GHOSH LAB 20

Stories and Publications of the Ghosh Lab

To members of the Ghosh Lab

whose stories fill these pages

and

whose hard work, collegiality and friendship made it all worthwhile

Contents

Science is a deeply social endeavor. Our life as scientists is as much a story of the people we have worked with as it is about the work we did. When I was starting out as a graduate student in Carla Shatz's lab, who was then a young assistant professor at Stanford, I was struck by how much the lab felt like a family. In Carla's lab, the other students and postdocs were my siblings, and in their company I took my first steps towards becoming a neuroscientist. A few years later I went to Mike Greenberg's lab at Harvard to do a postdoc. I knew nothing about molecular biology and felt like a kid again. I felt enormously grateful to my bay-mate Ana Zubiaga and the people in the Greenberg lab for holding my hand as I learned my way about genes and proteins. Those experiences not only influenced my scientific trajectory, they inspired me to create an environment in my own lab where the the way we worked together was as important as the papers we published.

Over the past twenty years I have had the great fortune of working with some wonderful people at my labs at Johns Hopkins, UCSD, and Roche. These students and postdocs came to my lab during a formative stage in their careers, and together we explored various aspects of how the brain works. We also had wonderful research associates and staff that held the lab together, and undergraduates who got their first taste of scientific discovery in our lab. We worked hard but also had a lot of fun. I remember the thrill of having our first paper published in Neuron – it was the moment I knew we could do something by ourselves! Over the years the lab was amazingly productive, and we had a collective pride in the papers we published (and of course we celebrated each acceptance with a bottle of Champagne!)

This book is the story of the Ghosh Lab, a place that was home to us for some part of our scientific journey, and which provided me with my fondest memories. I would like to thank everyone who contributed to this book, and particularly Caroline for collecting the stories to preserve these memories.

With gratitude and affection,

Anirvan

San Francisco
October 3rd, 2016

I met Anirvan for the first time in peculiar circumstances. I met Anirvan for the first time in San Diego in November 1995 at the Society for Neuroscience meeting. This was my first Neuroscience meeting and I had to give my first talk ever. I was terrified, petrified and did not know how to manage my stress. But on top of this, Anirvan was scheduled to give a talk in the same session on his post-doctoral work in Mike Greenberg's lab on the differential effects of bFGF and NT4 on cortical progenitors proliferation and differentiation. Hearing Anirvan's talk at that point in my scientific career was a shock, a true revelation. That was it, I knew what I wanted to do, studying cortical development with these kind of tools, a mixture of cellular and molecular approaches that I found so profoundly innovative and deterministic! But, I still had to give my talk! How could I give a talk after what I hear… I was even more nervous!! I gave a horrible talk, truly awful… but! I met with Anirvan afterwards and I had the conviction that at that point I had nothing to loose and that maybe if I was lucky, Anirvan did not hear my talk! I had a great one-hour chat with Anirvan, and in my broken english at the time, I tried to convince him that what I was studying was interesting (I still wonder how I did just that!). But whatever I did, it worked! Anirvan proposed a post-doctoral position in his lab shortly after.

It took me more than a year to complete my Ph.D. and I joined Anirvan's lab at Hopkins in may 1997. I had a lot to learn and Anirvan immediately turned out to be a great mentor for me. Anirvan had the idea of developing a new assay to assess the role of local cortical cues in the control of the balance between proliferation and differentiation. The idea was simple, to take cortical progenitors, dissociate them and instead of plating them on glass, plate them on cortical slices, as a substrate for differentiation. This assay that we called later on the slice overlay assay turned out to work nicely after a couple of trials but not for what we expected to study. The first time I succeeded in culturing the cells on top of cortical slices, the vast majority of the cells that landed in the cortical plate displayed a single neurite directed towards the ventricle after only a couple of hours on the slice. What we were witnessing was the initial synchronous outgrowth of the axon of cortical pyramidal neurons ventrally. We quickly realized this could be an amazing cellular assay because of the robustness and reproducibility of the response. Thanks to the expertise of Alex and David's laboratories next door (yes, this was an amazing environment!!), it took us only about a year using this assay to identify some of the cues that pattern the initial ventrally-directed outgrowth of pyramidal neurons in the cortex. It took us two more years to recognize that the same cues (Semaphorin 3A) was although controlling the orientation of outgrowth of the apical dendrite in the opposite direction towards the pial surface. Altogether, this work was amazingly rewarding for us intellectually and experimentally. It culminated by the publication of an article in Nature. We had the fun privilege of featuring on the cover of Nature in that issue which we did not know until the day of the publication. I still remember my friend Roman Giger from Alex Kolodkin's lab, running down the hall between our two labs with the issue in his hand screaming '…you got the cover, you got the cover !!' I will remember that day for the rest of my life.

I learned so much from Anirvan. He always struck me as the most organized human being I ever met. I had to adapt to his level of organization because I was a mess when I started!

I remember the first discussion we had about a potential paper (perhaps 3 months after I started in the lab), sitting at the Daily Grind, with his little pad and a pen, drawing all the potential figures of the paper for which we had no data yet!! This long-term vision of what it actually would take to publish a paper on a given topic is an amazing gift that Anirvan has.

I think what best describes Anirvan for me is his generosity. Not only scientifically but also simply as a human being. Coming from France and not knowing anybody in US, he always offered to house me before and after my post-doc. It was always so much fun to spend some time with Lee Anna, Ryan and Akaina!

Being in the lab during these early years was a blast. Lori did an outstanding job figuring out the unexpected function of Notch signalling in shaping dendritic arborization under pretty tight competition (thanks Nenad and Pasko!). The 'transcription team' with Kate, Perry and Gene was under pressure too from other competitors (thanks Mike!) but ended up making amazing contributions to the field with the identification of the role of CREB and CBP in the control of BDNF transcription. One of the most distinct lab meeting memory I have from these years is when Anirvan proposed to initiate a large scale screen based on a yeast-one-hybrid approach to identify calcium-regulated transcription factors that would control dendritic differentiation. Perry, Kate and Gene scratched their heads and during the lab meeting we went into the nitty-gritty of how to actually make it work. And they did it!! I really admire Gene for performing this screen as a Ph.D. student! what an achievement… I'm sure his piece will tell more about the frustration and the difficulties encountered during the screen but from outside it just seemed like an awesome idea that came true.

I clearly remember the Halloween and Christmas parties at Anirvan's house where we started to play 'the GAME'. Quickly we learned every little embarrassing/fun/unusual things that happened in the life of every other members of the lab! Oh but you know what I'm talking about, right? You played the GAME at least three times by now!

I miss these early years, I would definitely start all over again… cheers Anirvan, happy anniversary and good luck for the next ten years!

I was nearing the end of my PhD and beginning to think about my post-doc. I had trained in electrophysiology and calcium imaging but wanted to learn molecular biology and mouse genetics. I'd never transfected a neuron and I felt I needed to learn. However, it's hard to get into a good molecular biology lab if your only experience in the field is having read The Eighth Day of Creation. Around this time, I received an email from Anirvan. He'd gotten my name from Karl Svoboda and said he was looking for an electrophysiologist who was interested in joining a molecular biology lab. We made a plan for me to visit. It seemed like a pretty good option. It wasn't until I visited the lab and met Anirvan in person that I realized what a great opportunity it was. Anirvan immediately impressed me as an incredible host, a supportive PI and an enthusiastic scientist with broad interests. He was serious about setting up a whole-cell patch rig in his lab, which meant I could continue to do recordings while learning how to do things like acquire and store a plasmid - dilute it in water and freeze, molecular biology turned out to be pretty easy in the end (-:

My interview went well. I enjoyed coffee in the tenth floor Ghosh Lab café, crab cakes for lunch with Anirvan, dinner with the lab at Helmand and a tour of Baltimore. Everyone was so welcoming and so engaged in his or her project. I met with Lori, Kristin, Gulayse, Hiro, MiRyoung, Yachi, Paul, Amir and Josh. I gave my seminar in the tenth floor library and only one person in the audience fell asleep – I took this as a good sign! The next day, before he dropped me off at the train station, Anirvan and I talked about potential projects.

I remember his enthusiasm. I was impressed and excited. My interest in how NMDA receptor activation produced unique kinetics of calcium influx to regulate downstream pathways and control synaptic function was a great fit with the lab. Everyone I talked to over that summer at Woods Hole had nothing but good things to say about Anirvan. I had informal conversations with other PIs regarding postdoc positions but it ended up being the only formal interview I did! I called AG at the end of the summer and agreed to start the next year. When I arrived at Hopkins I remember Anirvan telling me every card-carrying molecular biologist worth his stripes has made a mouse. I ended up making two. The first started with Hiro and I screening a phage library to generate the targeting construct. Out of two mice I attempted one was successful and one failed. My lifetime batting average is therefore .500, good for a baseball player maybe not so good for a molecular biologist. Like any card-carry molecular biologist, however, I soon learned that one could order these things! I have so many great memories of Baltimore and the incredible Neuroscience community at Hopkins. I remember hanging out with the Ginty lab and Kolodkin lab peeps at Brewers Art and Club Charles, running around Federal Hill and Ft. McHenry past the statue of Johnny Unitas at the stadium, living beside Camden Yard and following the Orioles. I distinctly remember Lori telling me, at my interview, that JF would want me to join his hockey team, without first asking if I even played hockey. I guess she figured he's Canadian he must play. She was right and our team won the championship! To this day I find myself defending Baltimore and telling people how great a city it is to live in. Even while I was there it went from the City that Reads to the Greatest City in America.

Then, one day, all of that changed. I showed up in lab and noticed a presentation on the desktop of a lab computer, the presentation was titled "UCSD seminar". When he arrived in lab I casually asked Anirvan if he had been to San Diego to give a seminar? His eyes went wide, he motioned me into his office and he closed the door. He was shocked and he needed to know how the news had leaked, had I heard from Kleinfeld, or had I heard it through Jeff? It was unclear to me why he was so shocked and I told him, no that I had only seen his seminar presentation on the lab computer desktop. We laughed and he admitted to being recruite for the Kuffler Professorship at UCSD. A year later the deal was sealed and the lab headed west (for me it was returning out west). I went from storing my bicycle behind the rig to storing a surfboard behind the rig. We rebuilt the lab, settled into San Diego and then watched the lab grow as a new generation of Ghosh Lab scientists arrived; Zilong (with his suitcase in hand arriving in lab directly from the airport), Meghan, Scotter, Matt, Emily, and the Beths (R&D), Stefanie, Joris and Ji-Eun, as well as Nichole, Aras, Liz and Katie.

So many excellent molecular biologists and physiologists gave the lab a great balance, plenty of success and many great memories. Like Baltimore, I have so many excellent memories of my Ghosh Lab years in San Diego it would be hard to mention them all: parties at Anirvan's house, Big Bear ski trips, surfing at La Jolla Shores with Amir before work, our lab running teams and national relays with Swifty Williams, Fast Track Sylwestrak, All Out Otto, Ripping Ripley and The Demon. Not to mention trips to Vegas with Jerry. As soon as we got to UCSD we plastered Pac Hall with large banners challenging all of other UCSD neuroscience labs to sporting events and each time (because the other lab got to pick the sport) we got absolutely destroyed.

