Aug. 2012), 697–703.

MATTIS, J., TYE, K. M., FERENCZI, E. A., RAMAKRISHNAN, C., O'SHEA, D. J., **PRAKASH, R.**, GUNAYDIN, L. A., HYUN, M., FENNO, L. E., GRADINARU, V., YIZHAR, O., AND DEISSEROTH, K. Principles for applying optogenetic tools derived from direct comparative analysis of microbial opsins. *Nature Methods* 9, 2 (Feb. 2012), 159–72.

**GOLDSMITH, J. R.**, AND JOBIN, C. Think small: zebrafish as a model system of human pathology. *Journal of Biomedicine & Biotechnology* 2012 (Jan. 2012), 817341.

GOSHEN, I., BRODSKY, M., **PRAKASH, R.**, WALLACE, J., GRADINARU, V., RAMAKRISHNAN, C., AND DEISSEROTH, K. Dynamics of retrieval strategies for remote memories. *Cell* 147, 3 (Oct. 2011), 678–89.

ABILEZ, O. J., WONG, J., **PRAKASH, R.**, DEISSEROTH, K., ZARINS, C. K., AND KÜHL, E. Multiscale computational models for optogenetic control of cardiac function. *Biophysical Journal* 101, 6 (Sept. 2011), 1326–34.

TYE, K. M., **PRAKASH, R.**, KIM, S.-Y., FENNO, L. E., GROSENICK, L., ZARABI, H., THOMPSON, K. R., GRADINARU, V., RAMAKRISHNAN, C., AND DEISSEROTH, K. Amygdala circuitry mediating reversible and bidirectional control of anxiety. *Nature* 471, 7338 (Mar. 2011), 358–62.

WITTEN, I. B., LIN, S.-C., BRODSKY, M., **PRAKASH, R.**, DIESTER, I., ANIKEEVA, P., GRADINARU, V., RAMAKRISHNAN, C., AND DEISSEROTH, K. Cholinergic interneurons control local circuit activity and cocaine conditioning. *Science* 330, 6011 (Dec. 2010), 1677–81.

GRADINARU, V., ZHANG, F., RAMAKRISHNAN, C., MATTIS, J., **PRAKASH, R.**, DIESTER, I., GOSHEN, I., THOMPSON, K. R., AND DEISSEROTH, K. Molecular and cellular approaches for diversifying and extending optogenetics. *Cell* 141, 1 (Apr. 2010), 154–65.

YASHIRO, K., RIDAY, T. T., CONDON, K. H., ROBERTS, A. C., BERNARDO, D. R., **PRAKASH, R.**, WEINBERG, R. J., EHLERS, M. D., AND PHILPOT, B. D. Ube3a is required for experience-dependent maturation of the neocortex. *Nature Neuroscience* 12, 6 (June 2009), 777–83.

**PRAKASH, R.**, AND RICCI, A. J. Hair bundles teaming up to tune the mammalian cochlea. *Proceedings of the National Academy of Sciences of the United States of America* 105, 48 (Dec. 2008), 18651–2.