



## Grad students win SISCA for global ideas

**MORIAH BISCHANN**  
Staff Writer

The Dow Sustainability Innovation Student Challenge Award, a program sponsored jointly by DOW Chemical and the California Institute of Technology, has announced the 2015 competition winners. Caltech graduate student Prakhar Mehrotra took home the \$20,000 grand prize for his idea to build solar-powered storage units for food and crops in developing countries such as India. The “Micro Cold Storage” system would allow farmers to store their produce in an area near their fields in order to maximize the time between when a farmer can harvest their product and when they have to sell it.

Mehrotra explained that “India is a very fertile land...but there is no place to store the crops,” primarily potatoes. In India, many intermediary cold storage facilities are owned by monopolies that charge exorbitant prices, which is unaffordable for many farmers. This leads to widespread crop loss and drives the consumer’s price for a pound of potatoes up to artificially high levels. In response, Mehrotra, and his collaborators from schools such as Stanford and MIT, “thought of the idea of cold storage, which a farmer can keep on his farm. [That way] he doesn’t have to go far away and can use a local energy source,” which will extend produce shelf-life, and allow farmers to have



- dow.com

more time to get their products to market.

Mehrotra plans for the storage units to measure 6x8x12 feet, which will provide enough space for a small family farm. Additionally, his group removed the battery and water (both of which are found in traditional refrigeration systems and raise the product cost) in favor of new technology that they are currently patenting. When asked why his team chose solar power he responded, “it could be wind also...But India is a solar rich country...[And fuels such as] kerosene are much more expensive.”

The cold storage units are not limited to crop usage. Mehrotra envisions the refrigeration devices used in places such as Africa where humanitarian workers need to keep vaccines at cool temperatures. Mehrotra and his team are excited for DOW and Caltech’s sponsorship of their project. According to

Mehrotra, “DOW has been in India, and DOW has visited India, so they understand the problem.” Currently, Mehrotra is working on the project part-time while finishing his PhD thesis in aeronautics.

Runner-up and \$5,000 prizewinner Kangwoo Cho, another graduate student, studied wastewater systems that run on solar power. Cho won for his “Photovoltaic-Powered Wastewater Electrolysis Cell which starts from the conventional electrolysis for water splitting to oxygen and hydrogen with employing

Additionally, photovoltaic cells allow the system to operate off the grid while “inexpensive but highly active electrodes based on bismuth oxides doped titanium dioxide” help keep costs at a minimum.

In the near future Cho plans to have a working community toilet prototype to be tested on Caltech’s campus with eventual deployment in Africa and India. Cho’s work is closely tied to Caltech Environmental Science and Engineering Professor Michael Hoffmann and he will continue to work “on developing a simplified procedure for the BiOx/TiO2 electrode, which shows a higher activity for chlorine evolution and stability.”

Dow Chemical created the program in 2009 with 17 partner universities to reward students that conceive novel answers to the social, economic, and environmental challenges faced in our world. The winning solutions coordinate with the company’s 2015 Sustainability

Goals, which include: Sustainable Chemistry, Breakthroughs to World Challenges, Addressing Climate Change, Energy Efficiency & Conservation, Product Safety Leadership, Contributing to Community Success, and Local Protection of Human Health & the Environment.

Partner universities are picked by Dow for their efforts to address energy, climate change, sustainability, and food, water, housing, and human health concerns. This includes international schools in China, Mexico, Saudi Arabia, the Netherlands, UK, and Brazil and US universities Caltech, MIT, UC Berkeley, Northwestern, Penn State, Tufts, University of Michigan and University of Minnesota. Participating students must meet Dow’s rigorous criteria and final projects are judged through a peer review process at the school level. Entries may be submitted by both individual graduate students and teams.

More information about the program can be found online at [www.dow.com/sustainability/studentchallenge](http://www.dow.com/sustainability/studentchallenge).

“India is a very fertile land...but there is no place to store the crops.”  
- Prakhar Mehrotra

### In this issue

**NEWS**  
A new edition of ASCIT Minutes **2**

**OPINION**  
Reviews of Lincoln and Life of Pi **3**

**FEATURE**  
The Tech chats with Niles Pierce **4**

**SPORTS**  
Men and Women’s basketball coverage **7**

## News briefs from around the globe

*Helping readers burst out of the Caltech bubble*

**Need to know** < **100** words about the world this week – topics sorted from good to bad by The Tech Eds

<b>Hungary anti-Nazi rally</b>	<b>10,000</b> protest lawmakers’ request to screen Jewish citizens	<b>12/1/12</b>
<b>Stores close in protest</b>	<b>1</b> week ago, Syrian merchants shut down to protest violence	<b>12/1/12</b>
<b>Greece bond buyback</b>	<b>\$10b</b> Euros will be spent to purchase bonds from willing investors	<b>12/1/12</b>
<b>Palestine recognized</b>	<b>\$1.20b</b> in tax revenue withheld by Israel after UN status upgrade	<b>12/1/12</b>
<b>Russian traffic jam</b>	<b>12</b> mile jam lasts 3 days in freezing temperatures due to ice	<b>12/1/12</b>
<b>US-Afghan base bombed</b>	<b>5</b> killed when insurgents, dressed as coalition, detonate 3 car bombs	<b>12/1/12</b>
<b>Tunnel collapse in Japan</b>	<b>2</b> dead after cave-in crushes cars in Sasago Tunnel near Osaka	<b>12/1/12</b>

## Food with Mannion!

*Do you like eating food?*

*How about free food at nice restaurants?*

*Ever want to tell the world exactly what you think of said food?*

*The Tech will be beginning a new column to chronicle the foodie experiences of new writers every other week... The Catch: They'll be going head-to-head with Tom Mannion who will be reviewing the same restaurant. If you have ever thought you were more of a gourmand than our resident master chef, now's your chance to prove it!*

*Email us for a spot on the list at [tech@caltech.edu](mailto:tech@caltech.edu)*

### The California Tech

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The Tech is published weekly except during vacation and examination periods by the Associated Students of the California Institute of Technology, Inc. The opinions expressed herein are strictly those of the authors and advertisers.

Letters and submissions are welcome; e-mail submissions to [tech@caltech.edu](mailto:tech@caltech.edu) as plain-text attachments, including the author's name, by Friday of the week before publication. The Tech does accept anonymous contributions under special circumstances. The editors reserve the right to edit and abridge all submissions for any reason. All written work remains property of its author.

The advertising deadline is 5 PM Friday; all advertising should be submitted electronically or as camera-ready art, but The Tech can also do simple typesetting and arrangement. All advertising inquiries should be directed to the business manager at [business@caltech.edu](mailto:business@caltech.edu). For subscription information, please send mail to "Subscriptions."

## Write articles for the Tech

**get paid up to \$30**

## ASCIT Minutes

Minutes for November 29, 2012. Taken by Allika Walvekar

Officers present: Diego Caporale, Zach Rivkin and Matt Fu in lieu of Christian Rivas, Pushpa Neppala, Mario Zubia, Michelle Tang, Allika Walvekar, Puikui Cheng  
Call to Order: 8:35 pm

**DevTeam:** Eric Pelz updated the BoD on the status of DevTeam. The BoD will be conducting interviews at the beginning of second term for anyone who would like to participate in DevTeam.

**President's Report (Diego):** RA recruitment will start within the next 1-2 weeks. The House Presidents will be disseminating cards that students can pass out to their favorite grad students to encourage them to apply to be an RA. The ASCIT Meet and Greet will happen Sunday 12/2 at 1:30pm in Tom Mannion's house. The BoD will be re-examining the BoC bylaws, and the new vote will be a line item vote sometime before midterms next term.

Officer's Reports:

**V.P. of Academic Affairs (ARC Chair: Pushpa):** The next Student Faculty Lunch will be on Dec. 6th. Joel Tropp is the November Professor of the Month. Pushpa and Avin met with Ray Gonzalez to plan the Honor Code survey that will be released in January. The option committees have started working on their surveys for the 2013 SFC. The ARC will be hiring someone new to run the course capturing program.

**V.P. of Non-Academic Affairs (IHC Chair: Zach Rivkin, Matt Fu in lieu of Christian Rivas):** The House presidents will be assisting with student involvement for the RA hiring process.

**Director of Operations (Mario):** Mario has updated all the clubs that have been approved by the Club Steering Committee with the amount of funding and storage space they have been granted. Mario is working on ensuring a timely delivery of last year's yearbooks.

**Treasurer (Puikui):** Once Puikui receives the finalized list of approved clubs, she will update the information in the Registrar so that clubs can access their new funding.

**Social Director (Michelle):** Ricketts is planning a Holiday Party on 12/7. Michelle is planning an end of the year event at Coffee House's last night of term (12/6). The event will be holiday themed and will feature Santa, sleigh rides, a fire pit for s'mores, and lots of giveaways.

**Secretary (Allika):** Working on a design for ASCIT Thank You Cards. With the help of DevTeam, Allika re-launched the announcements page on donut to post email announcements.

Meeting Adjourned: 9:36pm

# Caltech Couture: Winter fashion and makeup

**NINA BUDAEVA**  
Staff Writer

December snuck up faster than I expected and I'm pulling winter clothes out of storage boxes even though the temperature is still in the 60's and 70's. Having grown up in Northern California, I've never characterized the Holiday Season with harsh weather (although rain and fog in San Francisco are not to be joked with) so much as by one's own spirit. So, overly warm winter clothing has not been necessary for physical comfort, but has served as a symbol of this cozy season.

Coming to LA though, I started debating whether this symbolism was practical. In the warm, almost tropical mist the other day, I saw Joe riding his board on his usual route to the library, wearing the same T-shirt I had seen him wearing in the blistering September days. On other days throughout the winter, I've seen efficient Techers comfortably walking around in shorts and tank tops! My biggest wake-up call came my Frosh year from one of my friends.

He grew up in LA and signed up to go on my House's ski trip. The only shoes he had at all were flip flops and he didn't think much of it.

So, he wore them in the snow.

After some debating, I've returned to my love of seasonal dressing. Others who did not grow up in such mild climates may think differently, and may want to make the most of their time in this miraculous weather and wear

the minimum they need to stay warm. I understand that, but one thing that is undeniable is that, regardless of weather, the Holiday Season is practically here and we should start gearing up for all the merry-making we will be doing once we complete Final Exams.

Recently I was at the Macy's on Lake Ave (which is not the typical Macy's, but much, much better; a bit closer to a Nordstrom). It was already fully decorated for Christmas and I was walking through my favorite section—the makeup department—when I saw some familiar people. They were standing, lightly hunched over one of the displays and were rigorously studying it. One of them was standing straight and talking. Of course, these were Techer girls. Techers are somehow very easy to spot off campus. First, there is always someone in the group wearing a Caltech sweater and perhaps a few others wearing old Ditch Day t-shirts. Second, there is something about the way Techers stand and interact with their

experiment. I recognized Victoria, wearing a woolen peacoat. She was one of the ones listening to Lily. I came closer and listened to what Lily was saying, curious about what could capture the attention of these Techer girls.

"So, I grew up with a lot of makeup in my life. I spent a lot of time on stage when I was little – don't ask how I ended up here—and so I learned a lot of the tricks of this art", she was saying. "My Mom taught me a lot and then I picked up some tricks from professional artists when they did my makeup for shows, but then I also learned on my own. I read this book called 'Vogue Makeup' ...".

One of the girls, Chelsea, wanted to get the attention of a guy she liked but she was too shy and didn't think he'd notice her. Lily heard her worries, and as her good friend, started putting together outfits for her.

She painted her nails, showed her how to walk like a real girl and not like a stifled bookworm, and made her wear heels every day for two weeks so that Chelsea wouldn't look like someone on ice for the first time when she wore her heels to the next party. Eventually the other girls noticed the effect of Lily's work on Chelsea and so, Lily took

all of them on a field trip to Macy's to teach them the secrets of make-up.

When applying mascara to eyelashes, a girl should make her strokes go outward and up, away from the nose to create the illusion of longer lashes and bigger eyes. Lily's pet peeve is bad mascara. Sometimes girls don't clean up mascara smudges on their eyelids, and combined with ridiculously dark eyeliner, the

eyes look like they're framed by ugly black circles. Eyeliner should not stand out, Lily explained, but should rather define the shape of the eye. Thick eyeliner all around only makes eyes look smaller and duller and is a cheap way for a girl to say that yes, she wears makeup.

An eye-opening trick is to use white or flesh-toned eyeliner on the inner corners of the eye and on the inside of the lower lid.

Dabbing highlighter on the browbones, cheekbones, nose tip and chin defines the face's shape and countering this with a darker blush underneath the cheekbones creates a dramatic and beautiful form.

Armed with this new basic knowledge of beauty-making, Chelsea went back to her room and looked in the mirror.

Can she really become that beautiful girl that she was too shy to dream of becoming when she was younger? Is that faint childhood dream of fairytale adventures with princes and happy endings tangible?

She sighed and moaned when she looked at her desk and was reminded of all the work she still had to do before she could allow herself to go back to nourishing her real dream.

“...overly warm winter clothing has not been necessary for physical comfort, but has served as a symbol of this cozy season.”

”

## Lincoln and *Life of Pi* are both must-see movies

**MALVIKA VERMA**  
Contributing Writer

I made a great decision this last Friday night when I became an Arclight Cinemas member. I was so excited to get points on my card that I went to see two movies this past weekend – Steven Spielberg's *Lincoln* and Ang Lee's *Life of Pi*. So I guess it was not surprising when one of the male employees recognized me from all my previous Arclight visits and asked me how Caltech was going, as well as if I actually study anything at all. For the record, I actually am an undergrad here. I'm just obsessed with watching movies as soon as I can, and in theaters of course.

On Friday night, I followed Abraham Lincoln as he fought across party lines to pass the

Thirteenth Amendment. Though the brilliant acting, direction, and script are not to be overlooked, I was mostly blown away by the attention to detail in the era-specific costumes. The coloring of the film made it feel antique as well.

You might have heard about method acting – techniques that actors use off-stage to immerse themselves in their role. Well, I don't know if this is what Daniel Day-Lewis did, but there was not even a moment in the entire film where he seemed out of character. Seriously, only Lincoln himself could have done a better job. The film gives a positive portrayal of Lincoln, but it does not shrink from showing how Lincoln wrestles with his domestic life – his oldest son, played by Joseph Gordon-Levitt, wants to enlist in the Union Army, while his volatile wife understandably objects to the thought of losing another son.

I don't think this movie should be missed, but if you have a nice TV at home, wait a few months until it's on DVD to save some money. It's a slow-paced movie relative to a Bond film, but if you are a history buff, you might pick up more humor than I did.

If you are a period film buff, utilize the extra time to admire the costumes and lighting that make this film a visual beauty. In the meantime, definitely give Frank Capra's *Mr. Smith Goes to Washington* a watch! It's my favorite political drama film.

The other film I watched this weekend was *Life of Pi*, definitely a movie that should be seen in 3D. Besty Sharkey, the LA Times film critic already took my words: "Lee has enhanced the novel's power, employing 3-D and CGI technology with such originality that there are moments when the

ocean seems to float around you. And when a certain tiger roars, you may well jump."

I have not read the book, but many of the friends who watched the movie with me had, and they unanimously agreed that they enjoyed the movie more than they enjoyed the book. This is not something you generally hear about movies based on books.

The story is narrated by the middle-aged Pi (Irrfan Khan) to a writer (Rafe Spall), who needs material for his book.

He describes his childhood spent in Pondicherry, India in the family-run zoo. He is born a Hindu, but later becomes a Catholic and then a Muslim. The dialogue in the first part of the film is humorous, yet thought-provoking.

As the story progresses to living life out in the Pacific as the only human for many days, the

visually stunning CGI takes the foreground.

I'm personally hoping for a Bollywood adaptation, which would most likely be much less philosophical but have some catchy song and dance sequences. The love story between Pi and childhood love Anandi would likely also be much more developed. But, the big-budget Hollywood production still kept me entertained in my second row seat in the theater. I'm definitely scared of tigers and might not get on a boat for sometime now.

*Lincoln*: 8/10 – Brilliant costumes, acting, direction, and script, but can skip in the theater

*Life of Pi*: 9/10 – Don't miss this in 3D. It is worth the extra money.

# A brief sit-down with Professor Niles Pierce

**JAMES CHANG**  
Contributing Writer

*California Tech:* What was life like at Princeton?

**Niles Pierce:** Life was extremely busy as an undergrad. I know Caltech undergrads feel like they've got the fire-hose situation, and it was pretty much like that for me at Princeton too. Engineers have to take a heavier course load over there than the other students, and it was very much a problem set, exam, problem set, exam type of lifestyle. It was a very intense experience. It's quite a bit different from Caltech though. The student body is much more diverse in its interests, so by comparison a much smaller fraction of people are working in technical fields. Sleep deprived or not, my roommates and I had a great time. We were good at finding the humor in our situations.



- eas.caltech.edu

*CT:* Why did you change fields?

**NP:** One thing that is unusual about me is that I've switched fields multiple times in my career, and I don't promise not to do it again. It's liberating in life to realize that you're not just headed down one irreversible road. Basically, you're learning how to learn. Once you've figured that out, you can decide what to spend your time on in any given decade.

It certainly is risky to switch fields when the tenure process is involved, but mostly I think you just have to be willing to ask questions and to not be embarrassed to tackle something new and unfamiliar. It's disorienting to be used to having mastery in one area and then to have to not only learn a new set of ideas but to get to know a new community of researchers. For me, it's been wonderful to follow research interests across fields.

I started as a mechanical and aerospace engineer at Princeton, with a minor in applied mathematics. For my senior thesis, I worked in computational fluid dynamics, and I decided to do my doctoral research in applied mathematics working on computational fluid dynamics. Later, before starting my independent research career, I decided to shift fields and apply computational mathematics to the field of biology.

At the time, this was not a traditional goal for applied mathematicians. I decided to take the plunge. In the fall of 1998, Gillian and I got married, moved from Oxford to Pasadena, and I switched fields by starting as a postdoc in the Biology Division at Caltech.

I'm open to continuing to shift fields over time, but that will be driven by research questions.

*CT:* What do you do in your spare time?

**NP:** I like to play sports with my daughter Clara and wife Gillian. Clara is eight years old. We play baseball together, and as Clara likes to say, she's "old school". She wants to use a wood bat, and she gets very upset with her father if he tries to

get her to use a lighter aluminum bat. Her stated career goal is to be the next Jackie Robinson – she wants to be the first female player in the major leagues. We also play soccer together. I serve as her soccer coach and also as assistant coach for her baseball team. We play all kinds of sports together in the park with friends and neighbors.

*CT:* Tell me about your soccer career.

**NP:** I'm a serious soccer player. I've played competitively most of my life. I grew up in Southern California, and when I started to learn soccer as a five-year-old, that was just about the time that it started to be available as a sport in my hometown. I played for the Christ Church college 1st XI in Oxford while I was a grad student over there, and we twice won the Oxford University Cup. The Dean of the College hosted black tie dinners to celebrate those victories. These days, I'm playing in a Pasadena league. For years, I've also played one game a year for Ruddock when they play Fleming. So far, we've always lost.

*CT:* What kind of soccer player are you and what is your weakness?

**NP:** I'm a striker. If you're a striker, your job is to score goals. The success of your contribution is largely based on brief moments that punctuate the overall game. The thing that I always try to do is to be calm in that moment when there is opportunity to score a goal and to remember that the goal keeper is more nervous and less calm. I try to make sure that's the case. It's something that is very hard for soccer players to do at any level. Most players can't be calm in that moment and make a

good decision and take the shot that's needed. It's an ongoing mental challenge. Last night I played in a game where I didn't score and we lost. I woke up in the middle of the night frustrated with moments or decisions where I could have done something slightly differently and possibly scored. It's a never-ending cycle of dissatisfaction and exultation. The day after a game, I can be standing in line at Peet's – legs sore, feeling beat up, but if I scored a couple of goals the night before and my team won, it just feels so good.

I'll tell you what my weakness is. I have never, in a competitive game, ever scored a goal with my head. I joke with my teammates: If I head the ball, that's one less paper I'll publish in my career. I really try as a player to put myself in a position where I will not be expected to head the ball. Most strikers score a lot of goals with their head, but my talent is different. I'm good at making sure I never have the opportunity.

## Caltech Library

### Classes

The Library offers a number of instructional sessions on using databases and other licensed resources.

In December we're offering:

Endnote for Beginners	December 5	2:00pm
Chemical Structure Searching / Physical Property Data	December 17	2:00pm
Patents	December 18	2:00pm
Crystallographic Databases	December 19	2:00pm

Please visit <http://library.caltech.edu/learning/> to register.

All of the classes take place in the Sherman Fairchild Library multimedia conference room.

## Caltech Totem Instagram Competition Theme: Forced Perspective

Submit your **Instagram** or **Cell Phone** pictures to the **Caltech Totem Facebook page** or email them to **caltech.totem@gmail.com!**

Prize: 1st Prize winner will get a Mannion Dinner for 2-3 people, plus a \$20 Amazon giftcard!

Pictures will be judged on creativity rather than technical excellence. Anyone affiliated with Caltech may enter.

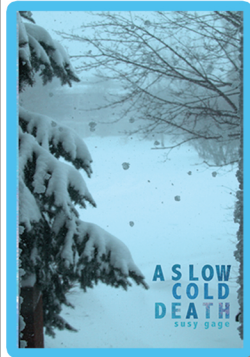
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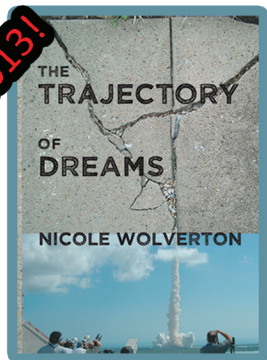


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## Bike Lab Announcements

### Caltech BikeLab Christmas Light Ride on December 11!

The Caltech BikeLab is leading a bike ride to go see the Christmas lights around the neighborhoods near Caltech and Pasadena. We'll meet at the Bike Lab (see map), head north to Christmas Tree Lane in Altadena, with very impressive christmas displays, and other displays along Altadena Dr and Allen Ave.

Following that, we'll head back to Caltech, where we will have cider and hot chocolate.

Please bring your bike lights and a helmet since we'll be doing our riding after dark! Everyone is welcome. Join us!

Questions? Contact us at [bikeshop@caltech.edu](mailto:bikeshop@caltech.edu)

### Pasadena Fold 'N' Go Bike Subsidy Program

The City of Pasadena and Metro developed a new and exciting folding bike subsidy program "FoldnGo Pasadena," which provides generous price discounts to transit riders to purchase a folding bike to ride to bus and/or rail stops in Pasadena.

If you live, work, or study in Pasadena, you can get \$220 off the price of a folding bike: <http://foldngobike.com/go-learn/>



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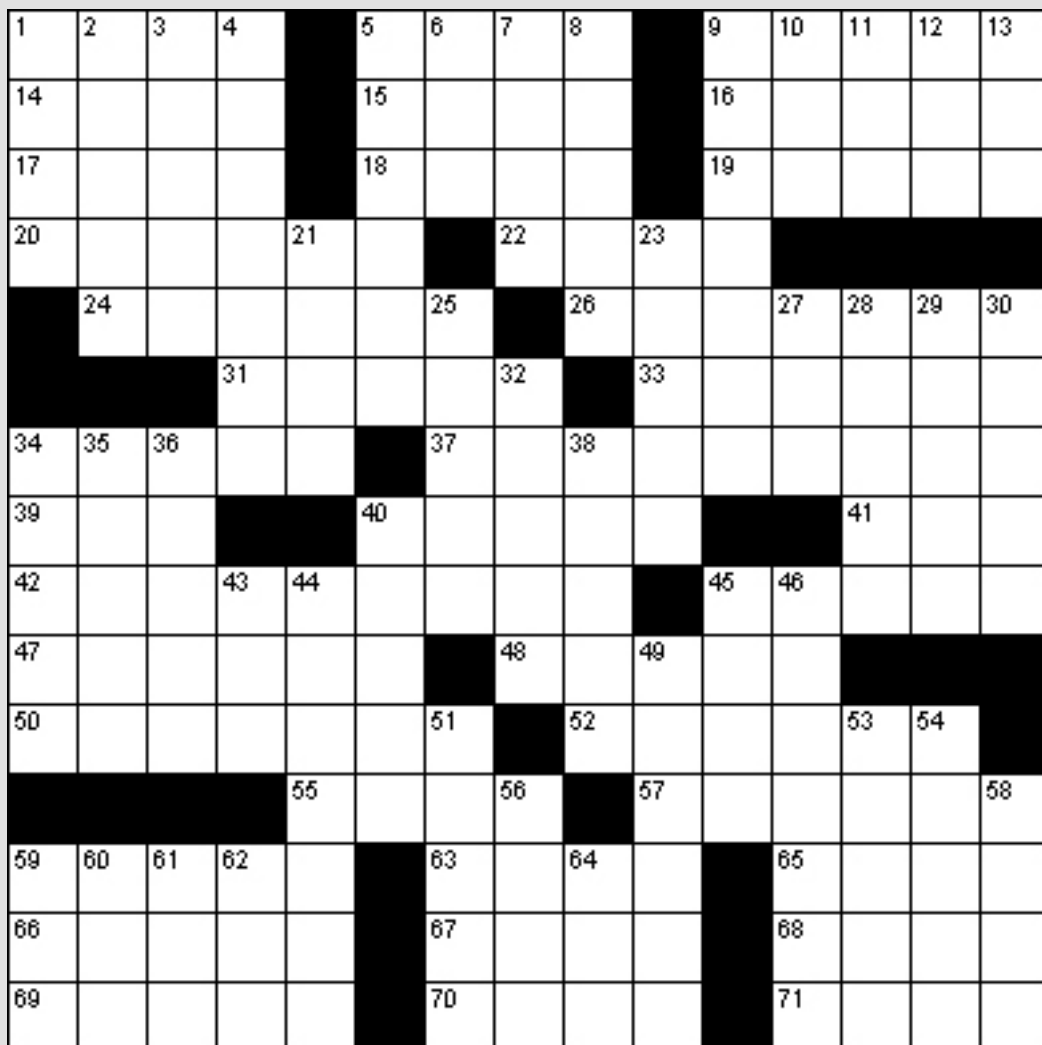
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## Today's Puzzle: Crossword



**Across**

- 1. Destiny
- 5. Female horse
- 9. Molar
- 14. Gemstone
- 15. Highly excited
- 16. Relating to sound
- 17. Part of the neck
- 18. Deep loud noise
- 19. Move furtively
- 20. Three-legged stand
- 22. Skilful in movement
- 24. Change location
- 26. Cut in three
- 31. Religious doctrine
- 33. Relating to the eye
- 34. Subsequently
- 37. Become known
- 39. Animal foot
- 40. Formal association
- 41. Spanish title
- 42. Chief
- 45. Branch of knowledge
- 47. Agreement
- 48. Specific anesthetic
- 50. Flow of water in the same direction as the wind
- 52. Worked hard
- 55. Bluish shade of green

57. Shrub

- 59. Length of sawn wood
- 63. Lather
- 65. Small restaurant
- 66. Spooky
- 67. Boundary
- 68. Notion
- 69. Entice
- 70. Facial expression
- 71. Limited period of time

27. Take a little at a time

- 28. Leave or strike out
- 29. Religious song
- 30. Tendency
- 32. Test
- 34. Offend
- 35. Travesty
- 36. Two times
- 38. Distribute
- 40. Lightheaded
- 43. Negation of a word
- 44. Field game
- 45. Impartial
- 46. Illegal
- 49. Metallic element
- 51. Tripod
- 53. Elude
- 54. Postpone
- 56. Connecting point of several lines
- 58. Side
- 59. Domestic companion
- 60. Sheltered side
- 61. Limb
- 62. Pinch
- 64. Historic period

**Down**

- 1. Typeface
- 2. Separate
- 3. Nocturnal ungulate
- 4. Raise
- 5. Arboreal mustelid
- 6. In the past
- 7. Highway
- 8. White heron
- 9. Plan of action
- 10. Belonging to us
- 11. Lyric poem
- 12. Draw
- 13. Jump lightly
- 21. At any time
- 23. Fern leaf
- 25. Lull

[<http://www.puzzlechoice.com/>]

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*For info on Caltech Public Events visit: [www.caltech.edu/content/public-events](http://www.caltech.edu/content/public-events)*



Clockwise from top left. Dat face; Freshman KC Emezie jumps over everybody. He did this several times; Everybody looks surprised in this picture. Actually, Hogue looks more like he's completing a double take; I like this picture because Esther Du gets fouled and the Redlands player's all like, "It wasn't me...don't look at me...I'm all the way over here and she's all the way over beyond yonder; Either she's waving or has an urgent question. Both could probably wait until after the game; ALL HAIL THE MAGIC FLOATING BALL!! HAIL!

These pictures were taken at the Caltech men's and women's basketball games vs Redlands. The men lost 106-74 and the women lost 70-49. Say, if you want to learn more about the men's game, Vishnu Manoranjan, Mandy Gamble, and I put together a highlight reel. It's available on youtube. So, yeah. Do that. Or not, either way. I won't be upset. Just a little bit hurt.

-Amol Kamat and Vishnu Manoranjan



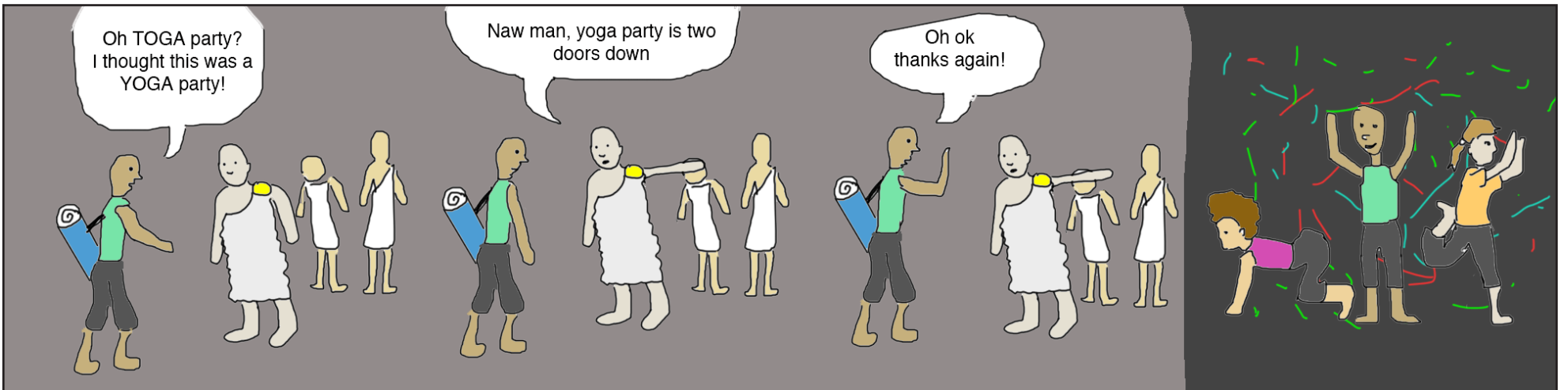
### CHRISTMAS EMERGENCY

BY TESSY TAFUT



### Acquired Taste

by Dr. Z



*For more photos,  
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