We hosted Pac Hall Friday Happy Hours weekly starting the first month we arrived and this required weekly beer deliveries directly to the lab! Friday evenings we would play kickball against the chemists on any piece of grass we could find near Pac Hall.

"I gave my seminar in the tenth floor library and only one person in the audience fell asleep."

f course, the most memorable aspect of all of those years was having Anirvan as a mentor. Anirvan's enthusiasm and support for his lab are tireless. I was never sure how he managed to be so efficient, especially for someone who can't type! Anytime I walked into his office with a question, a crazy idea or a problem he always took the time to discuss things and I always left more enthusiastic. Anirvan has been an incredible mentor and friend. As much as I look back with fondness for my time in the lab, I also look forward to following (and being a part of) the next 20 years of Ghosh Lab stories and scientific advances!

Brett Staahl

"A series of scientific discoveries and serendipity brought me into the Ghosh lab family a few years ago. I'm grateful to have been at the right place, at the right time, to join the fun!"

How I came to the Ghosh lab is a story of scientific discoveries and serendipity. My story starts in grad school at Stanford University in Jerry Crabtree's lab where I was researching the biology of subunit switching in the BAF (aka mammalian SWI/SNF) ATP-dependent chromatin-remodeling complex in the context of neuronal development. My project focused on BAF subunits that switch paralogue expression when neural progenitors exit the cell cycle and differentiate into neurons. One of these switching subunits is encoded by the paralogues SS18 (Synovial Sarcoma 18) and CREST (Calcium-RESponsive Transactivator). CREST was discovered in the Ghosh lab (Aizawa et al. Science, 2004 is an impressive transactivator trap strategy used to identify calcium responsive genes in neurons).

In my last year of grad school, Aaron Gitler's lab moved to Stanford. They had recently conducted a whole exome trio sequencing study of sporadic Amyotrophic Lateral Sclerosis (ALS) cases and identified de novo mutations in a number of genes including CREST. Remarkably, albeit guided by Aizawa's characterization of CREST protein, I had already made one of the CREST mutations present in an ALS patient and characterized the effect on activity dependent dendritic outgrowth in mouse cortical neurons. Therefore, serendipitously, my cell and molecular analysis of CREST mutations complemented their genetic data from ALS patients and we started a collaboration. Over the course of these studies additional ALS patients were identified with CREST mutations. We recapitulated these mutations in mouse neurons and tested. This research was published in Chesi et al. Nature Neuroscience, 2013.

As I was wrapping up the above studies and my kinetic characterization the SS18/CREST BAF subunit switching, Anirvan came to campus and gave a talk on industry research at Roche Pharmaceuticals. I remember some light-hearted joking from the assembled faculty about Anirvan's job title, "Global Head of Neuroscience Research and Early Development". After the talk I introduced myself to Anirvan and told him "I have some interesting news about an old friend of yours, CREST". Anirvan was interested in our findings on CREST, the BAF complex and the link to ALS. I offered to send him the manuscripts and in the email I sent, I asked him about post-doc or research opportunities in his lab.

I remember him telling me to send the manuscripts to his UCSD email directly and to write CREST in the subject line. I thought I had gotten the inside track as he was telling the other students in the group to contact him through his assistant. Well, it turned out the inside track was still a long road…

Months went by after sending that email. Then one day an email from Anirvan showed up. We had a phone interview and Anirvan told me about the major themes of research in his lab. It was all so interesting and his enthusiasm for the science was infectious! This was early 2013 and he said all post-docs were now starting at Roche in Basel, Switzerland. I was interested, but my wife and I didn't want to move to Switzerland at the time because she was about to give birth to our first son, Jack.

I told Anirvan about my interest in gene therapy and gene regulation therapeutics, an interest that began during my ALS research. In this project a genetically dominant mutation in CREST was, possibly, the underlying cause of the disease. I thought –"Wouldn't it be great if we could inactivate the mutant disease causing allele or correct it?"

Anirvan said Roche didn't have a program like this, but after some thought he suggested the Roche Post-Doctoral Fellowship (RPF) program. The RPF program sounded like an awesome fit for my career aspirations, two years in an academic lab and one to two years at Roche in the Ghosh lab. Anirvan told me to find a lab that was working in the gene therapy/regulation field.

Serendipitously, in August 2012, a paper, Jinek et al. Science 2012, was published on how a programmable prokaryotic endonuclease could be used to target any gene in any organism across all three kingdoms of life! The endonuclease was called CRISPR-Cas9 and its applicability to be used in prokaryotes and eukaryotic cells had been discovered/invented in Jennifer Doudna's lab at University of California, Berkeley. I contacted Jennifer Doudna and pitched the idea of doing a RPF in her lab. She was excited to explore the therapeutic possibilities of developing CRISPR-Cas9 into a therapeutic.

Anirvan thought this plan sounded great so the three of us wrote a research plan, I interviewed with Jennifer and her lab members, we submitted our RPF application and then we waited and waited on the approval at Roche. It passed one review board and then was supposedly reviewed by John Reed, which took a very long time.

Finally, in August 2013, we were granted the RFP and I began my project in September, 2013. Jennifer Doudna's lab is a structural biochemistry lab with limited tissue culture and no animal experience. I set out to establish these capabilities. I learned a lot about protein and RNA biochemistry, purification and was successful in developing the Cas9 Ribonucleoprotein Complex (RNP) as a biologic agent for "genome editing" in vivo.

Over the next two years the field of CRISPR/Cas9 blew up! It's been like nothing I've ever experienced. Articles in the NY Times, Wall Street Journal, Wired, cover of Time magazine, Science and Nature, not to mention a patent interference case between University of California and Broad Institute of MIT and Harvard for ownership of the CRISPR-Cas9 patents. CRISPR-Cas9 has captured the imagination of so many people because it's a tool that makes editing an organism's genome as technically simple as doing a transfection.

The implications of this technology are vast, genetically modified organisms that cannot be differentiated from naturally-occurring genetic variants, treating the underlying cause of genetic disease and the potential to create 'CRISPR babies', a term first used in TEST-ROCK OPERA in Basel. CRISPR-Cas9 is a truly revolutionary technology and we've been at ground zero of the revolution. Of course Anirvan's lab does neuroscience, so the bar for my project was set quite high; deliver Cas9 into the brain and edit post-mitotic neurons in vivo. While other labs all around the world were editing HEK293T cells and publishing Nature and Science papers, I was working to edit neurons and doing it with recombinant purified and assembled Cas9 ribonucleoprotein complexes.

Anirvan has made prescient recommendations that I've picked up, sometimes quickly, sometimes slowly. We got the Cas9 RNP working in mammalian cells by Christmas 2013 and editing in neurons done by June 2014. We engineered the RNP to make it cell penetrating and in June 2015 delivered the RNP into animals for the first time. Soon thereafter, we got evidence of editing neurons in the brain and liver cells in vivo. We continue to develop the Cas9 RNP toward a permanent treatment or potential cure of genetic neurological disease, Huntington's disease specifically.

During this same time my wife and I have had two happy and healthy children, Jack and Jules. Anirvan, the consummate mentor, has been supportive of us along the way. He's been an advocate for me on this challenging project. He's worked to increase Roche Pharmaceutical's scope and funding of the project, so that I can continue to do this research at UC Berkeley.

A series of scientific discoveries and serendipity brought me into the Ghosh lab family a few years ago. I'm grateful to have been at the right place, at the right time, to join the fun!

Dee Andryszak

The Christmas party at your house ~ my first year. We played Charades ~ a game that I had seen many times, but never played. I was a little cautious, because I don't like to be in front of people - center of attention, but to keep from being the party-pooper, I thought I'd go ahead and play. How Bad Could It Be....It was movie themes...well, guess what mine was.... that's right a little piece of death was written on the smallest scrap of paper....."Buns Of Steel" Anyway, after all these years I finally got over it :o)

As a new graduate student to UCSD, it's hard not to notice Anirvan's lab as a cornerstone of the UCSD neurobiology section and a favorite among the students. I had started at UCSD with a keen interest in electrophysiology and had already rotated in some fantastic labs. Knowing little of molecular biology, I thought I'd do a rotation in the Ghosh lab to learn some new skills, but I had no strong intention to join the lab. I had little idea I would call that place home for the next 5 years. The lab was an incredibly welcoming atmosphere and an intellectually stimulating one. Luckily, Ben Hall was there to provide electrophysiology expertise for the day-to-day and Anirvan helped me envision a project that combined my interest in electrophysiology with the molecular expertise of the lab. I was hooked!

After floundering a bit, I veered off the main path of the lab and started a project in interneurons at a time when everyone was focused primarily on excitatory neurons. I lacked more knowledge and know-how that I would have liked, but Anirvan was patient and my labmates were encouraging. I don't think I can stress enough how my fellow labmates helped me through this period.

During times when I simply lost motivation to do experiments, to times when I considered quitting grad school altogether, they were more instrumental to my success than the rig. On campus, that might mean: lunchtime break and crossword puzzle collaboration, random heated debates if our lab gloves were blue or purple (Katie Tiglio!), brainstorming lab Olympics events, the often-postponed but always appreciated Ghosh Lab Grad Student Happy Hour, and slosh ball out on the field. But it was the even more mundane that often counted the most. If I needed to return to lab late to finish something up, I could count on Beth Ripley or Scott Wilke to be there and suddenly it didn't seem like such burden to return.

It was a lab where people not only got along, but were actually close friends. For a few of the years I was there, Ben was the heroic instigator for much of our recreational activities. He organized events both inside lab and out: relays in Seattle, DC, and San Francisco; Sunday morning beach volleyball; lab happy hours; ski trips, and more. I particularly look back on the ski trips with fondness. I'm not a keen skier myself, but then again that wasn't really the point of the trip (it's southern California, after all). Inevitably, complications would emerge that were excellent fodder for memorable moments. One year a snow storm turned the journey to Big Bear into a 10 hour trek, including a few near death scares on the road. But we'd always make it through the bumps, cook fine food and enjoy good conversation. Often after dinner activities would include an epic game of beer pong. Anirvan's competitive nature would emerge, as well as his low tolerance for alcohol (although I think at one point Dimitri served as his designated drinker). But there were plenty of beer-fueled shenanigans to go around. I also remember one year Matt spent half the night and the following morning in a full length nightgown he dug out of the cabin's closet.

Like any strong group, it was dynamic. When I started in the lab, the projects were transitioning into the "synapse period". During my stint in lab, focus shifted from biochemical, to in vitro cell culture assays, to slice preparation, and by the time I left for Switzerland, we had a true in vivo contingent, spearheaded by Alberto. Scientifically that lab was drastically different than the one I had joined, but the spirit of the people had not altered. When Anirvan announced the move to Basel, I took the slightly surprising, but ultimately transformative decision to join him. So over the next two years, I saw a new and even more extreme transition. Anirvan had dozens of new people to manage at Roche, intercontinental lab meetings, and essentially two full time jobs. Somehow, he it still worked. I had to develop new techniques to get his attention on some new data, or a paper revision, but it all worked out in the end. In the two years I was at Roche a barrage of papers were published. Granted the foundations were laid years before, but it still felt like an incredibly productive time for the lab. I also had the rare chance of getting a taste for the scientific environment in industry, while still being able to work in an academic environment, since Peter Scheiffele was so kind as to let two of us squat in his lab. My new labmates in Basel mirrored the great group in San Diego. Having all just moved there, we became fast friends and explored Switzerland and beyond together: sledding and ski trips to the Alps, meandering down backstreets of Marrakesh, sipping on tsipouro in Athens, or road-tripping around Rajasthan. It was two intense years of science and exploration: frantically working to publish my paper, trying to sneak in trips where I could, and decide what to do next. Not every advisor would be so supportive, but I'm so grateful that Anirvan was.

The Ghosh lab will always be a part of my life, because the people are still in my life in a very real way. I still have lunch regularly with Laura and share beers with Scott in San Francisco; I've visited Joris in Leuven, Megan in Salt Lake City and Stef in Helena. We may be far apart, but the ties are strong enough to endure the distance.

A very happy anniversary to the Ghosh lab and a heartfelt thank you to everyone for making the lab one that helped me grow as a scientist and as a person.

Gene Hu

"Besides, Anirvan had a lot of money for me to spend, which I still think is true in his lab now!"

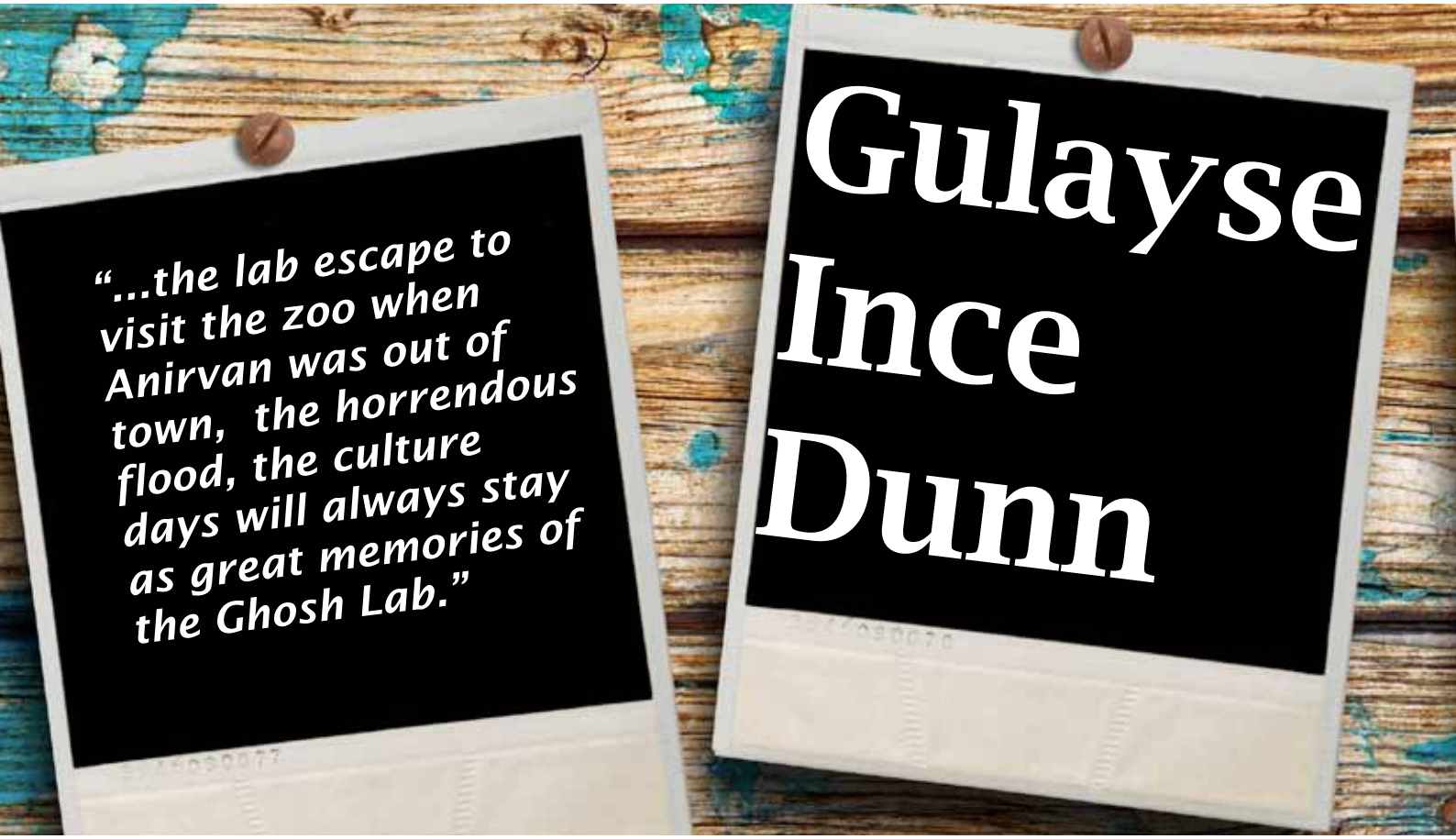
.....I came back from the Cherry Blossom Festival in Washington DC on a Saturday night in April 1998, my second year at Johns Hopkins and a little more than a year after I joined the Ghosh's lab. I had a good time in DC that day, and had lunch in Chinatown with several friends who came down from New York. I had to go back to the lab to develop some CAT assays, an antiquated, very labor-intensive expression system by which I am still traumatized to this date, since I did way too many of them.

I was struggling a lot then, and was doing several projects at the same time, both the projects based on Anirvan's ideas and my "secret projects" that Anirvan didn't know too much about. I was pretty desperate, and saw no way out of the graduate school, a reality I didn't anticipate when I applied for the graduate school. Retrospectively, I really believe my stomach problem started at that time.

Back on the 10th floor of PCTB, I was the only one there, not surprising considering how a beautiful balmy spring day it was earlier that day. I went to the dark room, where I had far more heartbreak than joy, then I put the cassette into the scanner. It was the CBP experiment. I couldn't figure out why exactly I did that experiment, as most of my secret projects. As a second-year graduate student seeing no light at the end of the tunnel, logics was not was a consideration. I believed in brute force. Volume of experiments also mattered. Besides, Anirvan had a lot of money for me to spend, which I still think is true in his lab now!

Then the moment came. A very dark dot. I saw my ticket out of the graduate school! And the rest is history.

Of course there are other memorable moments. Like those games we played at the parties in Anirvan's house. I hope you guys are still playing them at his parties. I should have felt more excited about the project of transactivator trap, a project based on Aniran's idea, one of very many, but not my secret project. I stopped all my secretive operations after the CBP project, because I could smell my PhD better now, and because Anirvan was more money-conscientious! The transactivator trap was indeed very logically designed, with many steps in the process, thus diluting out the big climax. Anyway, I really miss my days in the lab, even though after I left BaltimoreI have been enjoying my jobs very much in Seattle and now in New York. I also miss deeply the people in the lab when I was there.



Gulayse Ince Dunn

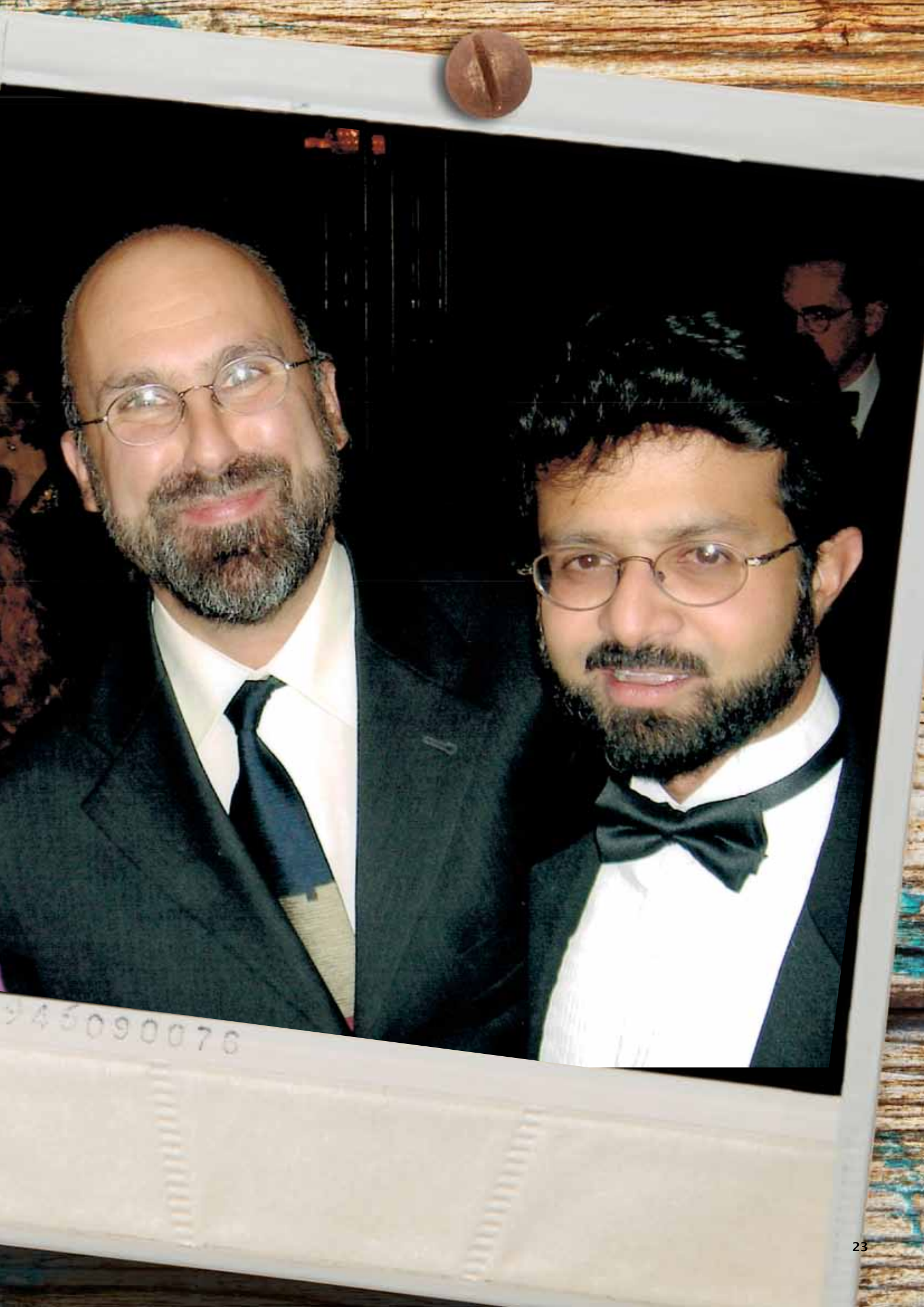
It is hard to believe that it's been ten years since I left the Ghosh Lab. Ten years on and still I remember those graduate school days as some of the most fun times of my life. When I first joined the Ghosh lab as a rotation student I was given a bench right outside of Anirvan's office where I started to work on the famous transactivator trap screen. I had a whole bench all to myself and my only neighbor was Frankie the mouse with his eartag hanging on one side. Gene was the master of the transactivator trap and I followed him around everywhere in those early weeks. After some hundreds of bacterial plates, minipreps, neuronal culture transfections and stainings with Gene, finally we identified the molecule that I would study for a very very long time. I remember the day we got the sequencing result back, blasted it, saw NeuroD2 pop out on the screen and how excited we all were. Then came of course, years of painful CAT assays, and a lot of mouse work. All worked out and we were able to show a role for NeuroD2 in the development of the somatosensory cortex.

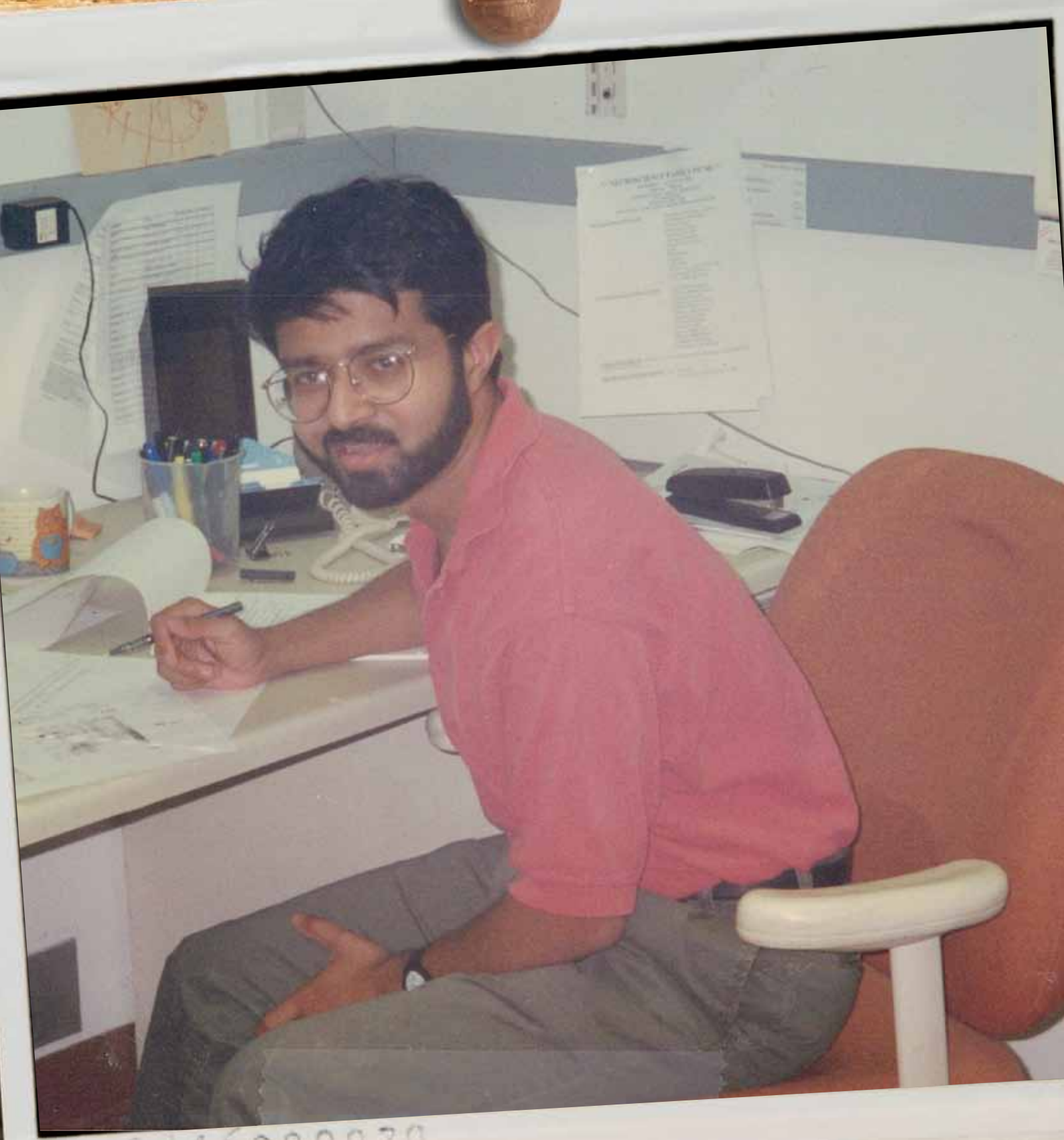
While working hard, a lot of fun with a lot of great people was had at the Ghosh Lab. Lori, Gene, Paul, Mi-Ryoung, Amir, Yachi , Daniele, Kristen and Ben all became great friends. I can never forget Gene's exotic recipe's of weird creatures, Paul's cheese sandwiches, Amir's secret girlfriend and Lori's never ending patience for all the questions I had. The tiny Ghosh café at PCTB 10th floor, lab parties and the infamous games, lab lunches, birthday cakes, the lab escape to visit the zoo when Anirvan was out of town, the horrendous flood, the culture days will always stay as great memories of the Ghosh Lab. Congratulations Anirvan on 20 years of doing extraordinary work with wonderful groups of people. And wishing the best to all the ex-Ghosh lab folks!

Josh Buchman

The Ghosh lab was helpful to me in terms of deciding finally what I was going to with myself after college. I have to say that the positive attitude in the lab and the excitement that people brought to it every day made a career in science seem like a feasible and pleasant option to medical school. It is therefore reasonable for me to blame Anirvan and my former labmates for their bad influence if graduate school does not work out for me. I remember lots of little things from those days. I remember going to lunch with Esther, who knew everyone in the Northeast Market in Baltimore. I remember having a communication breakdown with Hiro while he was driving me to my car in Pikesville. I also remember how I really liked postdoc candidate interviews since Anirvan would pay for dinner for the lab on those days and we could generally get away with going to a pretty decent restaurant.

One of the strangest things I remember was a lab-related dream I had. At the time I had the dream, I had come down with some kind of mild flu or cold. I had also been genotyping a large number of mice for the past few weeks and culturing a large number of rat neurons. In any case, I think my exposure to so many rodents had some weird effect on me. I recall lying in my bed sick and either hallucinating or dreaming, but seeing myself from above my bed, where I was laying in a full-body rat costume, complete with a tail, ears, and fur. So, finally, thanks Anirvan for allowing me the opportunity to work in the lab and good luck in the future.





Joris de Wit

I first met Anirvan at the 2005 SfN meeting in Washington DC, when I was looking for labs to do my postdoc. We met and discussed potential projects, and I was probably equally impressed with Anirvan's energy and ideas, as I was with his love for bright and colorful sweaters. I still remember the one he was wearing that day: it had some vivid combination of orange, green and purple (you probably know which one I'm talking about!). After that initial meeting I visited the lab in March the next year, and was truly excited by the science and the vibrant and positive atmosphere in the lab. I remember thinking on the way home to Amsterdam that this was the kind of lab I would want to do my postdoc in. Of course Anirvan was interviewing multiple candidates, and it took a while before I finally received an offer. It didn't take long to decide that I would be heading to San Diego.

I started in the lab in November 2006, and one of the first things I noticed were the traces of former lab members, whose names I recognized from papers, but most of whom I had never met. The shelf above my desk was sagging under the weight of Gulayse's old binders, Paul's kitchen magnets with his wedding date on them were still decorating the three TC flows, and I also found one of Franck's old slide boxes in my drawer, which I decided to keep for those experiments that needed a bit of extra luck (it worked).

My project followed up on Megan's discovery that dissociated hippocampal neurons still show a preference to connect with their original target cells. The plan was to look into the molecular mechanisms regulating specific synaptic connectivity between hippocampal neurons, and Anirvan suggested to use the newly launched Allen Brain Atlas as a search tool to screen for differentially expressed genes encoding synaptic adhesion molecules in the hippocampus. This approach worked remarkably well, and I soon started screening candidate genes for their effects on synapse formation in cell culture assays. We noticed very early on that a particular class of genes encoding leucine-rich repeat-containing receptors showed strikingly specific expression patterns in the hippocampus. Little was known about this class of proteins at the time, but they seemed to meet all the requirements for synaptic adhesion molecules involved in regulating specific connectivity. However, most LRR genes I tested for an effect on synapse formation had no effect. I remember exactly when I first discovered synapses on HEK cells expressing an obscure cDNA called LRRTM4.1, sitting at the old Leica SP2 confocal in Bonner Hall and thinking: this is it! I soon found that another LRRTM family member, LRRTM2, had even stronger effects on synapse formation, and from then on we quickly worked out the role of LRRTM2 in regulating excitatory synapse formation.

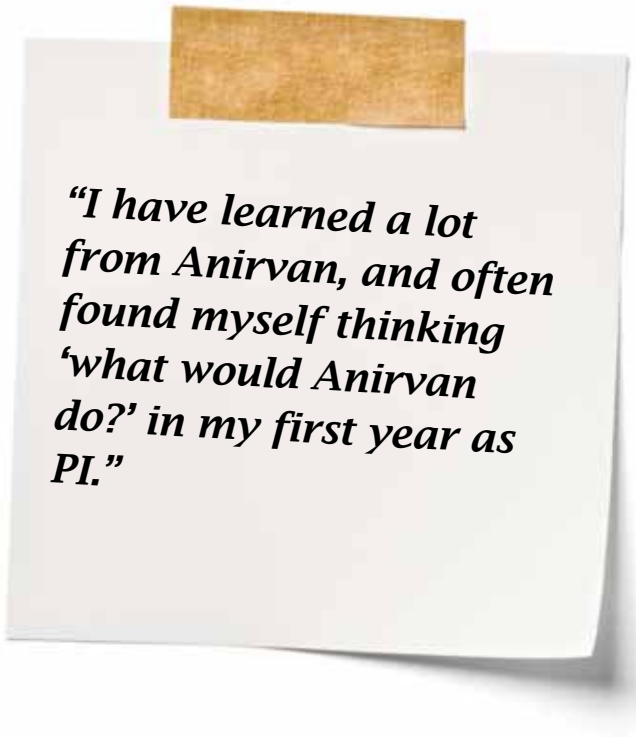
Things were about to change though. One morning, as I was Googling for LRRTM2 antibodies, I found the title of an article in press at Neuron that was almost an exact copy of the title of the manuscript I had been preparing. We had been scooped! Our attempts to rush in our manuscript at Nature Neuroscience failed miserably, and we had to admit defeat. There was nothing left to do but go back to the bench and try to come up with the next part of the story, identifying the presynaptic receptor for LRRTM2. I set up an expression screen with a cDNA library, but was unable to identify LRRTM2-binding clones. It was a frustrating time.

My fortunes changed when Jeff Savas, a postdoc in John Yates' proteomics lab at the Scripps Research Institute, contacted Anirvan to do a neuroscience project in his lab. Jeff and I devised a protocol, and within a few weeks after our first meeting did an affinity chromatography experiment with the last bit of my purified LRRTM2 ectodomain protein on synaptosome extract. As I left for a long-planned vacation in Hawaii, Jeff ran the samples on the mass spec. A few days into my vacation all our phones started ringing at the same time. We had no cell phone reception at the house we were staying at, and as we drove into town that day, we found that Anirvan had left voice messages on every number he could reach: the mass spec had identified the presynaptic adhesion molecule neurexin in our sample, and a whole lot of it. I remember that Anirvan initially suspected that Jeff was pulling a joke on him, but Jeff didn't even know what neurexin was when the data came in! It was one of those truly exciting moments in science that make up for a lot of frustrating experiments.

But it was not to last; about a week later, Anirvan called me again, this time with the message that another lab might also have found a receptor for LRRTM2. Getting scooped twice in a single year would be too much, and I was seriously considering a career change on the plane ride back to San Diego a few days later. My mood turned when I got to the lab however. Anirvan had mobilized half the lab to do experiments to wrap up the paper and everyone was excited. Anirvan had even done an experiment himself! (it didn't work). Stef, Matt, Emily, Davide Comoletti and I worked insanely hard for a week, got the data we needed to complete the story, and then Anirvan and I worked until midnight to finalize the manuscript for resubmission, with Lee Anna bringing us food so we could continue working. The paper got accepted a few days later. Thanks to Anirvan's talent for bringing people together, creating a positive atmosphere and getting people excited, we were able to complete an enormous amount of work in just over a week. It was amazing, and I owe everyone who helped out.

After that intense period, things normalized a bit and we worked on several projects involving LRR proteins and synapse development. I was very fortunate to work with immensely talented people on those projects, Matt, Laura, Jeff, Emily, Stef, Katie, Becky, Max and Merve. It was an exciting time in the lab, with exciting discoveries and a positive atmosphere.

What made the Ghosh lab such a cool place was all the fun things we did outside the lab. Lab ski trips to Big Bear, camping trips to the desert, playing disc golf or bowling… not to mention the much-dreaded Game, and trying to come up with something embarrassing for it on the way over to a party at Anirvan's because you knew it would get played! It was always very funny to see how competitive Anirvan would get, paying out dollar bills at disc golf or bowling to whoever would score the highest. I also remember one camping trip to the Anza-Borrego desert, where Anirvan insisted bringing water on desert hikes was overrated and he came back very thirsty! Another thing that made the Ghosh lab special was Anirvan's generosity. He bought a cute little dress for our baby girl, gifts for all the lab kids at Christmas parties (including a man-sized stuffed penguin that is still occupying our daughter's bed 4 years later), and let us use his house before we moved back to Europe.
I have learned a lot from Anirvan, and often found myself thinking 'what would Anirvan do?' in my first year as PI. I miss the old Ghosh lab days, and I feel fortunate to have been a part of it. Happy 20th anniversary Anirvan!



I came to Hopkins in 1996 for the MD-PhD program. During my first year of medical school, I gave a lot of thought to which lab I should rotate in during the summer of 1997. My undergraduate background was in developmental biology, but I was planning on joining the neuroscience graduate program and considering neurology for residency. When I talked with people about it, the same name kept coming up: the Ghosh lab. By the time I heard Anirvan give his cortical development lectures during the spring Neuro A course, I decided to approach him about rotating in the lab.

That summer, the lab included Lori Redmond, Perry Shieh, and Gene Hu. Tim Moeller had just left, and Kate Bobb had just started. Franck Polleux was newly arrived from France. At the time, it didn't occur to me what a brave thing it was for these people to have joined an essentially brand-new lab. But it was clear even then that Anirvan had what it takes to thrive in academic science and was able to recruit some of the brightest, most amazing people to his lab.

I officially joined the lab in the fall of 1998 and returned to medical school in the fall of 2002. I spent much of the first year taking classes and working on an ephrin project that never really went anywhere. Then, when Anirvan returned from the Cold Spring Harbor meeting in 1999 with a really neat story from the Tessier-Lavigne lab about Slits and Robos and the offer of a collaboration, the rest, as they say, was history.

What do I remember best about my years in the lab? The joy of dissecting brains under the microscope. Many, many late nights returning to image slice overlay assay experiments. Developing a fierce mouse allergy. The comraderie in the lab. The extraordinary helpfulness of the senior postdocs. The people, including Terri Morrow, Paul Dijkhuizen, Mi-Ryoung Song, Gulyase Ince, Amir Kashani, Daniele Peters, Josh Buchman, Hiro Aizawa, Yachi Chen, Rebecca Alvania, and Ben Hall. Lab parties and Anirvan's game. The excitement of watching scientific discoveries unfold. Birthday cakes from Patisserie Poupon. And the bittersweet moment when the lab was finally packed in October 2003 for the move to San Diego.

I'm still here at Hopkins, training to become a pediatric neurologist and waiting for the time when I can go back to the lab. It was really special, being part of the Ghosh lab and I recall very fondly my time as part of the Ghosh bunch.

Laura DeNardo Wilke

When I was applying to graduate school, Anirvan's lab stuck out as one of the most interesting potential thesis labs. Still, since I had been living in California my whole life, I thought it best that I move to the east coast for a few years to experience something new. When I visited UCSD, all my plans changed and I knew that it was the right program for me. The great faculty and the tight-knit community of happy graduate students made UCSD stand out as a rigorous but fun program where I knew I could thrive intellectually and socially. Looking back, I realize that much of this sense of community was thanks to Anirvan. As head of the Neurosciences graduate program, he always had the students' best interests in mind and encouraged us to balance hard work with fun.

I did my third rotation in Anirvan's lab and it was immediately clear that it was the best lab for me. I entered graduate school with an interest in synapse development and function, but I loved the problem of synapse specificity, which had recently become a major focus in Anirvan's lab. I was surrounded by a fun, smart and generous group of postdocs and graduate students. They were always willing to help me and I learned so much from my peers.

My thesis work focused on the molecular basis of input-specific synapse development in the hippocampus. As I set out to study the role of the LRR protein NGL-2 in CA1 development, other students and postdocs were studying different adhesion molecules with distinct roles at different hippocampal synapses. We were all thinking about similar problems and using similar techniques, which made for engaging lab meetings and a collaborative lab environment. I was a little concerned when Anirvan left for Roche during the middle of my PhD, but with a few months of practice (it did take a surprisingly long time to figure out), we became masters at the Cisco-Webex lab meeting and things carried on as usual.

While I loved the science, the best thing about the Ghosh lab was the group of people I got to work with. We had a great time both inside and outside of lab. I loved doing the NY Times crossword at lunch and our lab trips to Big Bear and Joshua Tree. We also had great holiday parties during which Anirvan wore an elf hat while encouraging us to share our most embarrassing stories so he could read them aloud and make everyone guess who did what. Once he lit tequila-soaked hot chocolate on fire with the help of the guy running the taco truck in his backyard. I realize now that it's rare to get to have so much fun while doing a PhD in Neuroscience.

As a postdoc, I am studying wiring specificity in cortical circuits. When I arrived at Stanford, it quickly became clear how well my thesis work in Anirvan's lab had prepared me for this next step. My thesis project provided me with a strong foundation in neurobiology concepts and techniques. Studying input specificity was a great intellectual bridge between synapse development and circuit wiring. Most importantly, I had the tools to be an independent scientist and to develop and carry out my own project. While I love working at Stanford, it has become clear that Anirvan's lab and UCSD Neurosciences graduate program were truly unique places in terms of the close-knit community of smart, talented, friendly and fun scientists. I was so lucky to have worked there and I will cherish those memories forever.

Lori Redmond

When I joined the Ghosh lab at Hopkins in December 1996 I began working on Notch signaling in neuronal differentiation. Intrigued by Notch in graduate school, pursuing it's function in mammalian neuronal development was enticing. Initial experiments Anirvan and Tim had done attempted to determine if Notch had a role in cell fate in cortical development. I immunostained developing cortices with Notch antibodies from Gerry Weinmaster. After seeing Notch in the nucleus of differentiated neurons, I knew that this was the question to pursue instead of the cell fate/asymmetry story popular at the time. Many experiments later, we had a story. Demonstrating Notch in the nucleus of normal cells had not been done and it was exciting data. However, convincing reviewers of our result took another year of experiments. Fortunately, we succeeded and the paper was published. After experiencing life in the difficult field of "Notchology" I redirected my efforts to understanding the morphological consequences of calcium signaling. Again many experiments later we knew that calcium, CaM Kinases and CREB controlled dendrite morphology. The first time I saw the extensive morphology of CaMKIVca expressing neurons was thrilling.Along with Amir's calcium imaging of cells and slices to help with "physiological relevance" and give us some great movies (what else would you expect of a guy from LA?), the paper was published.

Throughout my tenure in the Ghosh lab, the "Ghoshettes" were a wonderful group of young scientists who worked and learned together with a remarkable attitude of cooperation, humor, and respect. I have numerous fond memories of the time, of which only a few are described below.

The winter and spring following my arrival in the lab, I noticed whistling like sounds emanating from Anirvan's office and following him around. I refer to them as "whistling like" because they sounded like someone whistling softly, but after many attempts of careful listening I could not identify any tune or melody. To my relief Franck also noticed the "whistling". When I asked Leanna about this, she confirmed my suspicion. Anirvan was indeed whistling, but not any tune, or least not one anyone else knew. The whistling ceased after Perry's paper was accepted and I came to realize that the stress of being an Assistant Professor manifests itself in unusual ways. It placed the expression "whistle while you work" into an entirely different perspective. Which leaves me to wonder, "what am I doing?"

Anirvan consistently arrived at the lab by 8:30am and preferred to meet scientists invited to give a seminar as early in the morning as possible. The majority of the members of his lab did not share his tendency toward early mornings. This was particularly true in the "early days". At one lab meeting, he strongly encouraged us to arrive before 9am. His intent, as I recall, was to ensure that we maximized on the number of hours in the lab we overlapped with his. Both he and the lab would benefit. We would have more time to interact discussing data, planning the next experiment, etc. Another benefit, was of course, that his lab didn't appear empty when scientists came by for an early morning meeting. Lab members obligingly responded and arrived earlier. It lasted about a week. Later as the lab grew, early birds arrived, and the early mornings as well as the evenings were bustling.

In the early days Anirvan was a big proponent of self-help books, particularly time management. Whether a result of one of these books or a habit gained earlier, Anirvan had a propensity to make "to do" lists. Every trip away to give a seminar would leave him sufficient downtime while traveling to organize our research projects into a prioritized to do list. Each of us knew that his return would bring a list for at least one of us. He would also organize our research projects as part of one-on-one meetings. These meetings and lists were beneficial. Not everything on the list was accomplished. Some of the lab members affectionately referred to their collection of lists as "the bible". The items on the list were not a surprise to either Anirvan or the lab member.

However, I have now come to suspect that the lists were as much a means to keep Anirvan organized, as it was for us.

The items on the list were not a surprise to either Anirvan or the lab member. However, I have now come to suspect that the lists were as much a means to keep Anirvan organized, as it was for us.

In the Ghosh lab culturing primary cortical neurons was a group effort and an essential aspect of our research. When you're doing 10-20 embryos a culture, time matters so we had "dissecting races". Anyone who could dissect at less than 3 minutes an embryo was deemed a pro. Gene and I were always neck and neck. We never broke the 2 minute barrier though.One seemingly ordinary culture day, Perry, Gene and I worked together to establish cultures and dissected a litter of embryos. After the tituration, the cells looked absolutely terrible and judged not worth plating. So we made fresh solutions and repeated with another litter of embryos. Unfortunately to the same end. By then it was late and we were really scratching our heads trying to figure out why the "tried and true" culture procedure just wasn't working. Solutions were all made correctly, tituration wasn't too harsh, just WHAT was the problem? That's when I looked at the water bath and realized that neurons don't like being heat shocked at 42C for 40min. After resetting the water bath to the correct temperature of 37C, solutions were remade and the last available litter of embryos was dissected and successfully cultured. I now use a digital water bath, and check it often.

Other recollections:

- Ann standing in the cold room, using it as her personal cooling system.
- Sang's mastery of the plasmid prep
- Amir's delight in the tricked-out imaging scope (the more toys the better!)
- Franck saying, "Sushi is SO GOOD!" and his ORANGE shoes
- Perry waiting until he had dozens of CAT assays, and doing them all at one time
- Kristen's excursions into the National Parks - hiking, camping and the great outdoors
- Gene playing oldies on the radio
- Terri's love of "the game"
- Gulyase's lunch companions, her "harem of men"
- Paul's cheese sandwiches
- Trips to the Daily Grind for coffee and hot chocolate
- Great birthday cakes, parties, and champagne celebrations
- Ghosh cafe (the table in the hallway) - where science was dis cussed and experiments planned; a great place for lunch, celebrations, and good conversation.

Thanks Anirvan for creating an atmosphere that was productive and supportive. Congratulations on your 10 year anniversary!

From the first floor of Pacific Hall to a worldwide neuroscience syndicate, the Ghosh Lab was a changing place between 2007 and 2013 while I was a graduate student and postdoc. When I moved to San Diego, Anirvan was key fixture in the Neurosciences graduate program at UCSD: as program director, I first met him at my interview; as teacher, he was the first lecturer of the year in the cellular/molecular neuroscience course; and as a PI, his lab was my first scientific home. When my project's progress was agonizingly slow, his predictably unflappable demeanor, patience, and never-ending ideas always left me feeling better. It took a bit longer to get to know Anirvan personally, but through time in the lab, Christmas parties at the Ghosh residence, desert camping trips, and ski trips to Big Bear, it sure did happen! His insatiable curiosity manifested not only in his eagerness to take the lab into scientific territory well outside his past experience, but also in the way his career constantly evolved from graduate program director, to department chair, to Anirvan Roche. But his fun-loving nature came through in desert pyrotechnics and woefully inept but comically intense beer pong competitions.

The social environment of the lab was the most exceptional part of the experience for me, though. Working with Joris and Jeff over the years was incredibly rewarding; I was confident that they were eager and uniquely able to help me, and I in turn was motivated to do whatever I could for them. I feel truly fortunate to have shared as much time with Scott, Emily, and Laura as I did, and miss them often (since I failed to get the memo that I should move to San Francisco with everyone else from San Diego).

When Anirvan solicited contributions for this 20-year edition of the Ghosh lab scrapbook, this little exercise in nostalgia was a fun process of sorting through some fond memories and taking stock of where I stand now versus 8 years ago. As the trajectory of my career in science and medicine remains somewhat uncertain, I know that I can count on my Ghosh lab connections both personally and professionally.

In retrospect, I joined the Ghosh Lab rather serendipitously. Of all my postdoc interviews, this was the most informal one and in the end it was the one I was most excited about. On a sunny February morning, I met Anirvan in his Pac Hall office and presented my work briefly. A few rounds of out-of-the-box discussions later, I was thinking I would really like Ghosh Lab to be my next home. Although I wasn't necessarily looking at options in pharma, I jumped at the idea of joining the Basel lab. After a few months, I was in Basel just in time for the cold wave that was to sweep Europe that winter. Roche is a really exciting place to be in and Ghosh Lab Basel is based on an interesting concept. Postdocs work in different labs of the Discovery neuroscience department based on their skill sets. We come together for lab meetings, birthday cakes, night sledding in the Alps, wine tasting, Swiss national day fireworks, early morning carnival parades and holiday parties.

While Anirvan and I discussed the intellectual direction of the project, I had all the necessary support at the technical level to execute ideas. The primary goal of my project is to understand the neural circuits that govern normal social behaviors. This is a lot more in-vivo and behavior based project than the others in the lab and Anirvan made sure I had all the help I needed to start this project.

As part of the big group Anirvan heads at Roche, we were able to collaborate with many labs and give our project new directions. For instance, my initial experiments using chemogenetics support a role for prefrontal cortex in sociability. To understand the circuitry that is recruited by activating the PFC, Anirvan encouraged me to work with the MRI group in Roche. Small animal MRI is well established at Roche and in collaboration with them, we were able to test the brain-wide consequences of acute activation of the PFC in an intact circuit. This generated several interesting hypotheses about brain regions that could be directed by the PFC to control social behavior. As I write this, I am at the exciting crossroads of asking a basic question about social neurocircuitry and exploring the possibility of using this knowledge for drug discovery.

As it turned out, setting up animal use protocols and transgenic mouse lines in Switzerland was a challenge. But it was one I enjoyed and learnt a lot from. During this time, I took temporary shelter in Ghosh lab San Diego, where I was able to do pilot experiments that enabled me to come back to Basel and hit the ground running. With Merve and Max's help, and after many trips to the machine shop at the SIO, we setup the social behavior paradigms in the UCSD lab. Alberto, Laura and Matt helped me get started with the surgeries, and when Joris heard I don't have a lounge chair in my sublet in UTC, he lent me one. Laura sheltered me for a little while when my sublet ran out while I was finishing up and Euiseok was always there if I had to discuss work.

In my interactions with Anirvan, I continue to be inspired and awestruck by his energy. Now, Ghosh Lab meetings with Meghan, Ramya, and Tev, in Basel and Balaji and Lilian at UCSD over Webex are a fun and diverse mix. Starting from synaptic specificity to circuit specificity going all the way to developing cutting edge tools, I learn a lot from every lab meeting, even if it's a 6 pm lab meeting over sandwiches after a long day of experiments. I feel lucky to be part of this - if I may borrow Matt's words – 'worldwide neuroscience syndicate'.

Here's to many more years of Ghosh Lab and all the avatars it may take.

I came to the lab as it was in the midst of the momentous move to San Diego, so my first couple weeks were occupied with unpacking boxes. My main research project looked at the effects of activity on dendrite growth. I also worked on a clone from the transactivator trap screen. For a time, I had the pleasure of acting as lab computer czar, setting up the computer room and taking a crash-course in web design as I set up the original version of the lab webpage at UCSD.

One of my favorite things about the lab was the weekly lab meeting when lab members would present some of their own work or a journal article for discussion. I also enjoyed (of course!) the various lab social events like happy hour, dinners, and various parties. My time in the lab (and in San Diego) came to an end before I knew it. I am now in my second year as a medical student at the University of Colorado Health Sciences Center in Denver, Colorado. I hope everyone is well and thriving in their various pursuits.

Megan Williams

When I was a graduate student, I read Franck, Terri, and Anirvan's Nature paper using the cortical slice assay to dissect molecular mechanisms of dendrite patterning. I was immediately struck by how simple yet elegant it was and Anirvan's lab went right to the top of my "potential postdoc lab" pile. I had never met Anirvan and knew nothing about the lab but I gathered my C.V., publications, and research interests and emailed them to Anirvan inquiring about a postdoc. Then, to make sure he didn't overlook my application, I sent a hard copy of everything to his office door by FedEx. Looking back, this could have been interpreted as lunatic stalker as much as enthusiastic (which is what I was going for) but luckily Anirvan tends to look on the bright side and invited me to John's Hopkins for an interview. During my interview in Baltimore, Anirvan broke the news to me that the lab would soon be moving to San Diego and asked if I would mind if my postdoc was at UCSD? This interview was getting better by the minute. Sign me up!

I moved to San Diego a few months after the lab officially opened and began a project investigating mechanisms of synaptic specificity. After an axon is guided to the correct region of the brain, how does it select among the many potential synaptic partners in that specific area? My first goal was to determine if neurons could identify and synapse with their correct synaptic targets in dissociated culture lacking axon guidance patterning cues. Ha! I was actually trying hard not to study what drew me to the Ghosh lab in the first place. Eventually I set up a microisland system in the lab and with help from Beth D. and Anthony, we accumulated several lines of evidence that hippocampal neurons actually wire up correctly in a culture dish. It wasn't as "perfect" as in the brain but it was far more specific than most scientists envisioned. After several more years, I honed in on a molecule (cadherin-9) selectively required to form one type of synapse over another. By that time, the majority of the Ghosh lab had morphed its focus from cortical patterning to hippocampal synapse form, function, and specificity.

My project was conceptually simple but technically difficult. This made for a long postdoc with seemingly endless stretches of failed experiments and new experimental hurdles to overcome. While this situation could easily turn the cheeriest person into a bitter old postdoc, I like to think this didn't happen to me (perhaps some of my lab mates disagree! but this was one of the most fun times of my life. Mainly because life in the Ghosh lab was a blast and we really were one big extended family. Anirvan is a positive thinker and was convinced my project would work. Even if he was faking it, it really helps to think your PI has confidence in you. Anirvan was also always very interested in truly mentoring his lab members and prepping us for our future careers. He would introduce us to speakers and encourage us to present at meetings. So that I wouldn't be totally clueless about electrophysiology when I went into the real world, he asked Ben to run a 2 week ephys boot camp. Beth R. and I were to be whipped into shape!

Finally, the Ghosh lab's "no jerks allowed" policy meant that everyone was (and still are!) friends – from techs to students to postdocs – and even people outside the lab wanted to be unofficial Ghosh lab members. We spent most of our free time hanging out together doing things like:

- Road trips to Vegas
- Lots of running and 24 hour relay races –Team UnderPhunDed!
- Happy hours in the lab, outside the lab, and playing kick ball Sunday disk golf
- Our "Failure to Spike" Beach volleyball team
- Lab camping trips at Joshua tree – speeding tickets and flaming anarchy signs (you can't take Anirvan anywhere!)
- Lunch room NYT crosswords

I now have a lab at the University of Utah and the Ghosh lab has entered a new era at Roche in Basel, but it's spirit lives on across the globe. I try to instill many of the same values in my own lab – scientific rigor, envisioning the bigger picture, and community spirit. Cheers and happy anniversary to Anirvan and the entire Ghosh lab!

I started my Ph.D. program at the Hopkins in 1998 and joined Anirvan's lab in the spring of 1999. At that time, Anirvan was very popular young PI among graduate students and everybody wanted to rotate his lab. Naturally there was a long waiting list and I even had to compete with other rotation students. Luckily I could join his lab and still I think that was the best decision that I made in my graduate school days. One thing that I was very impressed by Anirvan was, in spite of his busy schedule, he set aside his time to do weekly journal club with naïve rotation students like me!

My graduate project in Anirvan's lab is to determine how progenitors choose to be neurons or glia. I initially worked with Terri, but after she left, I was the only one who's working on this question. It took a while until I could find that epigenetic control by FGF2 can regulate neuron/glia choice and finally made a story out of it. Regardless of my progress, I was always fascinated when I see beautiful fluorescent neurons and glia under the microscope. Although my topic did not overlap with other people, twice a week, all of us made a team effort to get primary cortical cells. Everybody participated the step that they can contribute and we all shared cells together. In retrospect, that was a quite unique experience and we felt a bond among us by that.

One of the little secrets that Anirvan can make his lab organized is that he assigned small responsibilities to individuals and disguised us with the name of ‘czar’. I was the culture room ‘czar’ and I had to take care of it whenever there is an outbreak or out of CO2 gas situation. I remember Gene once demonstrated me how to move a CO2 gas tank, rotating a tank with his arm around like a dancing motion. Lori was the plasmid ‘czar’ and, thanks for her, we could get a nice color-coded plasmid collection since then. Of course, everybody was sort of lazy and reluctant to do-making extra bacterial stocks, filling out plasmid info sheets, picking up the right color code and putting in -80’c were not trivial things to do. So she came up with an idea to give us an incentive-she gave us candies everytime we deposit our plasmids and it worked.

After old good days in Hopkins, he moved his lab to San Diego in the fall of 2003. I moved with him and witnessed how his lab started from the scratch. It was so awesome when we finally have our own kitchen/ conference room. What an upgrade from our tiny round table in the hallway back in Hopkins! Luckily I started my postdoc in Sam Pfaff’s lab at the Salk nearby. From time to time, Anirvan kindly invited me to many lab parties and I could be a part of his new era.

I definitely miss my days in Anirvan’s lab and all the people that I overlapped with. But now I am in La Jolla, always sunny, surrounded by nice cool ocean breeze and Anirvan is just across the street! What else do I need?

Happy anniversary, Anirvan.

Nichole Prescott

I feel so fortunate as to have had the opportunity to be the Ghosh lab manager from October 2003 to March 2004. Although it was only a brief time, it was the most positive research experience I have had to-date. There are, of course, some inherent problems with attempting to transplant a 10 year old lab from one coast to another, but I think it went off relatively smoothly. Unpacking and organizing some 200+ boxes was quite a project! But with such a great team effort, it went as well as anyone could ask.

The Ghosh lab had a wonderful dynamic of hard-working, yet easy-going people. They were the kind of people that you could count on to help you do the dirty work (ie--crawling around on all fours in the mouse room catching escapey pups), but were never so serious that they couldn't relax and have a great time.

I could go on and on about all the great memories I have from my time in San Diego, but I'll just rattle off a few, including Friday Happy Hours (EVERY Friday, NOT every OTHER Friday!), coffee and conversations at The Grove, my first (and only) surfing experience, and of course, having such a compassionate and kind PI to work for.

The Ghosh lab will always remain a very important part of my life that is near and dear to my heart. I swear, someday, I'll make it back.

"The Ghosh lab will always remain a very important part of my life that is near and dear to my heart. I swear, someday, I'll make it back."

I started as a Postdoc in Anirvan's lab in February of 2000, after completing my PhD in the Netherlands. When I started, the lab was still in its initial location, which meant that all experiments were done within a cozy distance from each other. Also, the ruling tradition was that the newest member would get the bench located under a powerful air-conditioner, so my first few weeks in the lab were pretty chilly. I did have a great time though, and did research on how neurotrophins can modulate dendritic morphology in developing neurons. My first experiments showed that BDNF can result in rapid changes in dendritic form of cortical neurons, and we started to pursue the signal transduction pathways underlying this change. This quest resulted in a paper that was published in the Journal of Neurobiology. That's the scientific part of my stay in the lab.

I had a marvelous time at Hopkins during my 2 year stay. I had a good time with all the people that were in the lab at the same time as I was, and appreciated the atmosphere of cooperation that had been present during my entire stay. As far as I'm concerned, the lab was pretty unique in the fact that we actually never ran out of any reagents or disposables thanks to the efforts of all.

Also, the tradition of inheriting someone's solutions and buffers upon their departure from the lab was a timesaver. I was able to lay a hand on Terri Morrow's entire buffer collection when she left, which had some prize buffers that I used till the end of my stay. I would have brought some of them with me to the Netherlands if the Custom Department had permitted it.

Not only the lab, but also Hopkins itself was an excellent place to work at. Since I'm from the Netherlands, anything that is big and famous had been foreign to me for about 29 years. Just the fact that you had a massive choice of places where you could have your lunch was enough to keep me bewildered for about 2 years. The thing I miss most in that regard is the Mango Mama that could be purchased exclusively in the cafeteria of the School of Public Health. Now that we're back in the Netherlands, my lunch is degraded again to a sandwich with 1 slice of cheese and some milk. Well, at least I have the fond memories….

I still have a lot of nice recollections from my stay in the Ghosh lab, and am happy that I had the opportunity to work with Anirvan and all lab members albeit for a shorter period than expected. I managed to drop by at Anirvan in his new lab in San Diego, when I was there for a conference a while ago. I must say I was impressed with the setting of the lab and its amount of space and equipment. But even though San Diego is a nice location, I still think that nothing beats a muggy Baltimore summer.

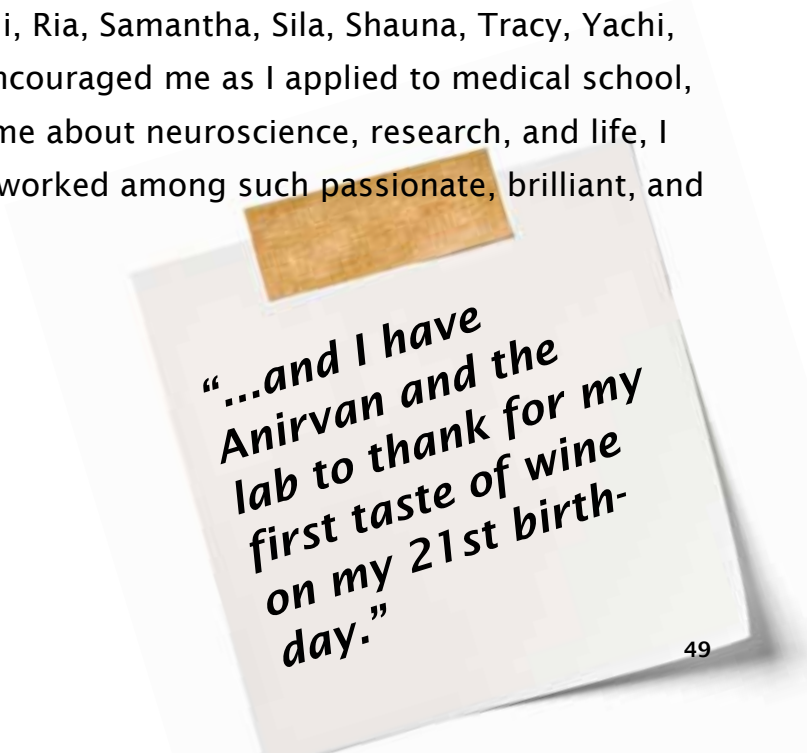
Anyway, I'm sure the lab is doing excellent, and I wish Anirvan and all lab members all the best and a lot of happy cortical cultures.

Phyllis Wang

A lot has changed since I was the intimidated little junior who started when the lab had just moved to UCSD. At first, glassware was so stressful and time consuming. I vividly remember when I accidentally broke a beaker and I was so scared! But I soon developed a routine, learned where everything was, and sought help in various situations. Then it was research that posed tremendous challenges. Thankfully though, everyone in the lab is so helpful and fun!

I remember long days, and some late nights, spent transfecting, counting cells, analyzing data, and often working backwards, learning the true meaning of problem solving. I also remember happy hour every Friday, and I have Anirvan and the lab to thank for my first taste of wine on my 21st birthday. I remember when Anirvan decided to challenge other labs in volleyball, soccer, and ultimate frisbee for the title of Neuro Champions of the Universe. Samantha and I were assigned to make posters to plaster on the third floor labs (I guess to harass them?), and subsequently much of the summer was spent playing outdoors.

From the first people who showed me the ropes (Gulyse and MiRyong showed me how to pipet, Inga taught me how to transfect, Nichole and Amir taught me how to autoclave, Anirvan showed me how to wash glassware) and others who helped me with daily tasks and guided me through various protocols (Ben, Beth R, Beth D, Irantzu, Ji-Eun, Krystal, Liz, Matt, Megan, Nejmi, Ria, Samantha, Sila, Shauna, Tracy, Yachi, Zilong), to all those who encouraged me as I applied to medical school, and everyone who taught me about neuroscience, research, and life, I am so thankful for having worked among such passionate, brilliant, and genuine people.



I first met Anirvan in May 2011 when he was visiting Basel and finalizing his move. I had just finished my PhD and I heard that Anirvan had accepted a role in Roche. I wasn't sure as to how the lab dynamics would work or even if he was interested in mentoring postdocs in his current role. Fortunately for me he was very keen on maintaining a lab in Basel and then it all started in February when the 4 of us (Meghan, Madhu and Emily and me) moved to Basel. I worked most with Emily, since we were initially based in Peter Scheiffele's lab. We had our own dark room corner in the Scheiffele lab where we discussed everything from science to our next travels. Of course we still had our interactions with the San Diego group through our regular Webex lab meetings.

The ghosh lab social events have always been a lot of fun. Mini golf in San Diego, sledging party followed by fondue in Swiss Alps and the Xmas/ Bday parties in Basel.

Anirvan is by far one of the most organized person I have ever met and this is why he has succeeded in maintaining an intercontinental lab along with handling Roche neuroscience portfolio with such great success. Another thing which I find incredible is the kind of people Anirvan has attracted over the years. I feel very privileged to work with such bright, passionate, and genuine people. Happy 20th anniversary Anirvan!! And I hope you manage to head the lab for another 20 years.

Tev Stachniak

I first met Anirvan during the final year of my Ph.D. at McGill University in Montreal. As the keynote lecturer at our departmental retreat (which that year had retreated only as far as the 6th floor), Anirvan was subsequently the guest of honor at a wrap up dinner and drinks. Upon introducing myself as Tev, I was immediately informed by Anirvan that the lab had developed a protein interaction assay based on TEV protease (no relation). Confident then that I had met a kindred spirit, I subsequently invited Anirvan to join my colleagues and I for "Scotch club," our regular Friday evening event open to all those with enough panache to drink a touch of scotch whiskey out of a tumbler or jam jar.

Having squirreled away the guest of honor from the professors and department head, we talked about whiskey and my work and my future plans to use optogenetics to study hypothalamic function. Anirvan referred me straightaway to Scott Sternson, a developing leader in the field. Having already spoken to Scott about our mutual scientific interests, I was thrilled to learn that Anirvan had a joint project funded with Scott in need of a post-doc. I promised to forward my CV, and in relatively short order found myself as the first outpost of the Ghosh lab, situated at Janelia in Ashburn, Virginia. When Anirvan and Emily subsequently moved to Switzerland to join Roche, lab meetings that included breakfast in San Diego, lunch in Ashburn, and dinner in Basel quickly became a weekly ritual. In addition to giving me regular access to a keen pool of scientific minds and advice, this also gave me access to an international pool of friends that served to make my subsequent journey to "the continent" relatively painless. Joining up with the Basel postdocs and my fellow Ghoshican-Canadian, Ben Hall in his new digs at Roche, I am incredibly grateful that these continuing evolutions of the Ghosh lab hold true to the core values of great science, talented people, and an unquenchable thirst for knowledge (and possibly after-work drinks) that have carried the Ghosh lab through 20 years of success and counting. Thanks to everyone for all of your thoughts, hard work and friendship over the years.

Terri Morrow

Here are my recollections:

1. Never being able to keep up with the 3-D structure of the brain when people referred to regions, projections, lesions, etc. Immunology is much easier in this respect.

2. How much fun fluorescent microscopy is; I always planned to make a photo album of my favorite images but never did.

3. Coffee breaks with Paul and his dry humor.

4. Karaoke at the Christmas Party.

5. Playing The Game.

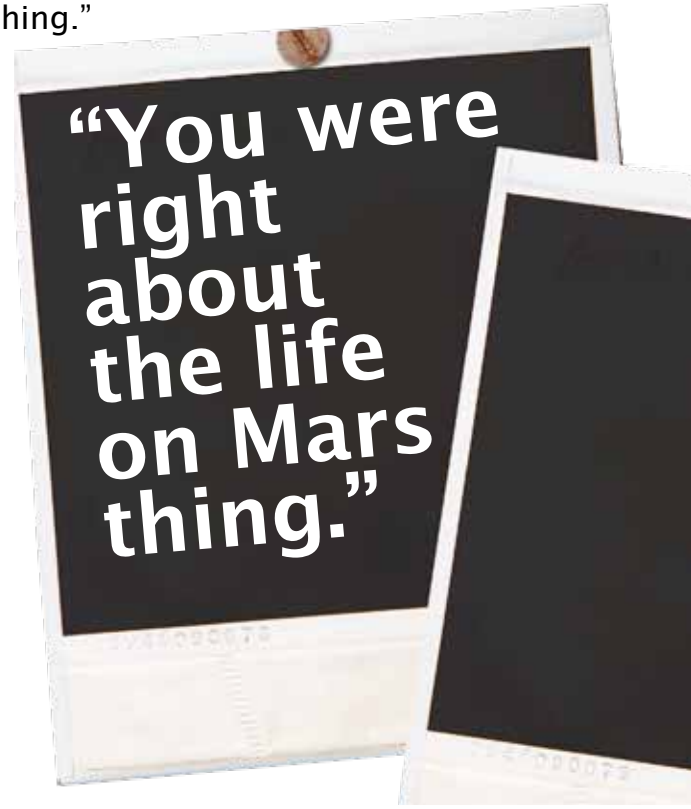
6. Meaning of life discussions with Gene.

Tim Moeller

I was just 25 when I first met Anirvan Ghosh as I interviewed for research assistant for his first lab. As he described with verve his research and the opportunities that would be availed to me in his lab, all I could think was, "this guy can't be more than 16 years old but the beard…" And one other thing stuck with me to this day that he said, "My name is Anirvan [A-nur-van], like Nirvana but a few letters moved." With that, I became his first employee. No lab mind you. I was stuck in a corner of a vacated lab formerly used to study primates that included an insulated vault-like room for observation. I was not sure if I was an employee or test subject. And, oh yeah, after one week, he takes off for a weeklong conference. Good managerial skills from the get-go.

But it got better. Brand-spanking new lab. Open budget to stock the lab. Interaction with my boss. Immense learning. Students and post-docs come and go. Grants flow like wine, and the scientific inebriation brings great ideas, curiosities and research to the lab. Papers are published. Success breeds success. It was a gift to around such minds. We discussed science, and not just neuroscience, but politics, social issues, work, recreation and any other topic that brought more questions and sometimes answers. Open and free thinking as mentor/student and sometimes as peers. One time while training a newbie Lori Redman on the microscope, she and Anirvan [like Nirvana, almost] were looking over some of her slides from the latest experiment. Anirvan gets his giddy self and inquires, "Do you see it? Do you see it?" Lori was perplexed as she was just getting used the culture system. He calls me over and asks me to look. Fat, truncated branching of neurites unlike normally thin ones. I see it. Anirvan and I just start going into the beauty of what we are seeing and how this may be occurring. The experiment worked. Lori looked at us as if we were loons, but for a moment or two, I was on the same level as Dr. Anirvan Ghosh. And he, whether conscious of it or not, allowed me to stay at that rarified spot for as long as I could.

Of course, all good things come to an end. I entered industry and he kept the fires burning up in the Ivory Tower. His move back to the west coast came as much as a surprise as it did expectedly. It was sad to think that the lab we started together, expanded in space and people was coming to a close. Our loss is UCSD's gain. And through it all it is the same Anirvan Ghosh, vibrant about life and science. And I know through it all, I am a better person for being apart of his world, and some sweet day around 2021, student will become teacher. A bottle of Krug vintage champagne will accompany Dr. Ghosh and the words, "You were right about the life on Mars thing."



Yachi Chen

My research focus in the Ghosh lab was to characterize the signal transduction pathways regulated by the small GTPase, Rap1, in the development of dendrites. Therefore, I had spent a lot of time working on Rap1 activation assay, which is both tedious and difficult and is definitely not something that I would miss doing-- ever. I also remember the seemingly endless number of chemicals tested in my experiments involving Rap1 activation assays. Fortunately, cracking crabs at Obryki and Bo Brook's -- with friends on weekends, let me forget about those assays temporarily.

I started my journey in the Ghosh lab from Nov 3rd, 2003, when a huge truck carrying all the stuffes from Baltimore just arrived the front doorway of the Pacific Hall.

I really enjoy my life spent in the Ghosh lab and in San Diego. Certainly there are some unforgotten moments in my mind, for example Anirvan's big 40th birthday party and my spill accident happened in Oct, 2004.

In 4-19-2004, Gulyase and Amir were working on organizing a surprise party for Anirvan's big 40th. They bought a lot of birthday party stuff, including hats and put a lot of stuff on the conference room. While they were doing this, I found Anirvan was showing a visitor around and going to enter the conference room! I run to call them.

Amir then stood in the front of Ben's physiology room and told Anirvan radiation people were having a meeting there. Finally the surprise party was just great.

I don't know whether my radiation spilling event is the only one ever happened in Ghosh lab. Anyway it was the only one happen to me. I was doing radiation labeling to look at whether CREST is phosphorylated. That day was a super busy day, I had a lot of work and wanted to attend a graduate neurobiology class as well. So thing happened. A 1.5ml hot eppendorf tube dropped and broke right outside of cold room. I didn't know what to do. Then I walked into the lab and asked Ben and Megan for help. This walking directly killed Ben's shoes, since my shoes were contaminated and then contaminated the main walkway of the lab. Ben walked follow me and got his shoes contaminated too. Make a long story short, everybody came to help me and finally we cleaned all dirty stuff and floor. It was the longest day of mine in Ghosh lab! The last thing I want to point out is that at least that labeling experiment works and CREST is phosphorylated!

Above was written on the 10th anniversary of the Ghosh lab, around 2005-6.

From scientific sides, it was for sure that I grew up to a neuroscientist from a biochemist in the Ghosh lab. It is so unforgettable that I run into Ben (Ben Hall) over and over again with stupid neural questions like "how is neural activity measured in the brain of crest knockout?" And thank the years of support from Anirvan, I attended neuroscience conferences each year and finally got myself comfortable with neuroscientists. My work as a postdoc is mainly two parts, first part is finishing up the molecular part of CREST. From this part, we developed a quite complicated molecular Drama for how CREST turns on transcription.

I still remembered Anirvan's word in the Champagne party that (it is the paper carried the most experimental data in the lab!). For the second part, it was a team work about the amazing role of MeCP2 in synaptic scaling, working with Emily and David. I have to say that I was quite impatient about collaboration work in the beginning and even kinda "yelling" to David a couple times. However, when I left for my own lab in Shanghai at 2009, it was Emily and David who spent many time and efforts to get the revision done and published it in the beginning of 2012. All of this is impossible if without the lab spirit provoked by Anirvan that "always being helpful".

Now I have my own lab in Institute of Neuroscience Shanghai. I am trying to run my lab with Anirvan's spirit "respect everyone's work", although I really cannot work like Anirvan that making appointment hourly and switch brain to different groups of people so efficiently. How hard it really is than looks!

Knowing the new Ghosh lab in beautiful Basel is quite exciting and Looking forward to visit there soon!

Caroline Hügi Mazzotti

Dear Anirvan

When I first met you in January 2014 during my interview as your P/A the only thing I could focus on was not getting sick on your table! I had just found out the day before that I was pregnant and wasn't quite sure what to do or say. So I left, thinking that once I let you know I was expecting a baby, you wouldn't even bother to hire me. I guess I didn't know you well enough as I actually started as your P/A a few weeks later. And I can honestly say I have never had a single day of regret, leavig Marketing and starting work as your P/A. Thank you for everything. I enjoyed working with you so much. You truly are a great leader, a fantastic manager and good friend. The two years have been short but a lot of fun! Your new staff and colleagues are lucky to have you.

Reading all those memories from your former Lab Members (and current ones) I have one very important question:

What was going on with the Taco truck in your backyard and you burning hot chocolate with Tequila?! Really?!