



Natural Selections

A NEWSLETTER OF THE ROCKEFELLER UNIVERSITY COMMUNITY

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Twenty-four visits to Stockholm: a concise history of the Rockefeller Nobel Prizes

Part XVIII: Robert Bruce Merrifield, 1984 Prize in Chemistry

JOSEPH LUNA

By the time Bruce Merrifield sat down to write in his lab notebook in May 1959, a scientific puzzle had been twirling in his head for quite some time. What he wrote next summarized a Nobel-worthy problem and offered a bold but totally unproven solution, all in three sentences. It turned out to be an impeccably succinct opening salvo, not just for a research career, but for an entire field.

"There is a need for a rapid, quantitative, automatic method for the synthesis of long chain peptides. A possible approach may be the use of chromatographic columns where the peptide is attached to the polymeric packing and added to by an activated amino acid, followed by removal of the protecting group and with repetition of the process until the desired peptide is built up. Finally the peptide must be removed from the supporting medium."

To unpack this a bit: Merrifield spotted the need to take amino acid building blocks and string them together to form a peptide of his choosing (or if a really long peptide, a whole *protein*). His idea in essence was to use a solid support to get an amino acid to hold still, so that he could methodically link amino acids together sequentially. Finally, the immobilized chain of amino acids, the peptide, could be released and studied.

At a time when molecular biology was just getting off the ground, Merrifield's understated first sentence belies a history of protein chemistry already more than half a century old, as well as his own frustration at

making the small peptides he was interested in studying. After joining Wayne Wooley's research group as a post-doc at Rockefeller in 1949, Merrifield applied his biochemistry training by isolating and characterizing "streptogenins" a catch-all term for small peptides that stimulated bacterial growth. The standard practice was to isolate these peptides from a biological source, but this approach almost always generated scholarly (aka vicious) pushback: it was very difficult to rule out contamination. If a compound could be crystallized as a means of isolating it to "purity", most biochemist naysayers would generally be assuaged.

Chemists, however, were an entirely different breed of naysayer. They would only be convinced by chemical synthesis of a pure compound, characterized at each intermediate step as a measure of quality, and where, by definition, no biological contaminant could be introduced since no life form (other than the chemist's hands) was required. For this reason, most biochemists weren't really considered chemists: they merely isolated and characterized what they thought were active compounds, but they could very well be fooling themselves. Justus von Leibig's famous chemical dictum "Tierchemie ist Schmierchemie" (Biochemistry is sloppy chemistry) stung hard for the better part of a century.

Peptide chemistry was one branch of biochemistry suited to the use of classical solu-

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NATURAL SELECTIONS OPEN MEETING. Visit **P.9 for more info!**

tion synthesis by Merrifield's day, but it was painstaking work. For instance, making one "strepogenin" peptide composed of five amino acids (Ser-His-Leu-Val-Glu) took Merrifield 11 months, with a yield of only 7% using classical methods. Across the street at the then Cornell Medical College in 1953, Vincent du Vigneaud and coworkers stunned the scientific community by synthesizing the peptide hormone oxytocin, a full nine amino acids long. The initial yield was about 1%. Du Vigneaud won the Nobel Prize in 1955 for this work.

Seen in this light, Merrifield's insistence on a "rapid, quantitative and automatic method" reads like a pipe dream in a world where classical peptide synthesis worked, despite monumentally poor efficiency. "Oh wouldn't we all!" one could almost read between the lines. But what Merrifield wrote contained no trace of irony or sarcasm. He was serious, as was his proposed solution.

What he thought would take him about three months to set up, ended up taking three years. But by 1963, he had *solid-phase* peptide synthesis (SPSS) working. By immobilizing one amino acid on a polystyrene resin, he could sequentially add amino acids to link them in a chain. Afterwards, he could remove the finished peptide from the resin for study. In his landmark paper, published in 1963, Merrifield described the synthesis of a tetrapeptide (Leu-Ala-Gly-Val) using this new technique. It wasn't perfect, but it was a compelling start and ripe for automation: within a few years, peptides that took years to make took days, with yields well into the double digits.

Not surprisingly, chemists initially weren't all that impressed. Because SPSS only yielded a finished product and not the intermediates that were customarily provided to vet one's synthesis, the method was perceived as "not chemistry at all." Even worse, as one noted chemist summed it up, SPSS lazily represented an "ingenious trick to overcome some of the unpleasant features of the classical methods." None of this mattered. Building on his idea, the Merrifield lab went on to perform truly heroic feats of peptide synthesis, making hormones like insulin, glucagon, and oxytocin and even entire enzymes like RNase A (124 amino acids long!) With the construction of an automated peptide synthesizer, critiques further ebbed as it became increasingly clear that classical methods were sorely inefficient compared to SPSS. Rapid, quantitative, and automatic indeed. ■

The Nobel Prize Online

SUSAN RUSSO

There is a wealth of enjoyment in exploring Nobel Prize information online. There are videos, such as a documentary of the four 2012 Laureates' discoveries in medical research; Mother Teresa's and Elie Wiesel's speeches after their awards of their Peace Prizes; and a 1994 interview with John Nash (prize in Economic Sciences), including his views of the movie *A Beautiful Mind*, based on his life and work. Another category, "Nobel Laureate Facts", delivers statistics on the number of total prizes throughout the years, the number of women's prizes "so far", ages of the awardees, and the reasons that two awardees, Jean-Paul Sartre and Le Duc Tho, declined their prizes. Other current special features appear about Albert Einstein, Marie Curie, Malala Yousafzai, and Rabindranath Tagore. There is even a section called "Educational Games", which includes "Save the Dog" about diabetes, "Bloodtyping", "A Drooling Game" about conditioned learning, and "All about Laser." In another link, the Director of the Norwegian Nobel Institute describes the process of nominations for the Peace Prize.

My favorite section, however, is listening to the Nobel podcasts, short interviews giving us the viewpoints of the awardees in their own words. A recent interviewee was Rockefeller's own Roderick MacKinnon. There are two separate interviews with May-Britt Moser and Edvard Moser, 2013's dual awardees in Medicine. May-Britt Moser talks about "pure joy" for herself, and "inequality in science", while her husband Edvard speaks of the value of "partnership" and recalls "childhood memories." Mario Molina, awardee in Chemistry in 1995, discusses "climate change" and the role of "human activity" and says, "The risks are unacceptable." In 2006, Roger Kornberg (Chemistry) admits that most of his "ideas are wrong." John Mather, a NASA scientist (Physics, 2006) thinks that if there is water on Mars, there is likely to be life in some form. Elizabeth Blackburn (2009 Physiology or Medicine), whose discoveries show how telomeres transform in aging, says, "We just know so much and yet we know so little." We hear from Randy Schekman, whose award in 2013 was in Physiology or Medicine, arguing for open access in scientific publications. And George Smoot (Physics, 2015) lauds the fact that "science today is a truly

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global enterprise." Some Nobel Prize winners admit that they were surprised by their awards. One, John O'Keefe (2013, Physiology or Medicine), prefers being in the lab, saying, "I'm a bench scientist." And Alice Munro, who won the prize in Literature in 2013, describes her reaction as, "Bewildering but very pleasant." In all the podcasts I've heard, the awardees reflect an excitement in their work, and most display a spirited optimism for the future. All in all, "meeting" these people online is thought-provoking and inspirational, at least to this listener. ■



Photo by LUIS DE NAVAS



Culture Corner

Six Perfect Songs

BERNIE LANGS

I enjoy listening to music of all genres and styles and truly appreciate the efforts of not only good composition and musicianship, but of superlative production in the recording studio. On a visceral, emotional, tactile and maybe even soulful level, I have many favorite tunes that I deem perfect. These are songs I've never tired of hearing after years of listening to them. I would include such pop songs as diverse as *Midnight Confessions* by The Grass Roots that was a hit in 1968, *Billie Jean*, the Michael Jackson mega-hit with stellar production by Quincy Jones, and the live version by The Cream of *I'm So Glad*, which boasts a ripping solo by Eric Clapton, which I consider the best in all of live rock recordings. I could make the case for many songs as "perfect", but I've chosen the following six to make remarks on:

Six: *Whole Lotta Love* by Led Zeppelin. Jimmy Page, guitarist of Led Zeppelin, has spoken of his obsessiveness in getting imaginative production sounds for his instrument in the studio, but even more importantly of the band's consistent search for great "riffs." And the clever, engaging riffing history of this monster band began with the very first notes of their first big hit,

Whole Lotta Love and culminated with the ascending guitar notes that makes a later song *Kashmir* a spiritually inviting mystical journey. *Whole Lotta Love* has front man Robert Plant singing at full throttle impassioned best. The abstract middle-break instrumental, with fading in and out head-play sounds, was unprecedented at the time. Drummer John Bonham has a great rollout of that interlude, which is followed by the piercing wail of Page's axe, which in turn segues back to the original riff. Brilliant!

Five: *Heroes* by David Bowie. Bowie fans will forever be intrigued by his Berlin period, when he retreated in the 1970s to that Cold War city to change artistic direction and wax philosophical. The album *Heroes* has a fabulous unity of thought and it's a disturbing one in which Bowie ruminates about the state of human emotion and its quasi-surreal future. The album production by Brian Eno, with assistance from Tony Visconti, is a perfect fit for Bowie's dark mood. Never before had synthesizers been utilized so fabulously in the rock music genre, melding perfectly with the structure of Bowie's dense and revelatory songs. The album's title song, "Heroes," isn't just a Cold War simultaneous desperate lament and solitary moment-in-time celebration. It boasts technical musicianship unmatched by any of Bowie's and Eno's contemporaries. Decades after most rock music is forgotten, they'll still be studying David Bowie.

Four: *Adagio* of the 5th Symphony by Gustav Mahler. This movement of Mahler's 5th is simply the most beautiful theme in music history. Theorist Theodor Adorno called passages of Mahler's symphonies "songs" so Mahler's passage here fits neatly in this list crowded with rock songs. I first heard the *Adagio* at the IBM Gallery of Art, where it was played in an auditorium during the Gallery's exhibition on the ancient, volcanically obliterated city of Pompeii. Images of the destroyed city and its artifacts were displayed in a slide show in the darkened theater to the sounds of Mahler's emotionally-charged song. Adorno's point that Mahler never completely repeats entire themes as practiced by his predecessors, holds true in this case. The passage's sad strings often do mournfully restart, but Mahler tweaks the presentation as if developing the yearning thoughts. The crescendo is forceful, and, unlike many of Mahler's themes, resolves beautifully. One finds oneself longing for—what is it? Love?

An unattainable soul mate? Understanding? For a better world? It's all there in this perfect "song."

Four: *Jumpin' Jack Flash*, *Street Fighting Man*, *Honky Tonk Women* by the Rolling Stones. Yes, I know that's three songs. Released in quick succession from 1968 to 1969, only *Street Fighting Man* was imbedded on an album (*Beggar's Banquet*). All three have what's missing in much of today's pop and rock music: ingenious melodies, unique guitar riffs (by Keith Richards), entertaining lyrics, and roughshod emotion all tarted up in within tight production. Mick Jagger sings his living guts out, Charlie Watts drives the pounding beat home, and bassist Bill Wyman patiently picks his moments to emerge from the mix to take us all on a ride. The lyrics range from catchy and clever to novelistic in the case of *Jumpin' Jack Flash*, which tells the improbable tale of an unlikely protagonist "born in a crossfire hurricane" climaxing with his drowning, where he is "washed up and left for dead." Top shelf Stones.

Two: *Hey Jude* by the Beatles. This song, penned by Paul McCartney in 1968, became a natural anthem for a feel good "join together" moment in the aftermath of the Summer of Love. In one of his last interviews, the late John Lennon was asked his thoughts on *Hey Jude* and he promptly dubbed it a "Paul masterpiece." John and George Harrison's harmonic background singing is crisp and beautiful and Ringo's entrance to introduce the descending middle break is a subtle nod to his joyful personality. *Hey Jude* has the most beautiful melody in all of rock music, and McCartney sings it to perfection.

One: The opening movement of *Requiem* by Mozart. In the words of scriptures, "the time has come to set aside childish things." Rock music will always have an adolescent aspect no matter how serious it tries to be. When the time comes to engage a music of profundity and, in turn, a theme of "dead" seriousness, Mozart's *Requiem* is there to be heard. Never a more haunting opening sequence and build-up is to be found in all of the sounds that mankind has made since he carved out his first pipe in a cave. One finds oneself in meditation on the haunting, chilling introductory strings that give birth to the swirling, forceful choir. This magnificent close-to-Godly sound is best heard in live performance where one can be carried away to the heavens. ■



New York State of Mind

This month *Natural Selections* interviews Raquel Hernandez-Solis, Research Assistant, Gilbert Laboratory

INTERVIEW BY GUADALUPE ASTORGA

How long have you been living in the New York area?

Two years, and I also lived here for three months during the Rockefeller SURF program (Summer Undergraduate Research Fellowship).

Where do you currently live? Which is your favorite neighborhood?

I live in my favorite neighborhood which is Astoria, Queens; it's a wonderful place. It has the New York vibes and also a bit of L.A., which I love.

What do you think is the most overrated thing in the city? And underrated?

I was going to say the most overrated thing is Shake Shack, but now I know it has also expanded to L.A.

I think Williamsburg is also overrated; it has lost a bit of the charm, even 3 years ago.

Underrated, I think Astoria Park, it has a beautiful view over the bridge and you can run on the track, there's always someone selling fruit in carts.

What do you miss most when you are out of town?

I miss the feeling of being able to do anything very quickly. I miss being only a 15 minute train ride from my dance class or my favorite restaurant. I love the convenience of the city.

Has anything (negative or positive) changed about you since you became one of us "New Yorkers"?

I have gotten a bit more cautious because I had some break-in incidents, but I have

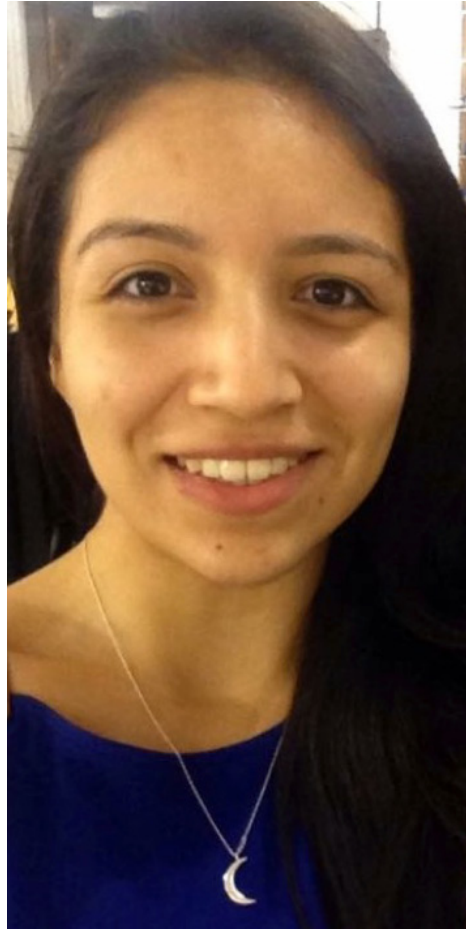


Photo Courtesy of Raquel Hernandez-Solis

not lost my sense of exploration. When I first got here I used to get off the train in a random station to explore the neighborhood, and I have not lost that, but I do feel that I have gotten a bit more cautious.

If you could change one thing about NYC, what would that be?

I would change smoking laws in the

streets, that's my least favorite thing in the city. I feel that the cigarette smoke that I smell on my way to work is too much.

What is your favorite weekend activity in NYC?

In the summer I really like looking at the free dance and cultural activities in my Time Out magazine. Last summer I saw the ballet *Hispanico* for free at Lincoln Center and also different concert venues outside.

What is the most memorable experience you have had in NYC?

My most memorable experience was to be able to perform in the Barclays Center, last summer, and feel like Beyoncé for a night, walking on the floor of the center and seeing thousands and thousands of people, it was the really cool.

Bike, MTA or walk it???

I love the MTA, and I'm starting to expand my horizons with the bus system. I think it's very convenient because it takes you where the subway cannot.

If you could live anywhere else, where [would] might that be?

I would like to live in Mexico for a little bit, not only to reconnect with my family down there; but I would also love the opportunity to do folklorico dance there for an extended period of time.

Do you think of yourself as a New Yorker?

I think so. My heart has changed from Los Angelino to New Yorker. I'm 75% New Yorker now. ■



Photo by LUIS DE NAVAS

For Your Consideration – Crystal Ball Edition

JIM KELLER

As we begin our fifth year of uncovering and examining the content that will eventually form the enigma that is the Academy Awards race, I thought it would be interesting to switch things up and break down my films of interest list by release date, festival appearance and production status. After all, outside of the pedigree attached to each film, these are the only available parameters to measure the Oscarability of each film, sight unseen. The early part of the Oscar race (from January until the Telluride Film Festival in August) is a moving target. The awards stops along the way, such as the Sundance, South by Southwest, and Cannes film festivals, can be equated to the change of seasons: their arrival is inevitable, but their impact is uncertain. This makes spit balling what may come down the slippery slope of the Oscar pike a dicey proposition. For one, a lot of the films lack distribution or have soft release dates, making it easy for studios to push their release to the following year. Second, the films discussed here haven't been screened, so it's impossible to know the genre they fit into. All we have to go on is the log line, the talent attached, and a little intuition. In this sense, one could say this parallels how we size up politicians, but I digress.

Last year, FYC's *Crystal Ball Edition* covered only two out of eight 2016 Best Picture nominees. With that, I give you films of interest, set to debut this year, which could wind up in this year's Oscar conversation.

Films to Compete for the Palme d'Or at the



Photo Courtesy of Amazon Studios



The Birth of a Nation

Photo Courtesy of Fox Searchlight Pictures

Cannes Film Festival: May 11-22

The Neon Demon (director: Nicolas Winding Refn, status: Completed, release date: June 2016):

Why you might like it: It's a horror/thriller about an aspiring model (Elle Fanning) who moves to Los Angeles, only to have her youth and vitality devoured by a group of beauty-obsessed women who will stop at nothing to get what she has.

Why I've got my eye on it: It's the third film from the director whose first film *Drive* competed for the Palme in 2011 and won him the Best Director prize. While his last film *Only God Forgives* was a critical flop, there's no reason to believe that he can't learn from past mistakes. Fanning has become a prolific actress and seems well-suited for a young ingénue role.

Loving (director: Jeff Nichols, status: Post-production, release date: November 2016):

Why you might like it: The drama tells the true story of Richard and Mildred Loving (Joel Edgerton and Ruth Negga), an interracial couple who were sentenced to prison in Virginia in 1958 for getting married.

Why I've got my eye on it: After the second year of #OscarsSoWhite, there are several films cropping up this year featuring prominent roles for minorities (and even a second one about an interracial marriage, see below). This second 2016 offering from Nichols, is one such film. Given Nichols' track record to date and the prime release date, this could be an awards player for Best Picture, Director, actor and actress.

The Last Face (director: Sean Penn, status: Completed, release date: 2016): **Why you might like it:** A director of an international aid agency in Africa (Charlize Theron) meets a relief aid doctor (Javier Bardem) amidst a political/social revolution, together they face tough choices surrounding humanitarianism and life through civil unrest.

Why I've got my eye on it: Penn's last film, 2007's *Into the Wild*, earned high critical acclaim and went on to land a Supporting Actor nomination for Hal Holbrook. Theron and Bardem are always ones to watch: Theron won Best Actress in 2004 for *Monster* and was nominated again in 2006 for *North Country*, and Bardem was nominated for Best Actor in 2001 for *Before Night Falls*, he won Best Supporting Actor in 2008 for *No Country for Old Men*, and was last nominated for Best Actor for 2010's *Beautiful*. While the two are a formidable duo, its French actress Adèle Exarchopoulos who I'm most excited to see after her remarkable turn in 2013's *Blue is the Warmest Color*. As of now, the film lacks distribution and may be one of those pushed to 2017.

Films Likely to Appear at the Telluride Film Festival: September 2-5

The Birth of a Nation (director: Nate Parker, status: Completed, release date: October 2016):

Why you might like it: Nat Turner (Parker), a former slave in America, leads a liberation movement in 1831 to free African-Americans in Virginia, which results in a violent retaliation from whites.

Why I've got my eye on it: This is one of my

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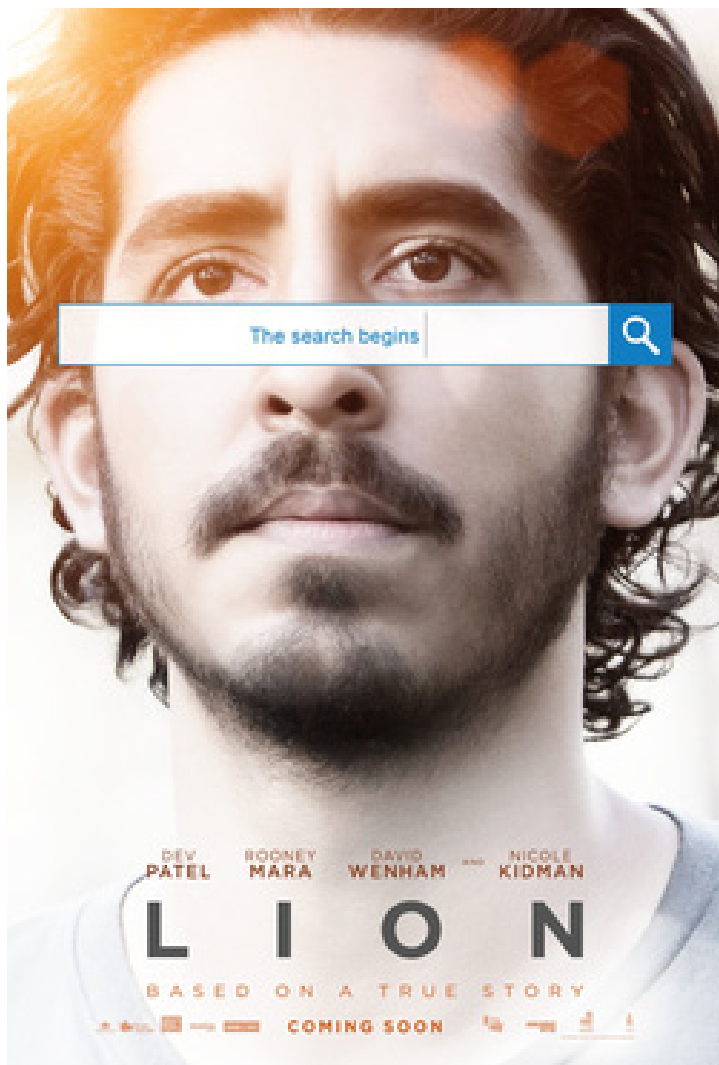


Photo Courtesy of The Weinstein Company

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most anticipated films of the year and the second of those featuring prominent roles for minorities. It is also directed by the African-American Parker, who stars in the film. It premiered this year at Sundance; where it won the Audience Award and Grand Jury Prize in the U.S. Dramatic Competition. Fox Searchlight Pictures bought worldwide rights to the film in a \$17.5 million deal, the largest deal to be made at the fest to date. Look for this one as a Best Picture contender.

Billy Lynn's Long Halftime Walk (director: Ang Lee, status: Post-production, release date: November 2016):

Why you might like it: Based on the novel of the same name by Ben Fountain, this drama concerns infantryman Billy Lynn (newcomer Joe Alwyn) who recounts a Thanksgiving Dallas Cowboys halftime show that he and his squad members made an appearance during in the final hours before the soldiers returned to Iraq.

Why I've got my eye on it: Lee was nomi-

nated for Best Director in 2001 for *Crouching Tiger, Hidden Dragon*, and he won in 2006 for *Brokeback Mountain*, and in 2013 for *Life of Pi*, a film with a staggering visual achievement. He has confirmed that *Billy Lynn* will be shot 120 frames per second, the highest frame rate for a film to date. The film also features Kristen Stewart, who has been flirting with Academy recognition with stellar supporting turns in 2014's *Still Alice* and *Clouds of Sils Maria*.

Lion (director: Garth Davis, status: Post-production, release date: November 2016):

Why you might like it: Based on Saroo Brierley's non-fiction book, *A Long Way Home*, this drama chronicles the

journey of Brierley (Dev Patel); who was lost from his family on the streets of Calcutta at the age of five and was adopted by an Australian family. At the age of 25, he finally finds his parents using Google Earth.

Why I've got my eye on it: The third film discussed here starring a minority (Patel), the cast also includes Nicole Kidman, who was nominated for Best Actress in 2001 for *Moulin Rouge!*, won Best Actress two years later for *The Hours*, and was last nominated in 2011 for *Rabbit Hole*. Rooney Mara, who was nominated for Best Actress for 2011's *The Girl with the Dragon Tattoo* and last year's *Carol*, also appears.

Other Films

Rogue One: A Star Wars Story (director: Gareth Edwards, status: Post-production, release date: December 2016):

Why you might like it: This stand-alone story set in the *Star Wars* universe, centers on a group of Rebel spies on a mission to steal the plans for the Galactic Empire's new weapon, the Death Star.

Why I've got my eye on it: Like last year's *Star Wars: Episode VII - The Force Awakens*, the film continues to flip the franchise on its head by employing a female lead: Felicity Jones. I, like so many others, was blown away by the quality of *The Force Awakens* (it was my number one film last year). I'm also eager to step back into that universe before the franchise's next film, next year's *Star Wars: Episode VIII*. Further, the last woman to earn a Best Actress nomination for a sci-fi film was Sigourney Weaver for 1986's *Aliens*. After Daisy Ridley's brilliant portrayal of Rey in *TFA*, I hold out hope for Jones, who earned a Best Actress nomination for 2014's *The Theory of Everything*. Finally, the cast also features Diego Luna, Ben Mendelsohn, Forest Whitaker, and Mads Mikkelsen.

Passengers (director: Morten Tyldum, status: Post-production, release date: December 2016):

Why you might like it: This sci-fi adventure revolves around two of thousands of spacecraft passengers traveling to a distant colony planet, who are awakened 60 years early from hypersleep due to a malfunction in their sleep chambers.

Why I've got my eye on it: Tyldum was nominated for Best Director in 2015 for *The Imitation Game*. Here he directs Oscar heavyweight and perennial Jennifer Lawrence and golden boy Chris Pratt.

Nocturnal Animals (director: Tom Ford, status: Post-production, release date: 2016):

Why you might like it: This drama/thriller is based on the Austin Wright's 1993 novel *Tony and Susan*, which follows suburbanite doctor's wife Susan Morrow (Amy Adams) as she plunges into the pages of her ex-husband's thriller and is drawn into the fictional life of math professor Tony Hastings (Jake Gyllenhaal). Morrow becomes engrossed in the manuscript as the Hastings' lives are violently sent off course. This causes Morrow to revisit her past to confront an inner darkness and name the fear that threatens her future.

Why I've got my eye on it: Ford's first film, *A Single Man*, was an astounding first effort that earned high critical acclaim and a Best Actor nomination for Colin Firth. There's no reason to think that his follow-up couldn't yield similar results for Academy Award nominees Adams, Gyllenhaal, or Michael Shannon, who also appears in the film. Without a specific release date, it's possible that this one will be pushed to 2017.

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HhHH (director: Cédric Jimenez, status: Post-production, release date: 2016):

Why you might like it: It's a French biographical war thriller/drama based on Laurent Binet's historical fiction novel of the same name, which focuses on the most ambitious military operation of WWII: when Jozef Gabcik (Jack Reynor) and Jan Kubis (Jack O'Connell) were recruited to assassinate Nazi leader Reinhard Heydrich.

Why I've got my eye on it: O'Connell's star has been rising since his performance in 2013's *Starred Up*, and while his performance in 2014's *Unbroken* failed to net him an Oscar nomination, he's still one to watch. As are Jason Clarke, Rosamund Pike (Best Actress nominee for 2014's *Gone Girl*), and Mia Wasikowska, who also appear in the film.

The Secret Scripture (director: Jim Sheridan, status: Post-production, release date: 2016):

Why you might like it: It's a drama based on Sebastian Barry's 2008 novel of the same name, in which a woman (Rooney Mara) keeps a diary of her extended stay at a mental hospital.

Why I've got my eye on it: Aside from the aforementioned Mara, Sheridan is best known for helming 1989's *My Left Foot*, which earned him Best Director and Best Adapted Screenplay nominations. He was nominated for the same awards for *In the Name of the Father* in 1994, and was last nominated for Best Original Screenplay in 2004 for *In America*. The film also stars Academy Award winner and five-time nominee, Vanessa Redgrave. Like the aforementioned *The Last Face*, the film lacks distribution and may be pushed to 2017.



A United Kingdom

Photo Courtesy of Pathé

Story of Your Life (director: Denis Villeneuve, status: Post-production, release date: 2016):

Why you might like it: It's a sci-fi drama that takes place after aliens land around the world wherein an expert linguist (Amy Adams) is recruited by the military to assess whether they come in peace or are a threat. It is based on Ted Chiang's short story of the same name.

Why I've got my eye on it: Villeneuve's career has been on the uptick with each of his film's inching closer and closer to a nomination. Last year's *Sicario* was the closest, netting a few craft awards nods and nearly a supporting nod for Benicio Del Toro.

Of course there's Adams, and Academy Award nominee, Jeremy Renner also appears. Even though it has a soft release date, it seems likely this one will not be pushed.

A United Kingdom (director: Amma Asante, status: Post-production, release date: TBD):

Why you might like it: This drama is based on the true-life romance between Prince Seretse Khama (David Oyelowo) of Botswana and his wife Ruth Williams Khama (Rosamund Pike) of

England whose interracial marriage caused an international stir in the late 1940s.

Why I've got my eye on it: It's the next feature film by black filmmaker Asante whose last film, 2013's *Belle*, put her on the map. In a year where all eyes will surely be on any film that seeks to bridge the gap of the racial divide, she has employed the talents of Academy Award nominees Oyelowo and Pike. Since the film hasn't been given an official 2016 release date and it stands to be compared heavily to the aforementioned *Loving*, its likely we won't see it this year.

Hidden Figures (director: Theodore Melfi, status: Filming, release date: 1/13/17):

Why you might like it: Based on Margot Lee Shetterly's non-fiction book of the same name, this film adaptation follows a team of African-American women who provide NASA with the mathematical data needed to launch the program's first successful space missions.

Why I've got my eye on it: The film has a stellar female cast including Taraji P. Henson, Octavia Spencer, and Kirsten Dunst. Henson was nominated for Best Supporting Actress for 2008's *The Curious Case of Benjamin Button* and Spencer won for her supporting role in 2011's *The Help*. With an early 2017 release date, it seems likely that an Oscar-qualifying run in December could bring it into the mix.

FYC returns in July-August when we'll have much more to discuss, after Cannes has shown its cards, and we launch into our annual *One's to Watch* three-part series. ■



The Secret Scripture

Photo Courtesy of Relativity Media

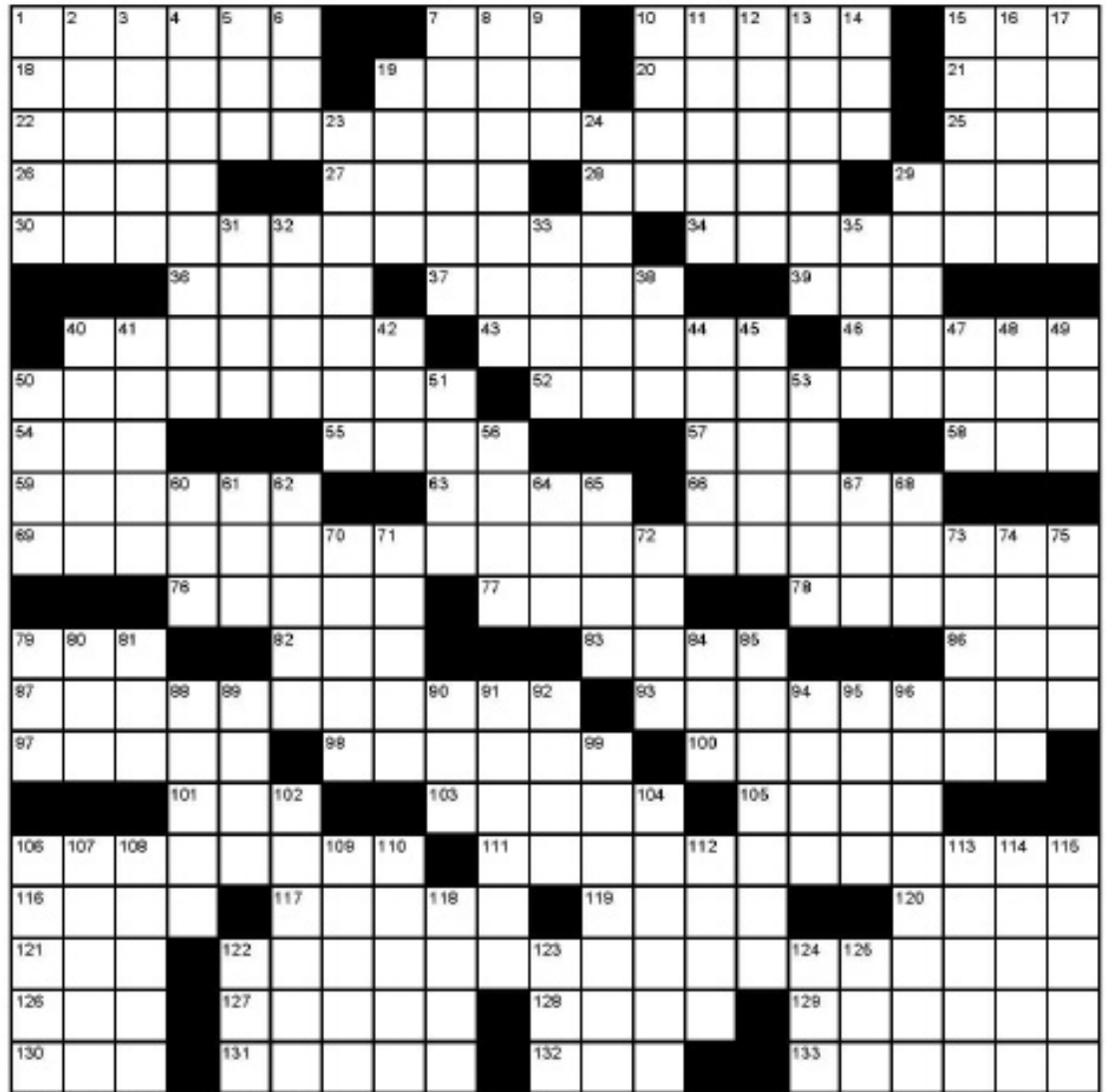
"The Answers My Friend ..."

ROBERT MARK AND GEORGE BARANY

George Barany is a Rockefeller alum (1977) currently on the Chemistry faculty of the University of Minnesota–Twin Cities. Robert Mark is a native New Yorker currently teaching in Thailand, and a long-time admirer of this puzzle's theme. For more information, including a link to the answer, visit [here](#). More Barany and Friends crosswords can be found [here](#).

Across

1. Two-person log cutter
7. Stetson or sombrero, e.g.
10. Battery terminal
15. Symbol for viscosity or index of refraction
18. One way to serve curry
19. Small amounts, as of cream
20. Filleted
21. Actor Beatty or Sparks
22. Biff, in the past, present, and "Future"?
25. ___ alai
26. Jumbo follower
27. Hawaiian beach ball?
28. Ricochet
29. Between all and none
30. Reassurance to cellist Yo-Yo?
34. Direct recruiting pitch from an iconic Uncle?
36. Tenth-century pope, better remembered in crosswords than in the history books (anagram of name of a certain rodent)
37. Took ___ for the worse
39. 1990's Indian P.M.
40. Director Tarantino
43. New York tribe, city, or lake
46. Like the walls at Wrigley Field
50. One that, according to Higgins, hardly ever happens in Hertford, Hereford, and Hampshire?
52. They're just this side of paradise?
54. Common street or tree
55. Clinch, as a deal
57. