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Newman and Orphan named MacArthur Fellows

LORI DAJOSE
Caltech Media Relations

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Dianne Newman, the Gordon M. Binder/Amgen Professor of Biology and Geobiology, and Victoria Orphan, the James Irvine Professor of Environmental Science and Geobiology, have been selected as MacArthur Fellows. The Fellowship is a five-year grant awarded to “individuals who show exceptional creativity in their work and the prospect for still more in the future,” according to the foundation’s press release. Fellows receive \$625,000 over the five years and are nominated anonymously by leaders in their respective fields.

Dianne Newman’s research focuses on microbial stress responses, with an emphasis on mechanisms of energy generation and survival when oxygen is scarce. The contexts that motivate her research span ancient sedimentary deposits to chronic infections yet are linked by similar physiological questions. She has demonstrated that some bacteria

in iron-rich environments, such as soils and sediments, can utilize extracellular iron as a dump site for excess electrons by generating extracellular electron shuttles, including a class of metabolites formerly considered to be a kind of antibiotic. Newman has made contributions to our understanding of other microbial metabolic processes of environmental significance, including how microbes respire using arsenate instead of oxygen, and how they perform photosynthesis using iron rather than water. Because molecular biosignatures record the earliest history of life on Earth, Newman’s mechanistic research has also advanced our interpretation of ancient molecular fossils.

More recently, Newman has been working to bring tools commonly used in geochemistry to facilitate environmentally informed studies of pathogens in chronic infections. For example, in collaboration with Caltech professor of geobiology Alex Sessions and researchers at Children’s Hospital Los Angeles, Newman’s group characterized the composition and growth rate

of pathogens in mucus collecting in the lungs of individuals with cystic fibrosis. With this information, her lab is using genetic and biochemical approaches to reveal how these organisms—such as *Pseudomonas aeruginosa*, an opportunistic bacterium that colonizes the lungs of CF patients and produces electron shuttles

therein—survive and thrive in this environment, as well as others.

Newman received her PhD from MIT in 1997 and joined the Caltech faculty in 2000 as the Clare Booth Luce Assistant



Dianne Newman and Victoria Orphan.

Photo Courtesy of Ryan Forbes Photography

Professor. She was awarded a Packard Fellowship in 2002 and was named a Howard Hughes Medical Institute Investigator in 2005. She received the Eli Lilly and Company-Elanco Research Award

in 2008 from the American Society of Microbiology, and recently received the National Academy of Sciences Award in Molecular

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Caltech’s noise pollution problem

PATRICIA BEEKMAN AND
DREW SCHÄFFER
Contributing Writers

Caltech is known for its beautiful, sylvan campus. The Mediterranean-style South Houses are flanked by olive trees and jacarandas, scents of jasmine waft through the air, and roses bloom by Millikan Library.

While these scents abound, the equally tranquil sounds of running water and the occasional chirping bird are, at many locations, drowned out by the noise of machinery. The school’s ventilation systems produce perpetual whirring noises that for some disrupt a sense of peace across campus.

Undergraduate student Willis O’Leary describes the noise on campus as a constant hum: “It discourages me from going outside sometimes because I just know it’s going to be quieter inside.” He says it’s always present, but is especially salient at night when no other noise masks the whir. When asked for a place on campus where he takes refuge from the din, he searches through his mental map before giving up, sighing that “I’ve looked for one but I cannot find a single spot.... Here there’s no quiet spot to just work.”

Despite the irritation O’Leary feels about the noise level on campus, many students don’t even notice it. Out of an additional 11 students surveyed, only one other expressed annoyance at the whirring caused by ventilation.

So, exactly how intense is this noise? Measurements taken around campus indicate the ambient outdoor sound levels are in the range of 54 to 62 A-weighted decibels (dBA) during the day, and 64 to 67 dBA at night. For context, the Occupation Safety and Health Administration (OSHA) describes 60 dBA as the noise level typically produced by a conversation going on 3 feet away from the observer. This explains why some students such as O’Leary might find it difficult to work outdoors. Even a Sherman-Fairchild Library (SFL) study room, which is meant to be extremely quiet, measures at around 57 to 58 dBA due to a noisy ventilation unit in the ceiling.

Caltech’s constant mechanical whir contrasts starkly with the verdant neighborhoods just south of campus. After a ten minute walk towards San Marino, noise levels were measured at around 46 dBA, and it wasn’t due to machinery either: leaves rustling and crickets chirping were the only things

that could be heard. By contrast, Caltech’s turtle pond, perhaps the most apparently peaceful place on campus, has noise levels around 55 dBA as the rush of streams competes with whining turbines.

Such high noise levels can be disruptive. For the purposes of mental health, the World Health Organization describes 50 to 55 dBA as a recommended sound threshold for the prevention of serious annoyance. The measurements on campus typically exceed this level, especially at night.

Still, while potentially disruptive, these sound levels are not unsafe. The Environmental Protection Agency identifies 70 dBA exposure over 24-hour periods as the noise exposure limit required to prevent hearing loss over a lifetime. While all the daytime measurements taken on campus (except for the measurement taken directly next to daytime traffic on Del Mar Blvd.) fall below this limit, noise levels at night at some campus locations, such as Beckman Lawn and the SFL courtyard, approach it (both at 67 dBA).

How does the noise level at Caltech compare with other college campuses? While few colleges have collected data, some accessible studies provide comparisons.

In 2005, West Valley College in northern California was found to have outdoor noise levels significantly lower than those at Caltech; sound measurements averaged between 42 and 55 dBA during daytime, evening, and nighttime hours (Geier *et al.*, 2005). In contrast, Gettysburg College in Pennsylvania has sound levels comparable to Caltech’s evening measurements, ranging between 65 and 70 dBA (Kapp *et al.*, 2014). Notably, Gettysburg College and West Valley College both cited traffic as their campus’ primary source of noise, making no mention of ventilation systems. So why is it that Caltech’s ventilation causes an omnipresent hum?

Michael Salazar, a senior heating, ventilation and air conditioning technician with Campus Operations, gives a simple answer: fume hoods.

Philip Vaziri, a senior engineer with Facilities Design and Construction, also points to fume hoods as the culprit. He explains that Caltech is loud due to its

extraordinary density of research facilities: “Background noise is a little higher than at most places.... Square foot for square foot I don’t think there’s an institute in the

country that has as many fume hoods or mechanical systems.”

By law, all chemistry and biology fume hoods must be under constant ventilation, and it’s because of this that there are so many loud fans around campus. Salazar notes in reference to the fans, “Everything runs 24/7. Wet labs are 24/7/365.”

When asked whether there were ways Caltech could lessen the noise caused by ventilation systems on campus, Salazar says that older buildings such as Spalding Laboratory have small fans for each individual hood. Eventually they will be replaced by a few large fans, which will reduce noise, though Salazar was unable to give a time scale for this change.

Both Salazar and Vaziri clarified that fixing noise pollution is simply not a number one concern driving ventilation upgrades: price, airflow, energy efficiency, and reliability all compete with noise levels to determine purchasing decisions. “It’s a balancing act,” Vaziri concedes.

For now, the noise of birds and crickets will continue to be drowned out by the whine of fans.

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Dear Prefrosh, welcome to Caltech!

TIMOTHY LIU
ARC Chair

Let me be the 42nd person to welcome you to Caltech! My name is Tim, and I'm a junior from the fine state of Indiana studying electrical engineering. I hope you're ready to say those three things (name, major, and where you're from) a lot over the next two weeks, because that's what half of the conversations you'll have during rotation will be about.

To be honest, I only vaguely remember my first weeks at Caltech, but I do know that it was a lot of fun. The first two terms on pass fail is a blessing granted by the mysterious hands that run academics at Caltech. Use this time to try things out, learn about yourself, and experiment. During winter term my freshman year, I did an experiment where I stopped going to lecture—something a lot of you might also try. It didn't work that well (actually, it went pretty badly; I can barely do linear algebra), but I passed my classes just like ninety-nine percent of you will. Moral of the story: try new things while you can.

When I started at Caltech, I was pretty convinced I was going to be a mechanical engineer. Fast forward two years, and I've spent way more time two floors underground in the electrical engineering lab than I expected. There's a saying that no plan survives contact with the enemy. From my experience, the same basically applies to Caltech. I think that making plans or schedules can be useful and can get you thinking about what you're interested in. But be ready for your plans to change, and maybe hold off on tattooing your major to your forehead in a desperate attempt to avoid rotation conversations (it won't work anyway). Once you learn more about different options, it's much easier to figure out what you really want to do. I'm still not sure why I changed my mind about my major (was there something in the Chipotle I ate at that electrical engineering event?), but things have worked out so far, and I'm sure they will for all of you as well. Keep an open

mind, and remember that pass-fail is a time for exploration.

You might have heard horror stories about Caltech academics: tales of pulling all-nighters, stumbling through finals, and battling nunchuck-wielding dragons with memory leaks. But there's a number that I think makes Caltech academics look a little more innocuous: 40.5. That's the average number of units you need to take per term to graduate on time. Admittedly, unit counts can be deceptive—a 36-unit load can be a walk in the park, or a slog through a muddy minefield depending on the classes. But the bottom line is that Caltech isn't a sprint; it's a long, steady marathon of sets, terms, classes and quite possibly less running than a real marathon.

Of all the resources available to help you at Caltech, there is one that is the most important: the upperclassmen around you. All of the awkward or embarrassing questions that you have and are going to have were asked by an upperclassman at some point. Can't get the door to your room open? Ask an upperclassman. Don't know where the laundry room is? Ask an upperclassman. Still can't get the door to your room open? Ask an upperclassman again, but maybe a different one this time. The people around you have gone through frosh plague, homesickness, academic stress, and almost anything else imaginable. Getting to know upperclassmen is incredibly useful, and if you ask nicely someone might even tell you where the fifth floor of Moore is.

Over the next few weeks, you're going to experience a mix of different feelings: excitement, confusion, joy, and maybe even vertigo. But what stood out to me is the feeling of novelty, of everything being so new, different and exciting. You're only a prefrosh once, and many of the things that right now feel new or unfamiliar will quickly become routine and normal. The first few weeks can be disorienting and tiring, but you only get to experience all this once. So have fun, prefrosh, and don't waste too

much time reading silly letters from heads of committees. You'll find that time really flies here, and pretty soon you'll be the ones welcoming prefrosh to campus.

The Academics and Research Committee (ARC) is the academic branch of Caltech student government. This is my third year on the ARC, and I'm lucky enough to be its chairman. We work on a range of projects, including planning student-faculty events, handling course concerns, and influencing academic policy. If you're interested in learning more about the ARC and what we do, our meetings are open to the public. You can find us in SAC 15 every Sunday at 3 PM, or find out more by talking to any ARC member. To find our website, go to donut.caltech.edu and click on the ARC link on the left side.

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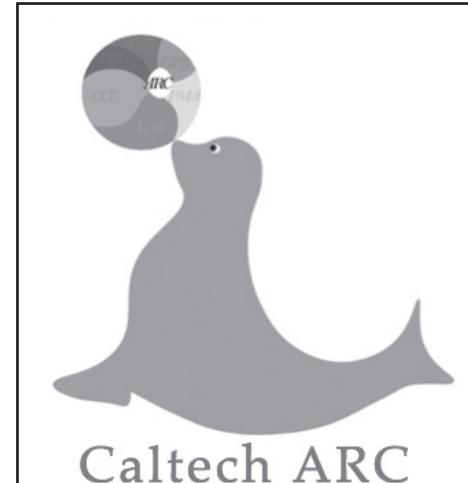
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Bechtel Residence Raises Questions about Housing, Rotation

SANDRA NING, JIHOON LEE, AND
NAVEEN ARUN
Contributing Writers

A New Place on Campus

A walk along the northern edge of campus, from Michigan Avenue to Avery House, takes one through a dusty parking lot, the Chester Ave. cul-de-sac, and a dirt lot. Over the next two years, this stretch of land will become something radically different, housing faculty, resident advisors, and an estimated 249 students within the sleek, contemporary walls of the Bechtel Residence.

Although Bechtel is a \$64 million venture capable of housing as many students as the three North Houses combined, the question of who will live there remains unresolved. The administration's silence on the matter continues to frustrate undergraduates, who are contemplating what students will reside in Bechtel -- and what that could mean for undergraduate House culture.

The concept of the Bechtel Residence was first proposed in 2012, when the S. D. Bechtel Jr. Foundation, founded by construction and civil engineering magnate Stephen Bechtel, Jr., donated \$25 million to the Institute "to support campus life and outreach programs." The Institute decided to use the money to create a new residence in Bechtel's name. Today the budget totals \$64 million, which the Institute reached from investing the Bechtel donation, conducting additional fundraising, and using income from the campus room plan. Initial planning of the residence design began in October 2015 and is ongoing this spring.

In collaboration with the ZGF architectural firm, the Matt Construction Corp, Caltech's Design and Construction group and current students, the Institute has been able to refine the Bechtel Residence from a concept to a more concretely defined living space. Bechtel House will occupy a space bounded by Avery House, Del Mar Ave., S. Michigan Ave., and Moore Walk. Additionally, the existing parking lot in that area will be mostly eliminated, and faculty parking spaces will be replaced by existing spaces in the four main parking garages and Avery parking garage.

This arrangement irks some students, in particular those living in Avery. According to former Avery Chancellor Tony Zhang, the Institute had already removed South House student parking spaces and this new development will do the same to Avery residents. "Parts of our house are being taken away," he remarked. ZGF claimed that parking would not be a concern, saying there would still be "over three hundred" surplus spaces left around campus after construction.

The House's interior layout takes a bit of a departure from existing houses. Bechtel will have one to three story sections, arranged such that it looks "imposing from outside campus, and increases the view of campus for the House's residents," stated a ZGF representative. Bechtel House will be generally composed of suites, with each bedroom slightly larger than South House singles. At a campus-wide Bechtel meeting, May 13th, architects proposed plans give each suite its own living and dining area, though without a kitchen. Suites may have movable walls that students can elect to in order to integrate with a second suite. Standalone single rooms were also proposed, as well as 1-bedroom apartments for RAs and two resident faculty apartments. Like existing houses, there will be several communal kitchens and general activity spaces for whole-house use.

Design Troubles

Zhang is skeptical of the suite design. "These are Caltech students we're talking about. If you put people in suites instead of houses they won't ever come out," Zhang said, laughing despite himself. Although a 2009 report from Caltech suggests that many students desired suite-style housing, he describes how Avery House was designed with supposedly communal rooms, such as the dining hall and the library, physically isolated from students, and how this physical distance led to difficulties in establishing a house culture early on. Likewise, nearby Pomona College implemented suite-style housing, which Zhang says resulted in "doors miles apart in hallways" that hindered interaction between students. Still, suites have become quite trendy in dormitory architecture as of late, and despite mild protests from some students the administration has had the final say on this matter.

Since last October, the Bechtel Planning Committee has met once a month to discuss Bechtel's interior designs. The meetings have involved student leaders and representatives from each House. A ZGF architect presents plans for Bechtel and receives feedback on the designs. The Institute has a tradition of including students in administrative decisions, but some feel, as undergraduate Amanda Lin says, "like it's input in name only." As Avery House's representative, Lin is responsible for attending meetings, relaying information to and from the Planning Committee and Avery House. Although from early meetings she and others voiced their concern that suites isolate students from the rest of their house's community, Lin felt administration did not seriously consider their opinions. More recently, students fought for Ethernet cables in every student room after architects revealed interior plans with limited ports and heavier reliance on wireless connection. "We all know how stellar the Beavernet connection is," quipped Nathan Schoepp, resident advisor (RA) of Avery House, encapsulating widespread consensus that Ethernet cables are essential for fast internet access on campus. At the time, both Schoepp and Lin felt there was no definitive agreement to change the port schematic.

"I think they [the architects] have been overly accommodating," says Schoepp, pointing to the changes ZGF made in response to student feedback. Indeed, suite and IT designs are still being changed around. Architects recently proposed 18-room suites that open directly to the main hallway of Bechtel, a design that gets rid of the initial two-tier hallway system where, in order to enter their rooms, students would enter a second suite corridor from the main hallway. The previous design "makes it hard for RAs to check in on students," Lin said. "The central hallway would be dead of activity," Schoepp agreed. But he also said that the architects' new designs successfully reduce the extent to which RAs intrude to check on students, which "makes our jobs much easier."

Architects have also balanced their budget constraints with student demands. Schoepp recalled that in response to student demands for more furniture in common areas, the firm slightly reduced the size of the rooms, exchanging the cost of making a larger room for having two couches per area rather than one. "They've done a pretty good job of incorporating student feedback, considering that everyone who is giving input won't live in Bechtel, or even be at Caltech, once it's built," said Schoepp. Regardless, Lin and other students feel that student opinion

alone isn't enough to sway administration from important design decisions. "They won't change anything they don't want to change," Lin concluded.

Students remain uneasy about designing a house without knowing who will live in it. Although students are asked to give advice on the interior designs, "It's hard to judge anything because we don't know what it [Bechtel] is going to be used for," Zhang said. For off-campus upperclassmen who may want to live quietly, Zhang said, consulting the Interhouse Committee (IHC), an extremely active subset of the student population, would be unfair. On the other hand, "for freshmen housing, it's the perfect group to ask," Zhang said. While Bechtel's singles-only rooms "could be ideal for seniors who have already formed their own communities and friends," offered Lin, incoming freshmen have no such pre-existing group, and Bechtel's layout could isolate them from peers and upperclassmen. Schoepp noted that "so many strong relationships came out of the roommate-picking process," and said he would reconsider singles-only housing if Bechtel was designated freshman housing. "I lived in a triple the size of this single in UCSD. It was a valuable lesson to live with other people in close proximity."

Who is Bechtel Residence for?

Joe Shepherd, Vice President of Student Affairs, said that discussions between students and administration over the next year should settle who exactly will live in Bechtel. Although he has sensed some tension from students regarding the several-years-long deliberations, he feels that they have been completely justified. In particular, he emphasized the importance of the long-term effects the new group of residents would have: in addition to affecting student life, they would have "significant implications for Student Auxiliary Services, who are responsible for the operations of dining and housing." For this reason alone, "it is important to proceed in a deliberate manner with a thoughtful engagement of the campus community," he added. To clarify rumors, Shepherd said there are no plans to immediately use Bechtel to house North House residents; nor will it be for expanding student enrollment.

Various other schemes are still under discussion. Bechtel may attract students who were forced off-campus despite wanting to stay on. Of the 250 students currently living off-campus, some fit this description; others are off-campus out of choice. Given that Bechtel will probably require board, Zhang says it's unlikely that many off-campus students will be attracted to Bechtel. Otherwise, Bechtel may be used as a mixed graduate-undergraduate house. Bechtel could also be all-freshmen housing.

The Future of Residential Life at Caltech

No matter who settles Bechtel, there's no doubt that the house will affect the undergraduate housing culture. If it becomes undergraduate-only housing, Bechtel would diverge from the tight-knit communities of other Houses, whose friendships form in the close proximity of central lounges and courtyard areas. Avery, the largest house of the eight, holds around 140 people, and has already had troubles forming a cohesive identity in its creation. Bechtel will house one hundred more people than Avery. This, in addition to its suite-style housing, creates some doubt that it will ever form a House identity. "It will disrupt house culture on

some level," Schoepp mused. Bechtel can house around a quarter of the undergraduate population. Its identity, or lack thereof, can seriously impact a large proportion of future undergraduates.

Bobby Sanchez, current IHC chair, sees Bechtel going either one of two ways. To Sanchez, Bechtel will either become unaffiliated housing like Marks-Braun, or will become integrated into the housing system like Avery. If Bechtel becomes a catch-all for students who drew a bad housing lottery number and must find living spaces outside their Houses, the former may become true. If Bechtel starts as mixed graduate and undergraduate housing, much like Avery, it could follow either route. Either way, additional housing will allow graduate students more housing options: either in the form of off-campus houses freed up by undergraduates moving into Bechtel, or in Bechtel itself.

If Bechtel does become freshman housing, the consequences for the House system are even more immediate and apparent. All-freshman housing would do away with the current system of rotation, the week-long process that determines which students are a good fit for which House. Sanchez states that he is not at all in favor of freshmen-only housing. "The gist of it is that seniors have a lot to offer underclassmen," Sanchez said. Although rotation is a long-standing tradition, the sorting process is mired in secrecy. "It's a system designed to judge people," Schoepp said. Some, like Sanchez, contend that rotation introduces freshmen to community rich with the upperclassman support essential to surviving Caltech. Zhang contests that upperclassman presence and activities often cause problems for freshmen. Interhouse construction and a myriad of House traditions pile up and form "a lot of distractions," said Zhang. "It's good, but it can be excessive at times." Schoepp and Zhang's criticisms echo issues with the current House system that Joe Shepherd says have been brought up throughout the years. "I think it's always valuable to reflect on the situation that you have," said Shepherd.

Currently, Bechtel is projected to begin construction in early 2017, after designs are finalized within the coming year. The plan is to have Bechtel available as housing by fall 2018, a full six years after the idea was first proposed in 2012.

Four years into the process, students are still wondering who will live in Bechtel, and what it will mean for undergraduate life. Although the waiting has caused friction and frustration, leading some to question if administration means to secretly bring down the House system, Shepherd says that is not at all the purpose. "Really, the goal of this is to be able to have more students on campus, and to provide better housing options than we have now," he said. Whether intentional or not, new housing options will ultimately change the landscape of undergraduate life. To Schoepp, this might not be a bad thing. "If something like the current house system is really beneficial to the community, then it's going to stand on its own," Schoepp said. "If the only way to preserve a tradition is by never challenging it, then it's probably good to re-examine that tradition."

FEATURE

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THE CALIFORNIA TECH

Newman and Orphan receive award

Continued from page 1

Biology for her “discovery of microbial mechanisms underlying geologic processes.” She is a Fellow of the American Academy of Microbiology.

“I was completely stunned when I got the call from the MacArthur Foundation,” says Newman. “In science we fail and are rejected far more often than we succeed. This award provides very meaningful encouragement to keep taking intellectual risks, and to be tenacious in their pursuit. It is a direct tribute to the quality of microbiology and geobiology research at Caltech, which is fueled by our spectacular students, postdocs, and colleagues. I hope the attention that comes with this award will help us sustain our efforts in these areas for years to come.”

Victoria Orphan studies the molecular microbial ecology of anaerobic communities with a particular focus on microorganisms that live in deep-ocean sediment beds and consume large quantities of methane released from seeps in the ocean floor. Because these microbes cannot be grown in the laboratory, Orphan has combined techniques from molecular biology and mass spectrometry into novel methods that enable the study of the activities of individual microbial cells, as well as the relationships among different microbes, in their natural environments. For the last two decades, Orphan’s lab has focused on the relationship between a species of bacteria and a species of archaea that live in symbiotic aggregates, or consortia, within deep-sea methane seeps. The organisms work together in syntrophy (which means “feeding together”) to consume up to 80 percent of methane emitted from the ocean floor—methane that might otherwise end up contributing to climate change as a greenhouse gas in our atmosphere. Orphan and her

colleagues contributed to the discovery of this microbial symbiosis between anaerobic methanotrophs—“methane eaters”—and a particular sulfate-breathing bacterium.

Recently, Orphan and her team discovered how this symbiotic relationship utilizes electrons to share energy, even when the organisms are not in direct contact with one another. The work was the first to document direct interspecies electron transport—the movement of electrons from a cell, through the external environment, to another cell type—in microorganisms in nature.

Orphan received her PhD from the University of California Santa Barbara in 2001. She received an Early Career Award from the Department of Energy in 2010, a Presidential Early Career Award in Science and Engineering in 2011, and a Young Investigator award from the International Society of Microbial Ecology in 2012. Orphan has been a Gordon and Betty Moore Marine Microbiology Investigator since 2013, and she became a Fellow of the American Academy of Microbiology in 2015.

“It is an honor to be part of the MacArthur Foundation’s 2016 class and I am extraordinarily proud to share this recognition with my current and former students, postdocs, and collaborators and with my dear colleague Dianne,” says Orphan. “Being recognized for this award as a geo-microbiologist is really a testament to how far the field has come in a relatively short span of time.”

Since 2002, 10 Caltech faculty (including Newman and Orphan) have been named MacArthur Fellows. Fellows are selected for their “exceptional creativity,” defined by the MacArthur Foundation as “the drive and ability to make something new or to connect the seemingly unconnected in significant ways.”



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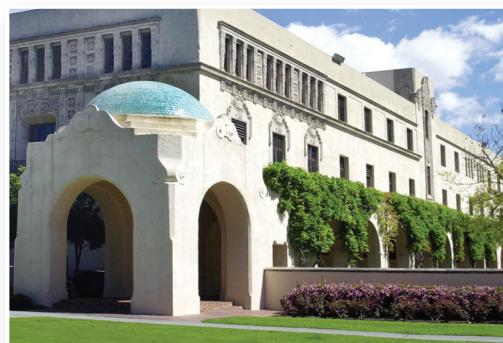
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SPORTS

THE CALIFORNIA TECH

SEPTEMBER 26, 2016

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Reed leads defensive stand in defeat

GOCALTECH.COM
Actual Sports Content Editor

PASADENA, Calif. (Sept. 17, 2016) – A strong defensive showing in the second half was not enough for the Caltech men's soccer team as the Beavers fell to SCIAC foe Claremont-Mudd-Scripps Colleges, 5-0, on Saturday morning.

The Stags improve to 5-1 overall and 3-1 in the conference, while the Beavers drop to 0-5 (0-4).

From the start of the game, the Stags were looking to attack the Beavers' back line, spreading the field and sending numerous through balls into the box. Within the first 13 minutes, the Stags jumped out to a quick 2-0 lead.

Caltech locked in on defense at that point, limiting the visitors' chances over the next 24 minutes before a 36th-minute curler from outside the box put CMS ahead 3-0 at halftime.

The Beavers came out rejuvenated in the second half,

again playing stout defense, with senior Schaeffer Reed in particular coming up with a slew of interceptions and recovered balls. The Stags' deep bench came into play late in the game, however, mustering scores in the 66th and 87th minutes. The Beavers fought right to the end, with freshman Kevin Yu cutting through multiple defenders on several occasions and finally creating enough space to whip in a low shot, but the effort was saved.



Congrats, Schaeffer, on being the only non-prefrosh on the first sports page of the year.

Photo Courtesy of Michael Wong

Lauinger just misses fifth straight double double

GOCALTECH.COM
Actual Sports Content Editor

CLAREMONT, Calif. (Sept. 17, 2016) – Freshman Alexa Lauinger came up just short of her fifth double-double with nine digs and nine kills in a 3-0 loss in the SCIAC opener to Pomona-Pitzer Colleges on Saturday evening.

The Beavers dip to 1-4 overall and begin SCIAC play 0-1 while the Sagehens improve to 5-4 overall (1-0).

Rookie Ellie Walker set for 16 assists and fellow freshman Lauren Li recorded five digs and four kills.

Caltech started slowly in the first set, going down 10-2 before a

run including two service aces by senior Sakthi Vetrivel pulled the visitors within three points. The Sagehens responded with their own 10-4 run to take the first set, 25-16.

The Beavers kept the second set close and were within two points through the first half of the set before Pomona-Pitzer took control with the score at 12-10, going on to win 25-16. The Sagehens came out firing in the third set and took a quick 7-2 lead. With the hosts looking to close out the match, Caltech fought to stay in the match but could not quite get back into it, falling 25-9 to suffer the defeat.



*The Sagehens raise their hands in the air,
Like they just don't care,
Because the ball Alexa hit,
Gave them quite a scare.*

Photo Courtesy of Bob Paz

Records fall for cross country at Biola Invitational

GOCALTECH.COM
Actual Sports Content
Editor

FULLERTON, Calif. (Sept. 10, 2016) – Freshmen Simon Ricci and Sophie Walton each set new Caltech cross country program records at the inaugural Biola Invitational on Saturday morning.

Although the course appeared to have been measured a bit short, both rookies turned in unquestionably impressive performances, as Ricci would likely have turned in no worse than the second-quickest time in program history and Walton leaving no doubt as she shattered the previous 5k record by more than a minute, even bettering the track & field 5k record. Ricci keyed the men's team to a sixth-place finish among the 12 teams in the race, while Walton led the women's side to 10th place among 15 teams, including defeating a pair of SCIAC foes for the first time in five years.

"Our depth was on display again today," Head Coach Ben Raphelson said. "In cross country, finishing times are always secondary to finishing place. The times were



Sophie tries her hardest to run away from the problems Caltech will soon throw at her. P/F, prefrosh.
<http://gocaltech.com>

season-opening 6k distance to the full race length of eight kilometers, while the women took a slight step up from the 4.5k Redlands Invitational to 5k, with their first 6k of the season set for the SCIAC Multi-Duals in three weeks.

Ricci was the top-finishing rookie among Division III runners, clocking a 25:30.44 to beat out two-time NCAA qualifier Aditya Bhagavathi's 2014 program record. Fellow freshman Greg Gephart also turned in a phenomenal performance, crossing the finish line in the



Simon says, "run slower than me losers."
<http://gocaltech.com>

exciting to see, but we're drawing more encouragement from how we fared relative to some familiar opponents. Things are progressing well."

Covering the mix of rolling hills, pavement and even the odd wood bridge, both teams entered their second weekend of competition with a carefully crafted plan and executed to near perfection. The men's team jumped right from the

fourth-fastest time in program history, while sophomore Rohan Choudhury improved from his position in 15th on the all-time list to sixth. With the team again focusing on a conservative start to the race, nearly every Beaver ran within five seconds of last week's mile pace, with freshman Sam Blazes even pacing a second per mile quicker.

"I was excited with the way the men executed the race plan," Raphelson said. "They did that well last week, but the added challenge for this week was the two extra kilometers and a much larger field. They really kept their composure and closed well over the final miles; seeing that and their overall placement was more exciting than their final times."

Walton reached the finish a full minute and 21 seconds faster than the previous Caltech 5k record, also finishing first among Division III freshmen and third among all Division III runners with a 17:48.36. Sophomore Melissa Gutierrez cracked the top-15 list with the third-fastest time in program history, while classmate Cherie Jia claimed the fifth-quickest time in just her second competitive race at any level thanks to shaving the most time off her mile pace from last week of any Beaver.

"We were pleased with how last weekend went, but we wanted to refine a few things in terms of our overall execution," Raphelson said. "The highlight of the weekend was how our women finished relative to the other SCIAC schools. They've been working hard

and were justifiably proud of the team result. I felt we paced today more appropriately and looked really strong in the latter stages of the race – that bodes well going forward."

Raphelson and the Beavers will take three weeks off from competition to train for the SCIAC Multi-Duals on Oct. 1, which once again will take place at La Mirada Park.

ROTATION

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THE CALIFORNIA TECH

Last Name	First Name	Dinner A	Dinner B	Dinner C	Dinner D	Dinner E	Dinner F	Dinner G	Dinner H	Dessert 1	Dessert 2	Dessert 3	Dessert 4	Dessert 5	Dessert 6	Dessert 7
Abou-Zamzam	Zafir	Avery	Ricketts	Lloyd	Fleming	Page	Dabney	Ruddock	Blacker	Dabney	Page	Ruddock	Blacker	Fleming	Lloyd	Ricketts
Adams	David	Avery	Fleming	Lloyd	Ricketts	Dabney	Blacker	Page	Ricketts	Blacker	Dabney	Page	Lloyd	Ruddock	Fleming	
Adams	Sara	Avery	Ricketts	Ruddock	Fleming	Blacker	Lloyd	Page	Dabney	Lloyd	Page	Blacker	Ruddock	Fleming	Ricketts	
Aksensfeld	Rita	Avery	Page	Dabney	Ricketts	Lloyd	Ruddock	Fleming	Blacker	Lloyd	Blacker	Ruddock	Fleming	Ricketts	Page	
Alford	Thomas	Page	Fleming	Lloyd	Ruddock	Dabney	Avery	Ricketts	Blacker	Avery	Ricketts	Dabney	Ruddock	Fleming	Lloyd	
Anderson	Margaret	Lloyd	Page	Avery	Ruddock	Blacker	Dabney	Fleming	Ricketts	Blacker	Dabney	Fleming	Page	Avery	Ruddock	
Andrews	Alec	Ruddock	Ricketts	Lloyd	Page	Fleming	Dabney	Avery	Blacker	Fleming	Dabney	Avery	Blacker	Page	Ricketts	
Ayres	Aaron	Fleming	Page	Ricketts	Avery	Lloyd	Dabney	Blacker	Ruddock	Lloyd	Dabney	Ruddock	Blacker	Avery	Page	
Badal	Yovan	Lloyd	Fleming	Blacker	Dabney	Page	Avery	Ruddock	Ricketts	Avery	Ruddock	Page	Ricketts	Fleming	Blacker	
Bagger	Eigel	Avery	Lloyd	Blacker	Page	Dabney	Fleming	Ruddock	Ricketts	Ruddock	Dabney	Fleming	Blacker	Dabney	Dabney	
Bai	Andrew	Avery	Ricketts	Blacker	Ruddock	Lloyd	Fleming	Dabney	Page	Page	Fleming	Lloyd	Dabney	Ricketts	Ruddock	
Bal	Roshan	Blacker	Ricketts	Dabney	Fleming	Avery	Page	Lloyd	Ruddock	Ruddock	Page	Avery	Lloyd	Ricketts	Fleming	
Bandopadhyay	Ayan	Dabney	Blacker	Fleming	Page	Ruddock	Lloyd	Avery	Ricketts	Ruddock	Avery	Ricketts	Lloyd	Page	Blacker	
Bannister	K'yal	Blacker	Fleming	Dabney	Ruddock	Lloyd	Ricketts	Page	Avery	Lloyd	Ricketts	Page	Dabney	Ruddock	Fleming	
Berube	Damien	Dabney	Lloyd	Blacker	Fleming	Ricketts	Ruddock	Avery	Page	Avery	Page	Ruddock	Blacker	Lloyd	Fleming	
Bharadwaj	Vivek	Page	Lloyd	Blacker	Ruddock	Fleming	Ricketts	Dabney	Avery	Ricketts	Avery	Fleming	Dabney	Lloyd	Blacker	
Bhundiya	Harsh	Avery	Blacker	Ricketts	Page	Lloyd	Dabney	Fleming	Ruddock	Fleming	Lloyd	Ruddock	Dabney	Ricketts	Page	
Bishop	Caleb	Ricketts	Ruddock	Blacker	Lloyd	Avery	Page	Dabney	Fleming	Avery	Page	Fleming	Dabney	Ruddock	Lloyd	
Blazes	Samuel	Page	Blacker	Fleming	Ruddock	Avery	Ricketts	Dabney	Lloyd	Ricketts	Avery	Lloyd	Dabney	Blacker	Ruddock	
Bodrova	Alexandra	Avery	Lloyd	Ricketts	Blacker	Page	Fleming	Ruddock	Dabney	Ruddock	Fleming	Dabney	Ricketts	Lloyd	Blacker	
Bouman	Alexander	Ruddock	Fleming	Page	Lloyd	Avery	Blacker	Dabney	Ricketts	Dabney	Avery	Ricketts	Blacker	Fleming	Page	
Brady	Madison	Lloyd	Avery	Ruddock	Ricketts	Blacker	Fleming	Page	Dabney	Dabney	Blacker	Fleming	Page	Avery	Ruddock	
Briones	Jackson	Page	Ricketts	Dabney	Fleming	Ruddock	Blacker	Lloyd	Avery	Lloyd	Avery	Blacker	Ruddock	Dabney	Ricketts	
Cai	Jesse	Avery	Ricketts	Fleming	Page	Dabney	Ruddock	Blacker	Lloyd	Blacker	Ruddock	Lloyd	Dabney	Fleming	Ricketts	
Caldwell	Jack	Page	Ricketts	Blacker	Ruddock	Avery	Lloyd	Fleming	Dabney	Avery	Lloyd	Fleming	Ricketts	Blacker	Ruddock	
Carr	Philip	Page	Blacker	Dabney	Ruddock	Ricketts	Lloyd	Fleming	Avery	Avery	Ricketts	Lloyd	Dabney	Blacker	Ruddock	
Carrera	Mattia	Avery	Lloyd	Dabney	Fleming	Ruddock	Page	Blacker	Ricketts	Ruddock	Blacker	Ricketts	Page	Dabney	Fleming	
Carter	Ross	Lloyd	Blacker	Page	Ruddock	Fleming	Avery	Dabney	Ricketts	Fleming	Dabney	Avery	Ruddock	Blacker	Page	
Cassese	Benjamin	Fleming	Ricketts	Page	Dabney	Blacker	Ruddock	Avery	Lloyd	Avery	Lloyd	Blacker	Ruddock	Dabney	Ricketts	
Chadha	Anuj	Page	Ricketts	Ruddock	Avery	Lloyd	Blacker	Fleming	Dabney	Lloyd	Fleming	Dabney	Avery	Ruddock	Ricketts	
Borges	Arlindo	Ricketts	Fleming	Blacker	Lloyd	Avery	Ruddock	Page	Dabney	Dabney	Page	Ruddock	Avery	Blacker	Lloyd	
Chan	Gabriella	Lloyd	Ricketts	Page	Dabney	Avery	Fleming	Blacker	Ruddock	Avery	Fleming	Blacker	Ruddock	Dabney	Ricketts	
Chan	Jonathan	Lloyd	Fleming	Ricketts	Blacker	Avery	Page	Ruddock	Dabney	Avery	Ruddock	Page	Blacker	Fleming	Ricketts	
Chen	Sharon	Ruddock	Avery	Fleming	Lloyd	Page	Ricketts	Dabney	Blacker	Dabney	Ricketts	Page	Blacker	Lloyd	Fleming	
Chen	Timothy	Lloyd	Fleming	Page	Avery	Blacker	Dabney	Ricketts	Ruddock	Ruddock	Blacker	Dabney	Fleming	Page	Avery	
Chen	Victor	Avery	Ricketts	Fleming	Page	Dabney	Lloyd	Ruddock	Blacker	Ruddock	Blacker	Dabney	Fleming	Ricketts	Page	
Chica	Daniel	Ruddock	Page	Blacker	Ricketts	Fleming	Avery	Lloyd	Dabney	Avery	Fleming	Dabney	Lloyd	Blacker	Ricketts	
Chidambaram	Bhairav	Lloyd	Avery	Ruddock	Ricketts	Fleming	Dabney	Page	Blacker	Fleming	Page	Dabney	Ruddock	Ricketts	Avery	
Christensen	Annelise	Avery	Blacker	Lloyd	Dabney	Fleming	Ricketts	Lloyd	Ruddock	Ricketts	Fleming	Page	Blacker	Dabney	Lloyd	
Chung	Ami	Avery	Ruddock	Fleming	Dabney	Blacker	Ricketts	Page	Ruddock	Ricketts	Lloyd	Page	Blacker	Dabney	Ruddock	
Cooley	Christopher	Avery	Ricketts	Fleming	Blacker	Lloyd	Page	Ruddock	Dabney	Dabney	Lloyd	Ruddock	Blacker	Ricketts	Fleming	
Coplin	Sophia	Page	Avery	Lloyd	Ruddock	Fleming	Blacker	Ricketts	Dabney	Ricketts	Blacker	Dabney	Fleming	Lloyd	Avery	
Corado	Robert	Ruddock	Ricketts	Dabney	Page	Avery	Lloyd	Blacker	Fleming	Blacker	Lloyd	Avery	Page	Ricketts	Dabney	
Cowell	Adrianna	Lloyd	Dabney	Avery	Ricketts	Blacker	Page	Fleming	Ruddock	Blacker	Page	Ruddock	Fleming	Avery	Ricketts	
Crucilla	Sarah	Ruddock	Avery	Blacker	Ricketts	Dabney	Fleming	Lloyd	Page	Page	Ricketts	Avery	Ruddock	Blacker	Avery	
Cruz	Kaylor	Ruddock	Avery	Lloyd	Ricketts	Fleming	Page	Blacker	Dabney	Fleming	Page	Blacker	Ruddock	Blacker	Lloyd	
Cui	Alexander	Avery	Blacker	Lloyd	Ruddock	Ricketts	Fleming	Page	Dabney	Ricketts	Page	Ricketts	Blacker	Ruddock	Blacker	
Cui	Can	Lloyd	Fleming	Dabney	Ruddock	Page	Ricketts	Blacker	Avery	Blacker	Ricketts	Page	Avery	Ruddock	Dabney	
Daghlian	George	Ruddock	Avery	Fleming	Page	Lloyd	Dabney	Ricketts	Blacker	Dabney	Ricketts	Lloyd	Page	Avery	Fleming	
Dai	Sihui	Blacker	Dabney	Ricketts	Avery	Page	Ruddock	Fleming	Lloyd	Fleming	Ruddock	Page	Avery	Dabney	Ricketts	
Davis	Noelle	Page	Ruddock	Fleming	Blacker	Ricketts	Avery	Lloyd	Dabney	Avery	Dabney	Ricketts	Lloyd	Fleming	Ruddock	
D'Costa	Samantha	Blacker	Dabney	Ricketts	Fleming	Page	Ruddock	Lloyd	Page	Ruddock	Lloyd	Page	Avery	Blacker	Lloyd	
De Angelis	Maria	Ruddock	Blacker	Page	Dabney	Fleming	Ricketts	Avery	Ruddock	Dabney	Lloyd	Ricketts	Blacker	Ruddock	Ricketts	
Debbas	Maximilien	Blacker	Ruddock	Page	Dabney	Avery	Ricketts	Fleming	Lloyd	Avery	Ricketts	Lloyd	Page	Ruddock	Dabney	
Derrick	Cayla	Dabney	Fleming	Ruddock	Page	Lloyd	Avery	Blacker	Ricketts	Ruddock	Avery	Ricketts	Page	Ruddock	Fleming	
Deshpande	Ramya	Ruddock	Lloyd	Dabney	Fleming	Ricketts	Avery	Ruddock	Blacker	Page	Ruddock	Fleming	Avery	Ricketts	Dabney	
Diaz	Erica	Avery	Ruddock	Blacker	Lloyd	Ricketts	Fleming	Page	Dabney	Ruddock	Lloyd	Blacker	Page	Ruddock	Dabney	
Dilmore	Amanda	Avery	Page	Ruddock	Fleming	Blacker	Dabney	Lloyd	Ricketts	Lloyd	Blacker	Ricketts	Page	Ruddock	Fleming	
DiMino	Dessie	Fleming	Ruddock	Lloyd	Dabney	Page	Ricketts	Blacker	Ruddock	Avery	Ruddock	Blacker	Page	Ruddock	Dabney	
Ding	Jing	Dabney	Page	Ruddock	Lloyd	Ricketts	Blacker	Avery	Fleming	Ruddock	Dabney	Page	Avery	Ruddock	Ruddock	
Ding	Stephanie	Ricketts	Lloyd	Blacker	Page	Fleming	Avery	Ruddock	Dabney	Avery	Dabney	Blacker	Page	Lloyd	Lloyd	
Domiguez-Kuhne	Marcus	Avery	Dabney	Lloyd	Blacker	Ricketts	Page	Ruddock	Fleming	Page	Ricketts	Ruddock	Fleming	Blacker	Dabney	
Dor	Harel	Lloyd	Dabney	Blacker	Fleming	Page	Ruddock	Ricketts	Dabney	Avery	Ruddock	Blacker	Ruddock	Fleming	Blacker	
Duran	Kenny	Avery	Ruddock	Lloyd	Ricketts	Dabney	Blacker	Page	Fleming	Blacker	Ruddock	Page	Dabney	Lloyd	Ruddock	
Durney																

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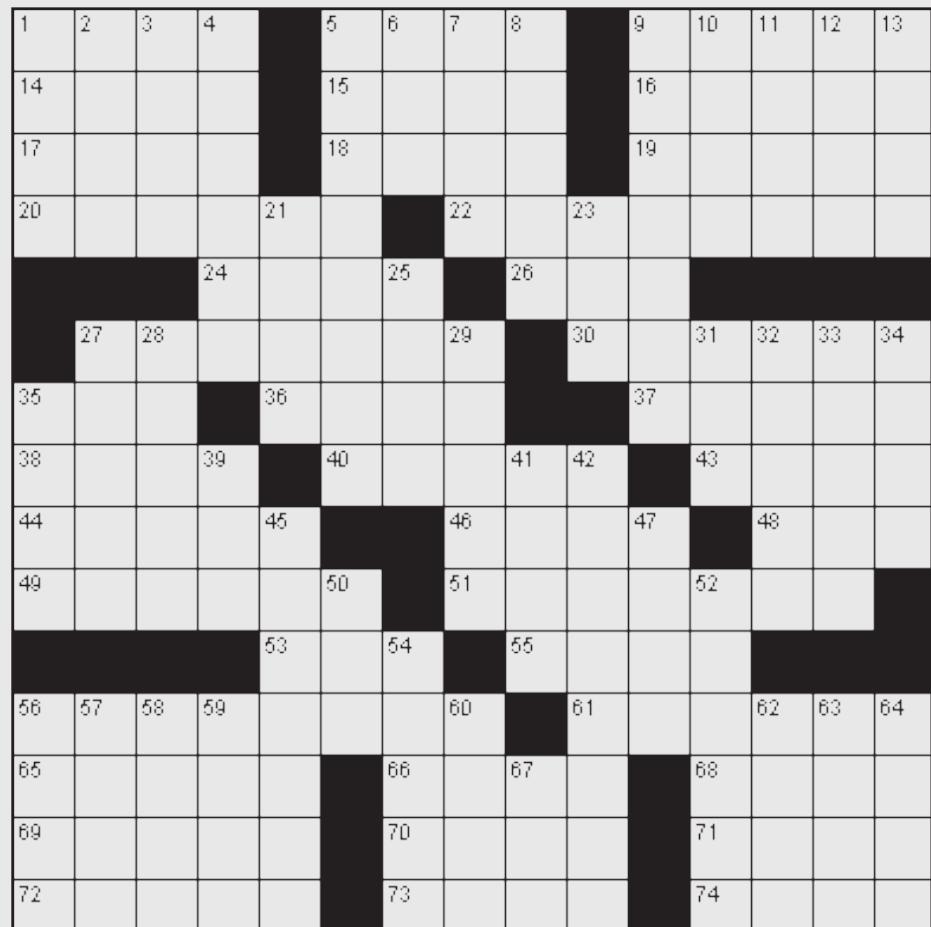
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Lopez	Alejandro	Ricketts	Dabney	Blacker	Fleming	Avery	Ruddock	Page	Lloyd	Lloyd	Avery	Page	Ruddock	Fleming	Dabney	Blacker
Lopezalles	Sierra	Ruddock	Ricketts	Dabney	Avery	Blacker	Lloyd	Page	Fleming	Blacker	Page	Fleming	Lloyd	Dabney	Avery	Ricketts
Lu	Tiger	Dabney	Page	Avery	Ruddock	Blacker	Fleming	Ricketts	Lloyd	Lloyd	Ricketts	Fleming	Blacker	Avery	Ruddock	Page
Mandigo-Stoba	Morgaine	Avery	Ruddock	Page	Lloyd	Dabney	Fleming	Ricketts	Blacker	Ricketts	Fleming	Blacker	Dabney	Lloyd	Page	Ruddock
Mark	Daniel	Page	Dabney	Fleming	Avery	Blacker	Ruddock	Lloyd	Ricketts	Ruddock	Blacker	Lloyd	Ricketts	Fleming	Dabney	Avery
Martinez	Christian	Fleming	Ricketts	Dabney	Ruddock	Lloyd	Avery	Blacker	Page	Page	Avery	Lloyd	Blacker	Ruddock	Ricketts	Dabney
Mathialagan	Surya	Fleming	Avery	Ricketts	Page	Lloyd	Dabney	Ruddock	Blacker	Ruddock	Blacker	Dabney	Lloyd	Avery	Page	Page
Mathur	Sudhi	Lloyd	Avery	Ricketts	Dabney	Fleming	Ruddock	Blacker	Page	Blacker	Ruddock	Fleming	Page	Dabney	Ricketts	Avery
McBlane	Neil	Avery	Blacker	Lloyd	Ricketts	Dabney	Page	Ruddock	Fleming	Ruddock	Blacker	Dabney	Page	Fleming	Blacker	Lloyd
McLaughlin	James	Fleming	Avery	Dabney	Page	Lloyd	Blacker	Ruddock	Ricketts	Blacker	Ruddock	Ricketts	Lloyd	Avery	Page	Dabney
Mercado	Roberto	Page	Ricketts	Dabney	Ruddock	Avery	Blacker	Fleming	Lloyd	Blacker	Avery	Lloyd	Ricketts	Dabney	Ruddock	Ricketts
Messner	Grant	Ricketts	Ruddock	Avery	Blacker	Lloyd	Fleming	Dabney	Page	Lloyd	Dabney	Page	Avery	Blacker	Ruddock	Ricketts
Miao	Cathy	Dabney	Avery	Fleming	Page	Ruddock	Ricketts	Blacker	Lloyd	Blacker	Ricketts	Lloyd	Ruddock	Fleming	Page	Blacker
Mikofsky	Rebecca	Avery	Blacker	Ricketts	Page	Ruddock	Dabney	Fleming	Lloyd	Blacker	Ruddock	Fleming	Ricketts	Page	Blacker	Lloyd
Miller	Jayne	Blacker	Fleming	Page	Dabney	Ruddock	Ricketts	Lloyd	Avery	Ricketts	Ruddock	Lloyd	Avery	Page	Dabney	Page
Min	Joseph	Lloyd	Blacker	Ricketts	Dabney	Avery	Ruddock	Fleming	Page	Ricketts	Page	Avery	Ricketts	Dabney	Ruddock	Ricketts
Mistry	Prinesh	Blacker	Lloyd	Ruddock	Fleming	Dabney	Avery	Page	Blacker	Avery	Page	Avery	Ricketts	Dabney	Ruddock	Lloyd
Mo	Ziyan	Lloyd	Fleming	Dabney	Ruddock	Page	Ricketts	Blacker	Avery	Page	Avery	Blacker	Ricketts	Ruddock	Fleming	Dabney
Montreal	Antonio	Ricketts	Page	Fleming	Ruddock	Dabney	Blacker	Avery	Lloyd	Dabney	Lloyd	Blacker	Avery	Page	Ruddock	Fleming
Moore	Tanner	Ruddock	Ricketts	Dabney	Page	Lloyd	Avery	Fleming	Blacker	Avery	Fleming	Lloyd	Ricketts	Page	Dabney	Page
Moraru	Alex	Lloyd	Page	Blacker	Fleming	Ricketts	Avery	Ruddock	Dabney	Avery	Dabney	Ruddock	Ricketts	Fleming	Blacker	Page
Mu	Siqiao	Fleming	Lloyd	Ricketts	Page	Avery	Ruddock	Blacker	Dabney	Blacker	Dabney	Avery	Ricketts	Lloyd	Page	Ruddock
Nair	Karthik	Ricketts	Ruddock	Dabney	Avery	Fleming	Blacker	Page	Lloyd	Fleming	Blacker	Lloyd	Ruddock	Dabney	Avery	Page
Nair	Maitreyi	Page	Lloyd	Dabney	Avery	Ruddock	Blacker	Ricketts	Fleming	Ruddock	Blacker	Lloyd	Ruddock	Avery	Dabney	Page
Nanda	Sasha	Avery	Ruddock	Ricketts	Fleming	Blacker	Dabney	Lloyd	Page	Dabney	Lloyd	Blacker	Page	Ruddock	Fleming	Ricketts
Nie	Cherish	Blacker	Page	Ricketts	Avery	Ruddock	Lloyd	Dabney	Fleming	Fleming	Ruddock	Dabney	Ricketts	Page	Ruddock	Avery
Nielson	AJ	Dabney	Ruddock	Ricketts	Fleming	Avery	Lloyd	Blacker	Page	Avery	Blacker	Lloyd	Ricketts	Fleming	Ruddock	Ricketts
Nitsch	Leslie	Avery	Ricketts	Dabney	Blacker	Ruddock	Lloyd	Page	Fleming	Lloyd	Ruddock	Blacker	Dabney	Ruddock	Avery	Ruddock
Ora	Camilla	Dabney	Avery	Ruddock	Page	Ricketts	Blacker	Fleming	Lloyd	Ricketts	Fleming	Lloyd	Blacker	Avery	Page	Ruddock
Ortegaray	Andrew	Dabney	Avery	Blacker	Ricketts	Lloyd	Fleming	Ruddock	Page	Ruddock	Fleming	Lloyd	Ricketts	Avery	Blacker	Page
Overman	William	Lloyd	Avery	Ricketts	Blacker	Ruddock	Fleming	Page	Dabney	Fleming	Ruddock	Dabney	Ricketts	Fleming	Blacker	Page
Owens	Kayla	Ruddock	Lloyd	Ricketts	Fleming	Avery	Ruddock	Blacker	Dabney	Blacker	Dabney	Avery	Ruddock	Lloyd	Page	Ruddock
Pan	Angelina	Fleming	Avery	Ricketts	Lloyd	Dabney	Ruddock	Page	Ricketts	Blacker	Fleming	Lloyd	Ruddock	Avery	Ruddock	Avery
Pan	Emily	Blacker	Avery	Ruddock	Page	Dabney	Fleming	Ruddock	Blacker	Avery	Ruddock	Lloyd	Ruddock	Fleming	Avery	Ruddock
Park	Michelle	Blacker	Fleming	Page	Avery	Lloyd	Dabney	Ricketts	Ruddock	Lloyd	Ruddock	Dabney	Ruddock	Fleming	Avery	Ruddock
Patterson	Kyle	Ricketts	Blacker	Ruddock	Avery	Dabney	Page	Ruddock	Dabney	Fleming	Ruddock	Dabney	Ruddock	Fleming	Blacker	Ruddock
Peng	Changnan	Dabney	Fleming	Ruddock	Page	Lloyd	Ricketts	Blacker	Page	Ruddock	Dabney	Blacker	Ruddock	Fleming	Blacker	Ruddock
Peng	Grace	Lloyd	Ruddock	Ricketts	Fleming	Page	Avery	Ruddock	Dabney	Blacker	Dabney	Avery	Ruddock	Fleming	Ricketts	Page
Perry	Cortland	Fleming	Blacker	Ruddock	Lloyd	Dabney	Avery	Ruddock	Blacker	Avery	Ruddock	Lloyd	Ruddock	Blacker	Lloyd	Avery
Pham	Karen	Ricketts	Ruddock	Avery	Dabney	Page	Lloyd	Ruddock	Blacker	Avery	Ruddock	Lloyd	Ruddock	Avery	Dabney	Page
Piascik	Samuel	Ricketts	Page	Avery	Fleming	Dabney	Blacker	Ruddock	Lloyd	Ruddock	Dabney	Lloyd	Ruddock	Fleming	Avery	Page
Pinkus	Eli	Avery	Dabney	Ricketts	Page	Ruddock	Blacker	Fleming	Lloyd	Ruddock	Dabney	Blacker	Ruddock	Fleming	Dabney	Ruddock
Pomerenck	Olivia	Lloyd	Fleming	Dabney	Ruddock	Avery	Ricketts	Blacker	Page	Ruddock	Dabney	Blacker	Ruddock	Fleming	Ruddock	Dabney
Poole	Nikhil	Fleming	Lloyd	Ricketts	Dabney	Blacker	Ruddock	Page	Ruddock	Dabney	Blacker	Ruddock	Dabney	Lloyd	Blacker	Ruddock
Proskauer	Alejandro	Page	Ricketts	Avery	Blacker	Dabney	Ruddock	Lloyd	Ruddock	Dabney	Blacker	Ruddock	Dabney	Lloyd	Blacker	Ruddock
Putterman	Harald	Dabney	Page	Fleming	Avery	Ricketts	Blacker	Ruddock	Lloyd	Ruddock	Dabney	Blacker	Ruddock	Fleming	Avery	Page
Ramirez	Andrew	Avery	Page	Ricketts	Dabney	Lloyd	Ruddock	Blacker	Fleming	Ruddock	Dabney	Blacker	Ruddock	Dabney	Fleming	Page
Raniwala	Hamza	Ruddock	Ricketts	Lloyd	Blacker	Page	Fleming	Blacker	Page	Ruddock	Dabney	Blacker	Ruddock	Fleming	Ricketts	Page
Reese	Skye	Fleming	Ricketts	Avery	Lloyd	Ruddock	Dabney	Page	Ruddock	Dabney	Blacker	Ruddock	Dabney	Lloyd	Avery	Ruddock
Renn	Peter	Ruddock	Dabney	Ricketts	Page	Lloyd	Fleming	Blacker	Avery	Ruddock	Dabney	Blacker	Ruddock	Fleming	Avery	Ruddock
Rhoads	Amrita	Ricketts	Fleming	Dabney	Page	Blacker	Ruddock	Avery	Ruddock	Dabney	Blacker	Ruddock	Dabney	Fleming	Ruddock	Avery
Ricci	Simon	Blacker	Ruddock	Ricketts	Page	Dabney	Blacker	Fleming	Lloyd	Ruddock	Dabney	Blacker	Ruddock	Fleming	Ruddock	Avery
Roberson	Milan	Dabney	Ruddock	Page	Blacker	Ricketts	Avery	Ruddock	Blacker	Fleming	Blacker	Page	Ruddock	Fleming	Ruddock	Avery
Rogers	Alden	Page	Blacker	Ruddock	Dabney	Ricketts	Blacker	Fleming	Lloyd	Ruddock	Dabney	Blacker	Ruddock	Fleming	Ruddock	Avery
Rupprecht	Michael	Fleming	Lloyd	Page	Ricketts	Ruddock	Blacker	Dabney	Blacker	Avery	Ruddock	Blacker	Ruddock	Fleming	Ruddock	Avery
Salzman	Erika	Page	Lloyd	Avery	Ruddock	Blacker	Dabney	Ricketts	Blacker	Fleming	Blacker	Page	Ruddock	Fleming	Ruddock	Avery
Schmidt	Soren	Avery	Lloyd	Ricketts	Page	Ruddock	Blacker	Fleming	Lloyd	Ruddock	Blacker	Fleming	Blacker	Ruddock	Fleming	Ruddock
Schwacke	Miranda	Dabney	Ricketts	Blacker	Ruddock	Avery	Ruddock	Page	Ruddock	Dabney	Blacker	Ruddock	Dabney	Fleming	Ruddock	Avery
Sharma	Arnav	Avery	Lloyd	Dabney	Blacker	Fleming	Ruddock	Page	Ruddock	Dabney	Blacker	Ruddock	Dabney	Fleming	Ruddock	Avery
Shen Molesky	Maxwell	Blacker	Dabney	Ruddock	Avery</											

Crossword

Across

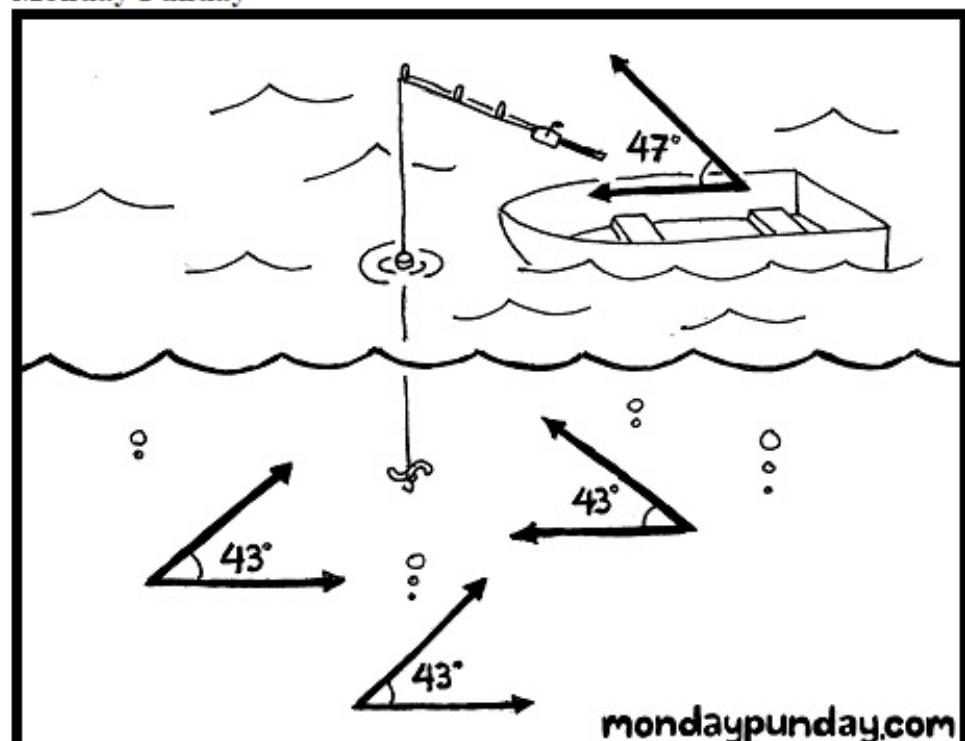
- | | |
|-----------------------------------|---|
| 1. Wash with a mop | 68. Catch sight of |
| 5. Go across or through | 69. Broker |
| 9. Stringed instrument | 70. Parch |
| 14. Garment of ancient Rome | 71. Shantytown |
| 15. Dilapidation | 72. Verbose |
| 16. Maxim | 73. Jittery |
| 17. Metallic element | 74. Small gull |
| Down | |
| 18. Gumbo | 1. Fuss |
| 19. Scorch | 2. Had on |
| 20. Admiration or esteem | 3. Highly excited |
| 22. Square root of 324 | 4. Elongated fruit |
| 24. Naive or inexperienced person | 5. Profligate |
| 26. Garland | 6. Seabird |
| 27. Chemical weapon | 7. Father |
| 30. Amalgamation | 8. Escargot |
| 35. Armed conflict | 9. Teller |
| 36. Apiece | 10. Way out |
| 37. Awaken | 11. Formation of people |
| 38. Halo | 12. Theater balcony |
| 40. Parasite | 13. Portent |
| 43. Morsel | 21. Uncommon |
| 44. Mar | 23. Jewel |
| 46. Region | 25. Vertical surface of a cliff |
| 48. Guided | 27. Fuscous |
| 49. Recluse | 28. Mistake |
| 51. Person who shoes horses | 29. Bundle |
| 53. Nocturnal mammal | 31. Take away without the owner's consent |
| 55. Profit | 32. Cunning |
| 56. Blossomed | 33. Organic compound |
| 61. Munificent | 34. Tall woody grass |
| 65. Flat metal tumbler in a lock | 35. Launder |

- 39. Objective
 - 41. Steep rugged rock or cliff
 - 42. Armorial bearing
 - 45. Freedom
 - 47. Elaborate song for solo voice
 - 50. Mariner
 - 52. Provide with power and authority
 - 54. Laconic
 - 56. Defect
 - 57. Toy construction set
 - 58. Finished
 - 59. Direct a course or w
 - 60. A notable achievement
 - 62. Small island
 - 63. Branch railway line
 - 64. Song of praise
 - 67. Worry persistently



-http://puzzlechoice.com

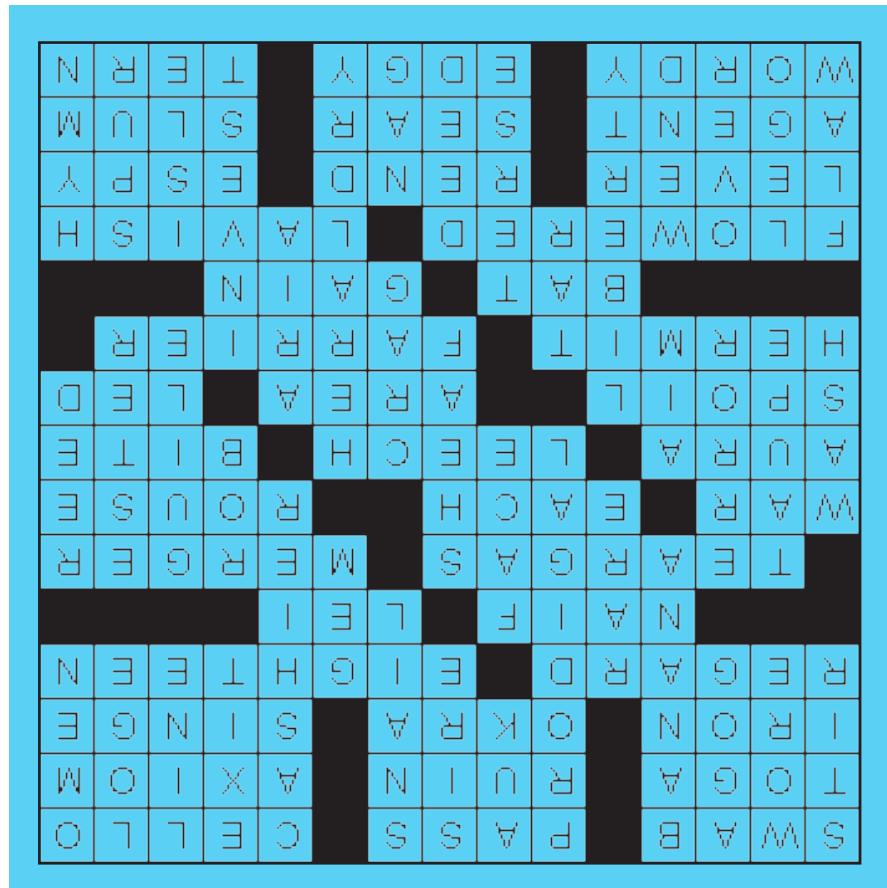
Monday Punday



This picture represents a common phrase, title, or person.

Think you know the answer? Take a guess at mondaypunday.com/133

Answers to current crossword



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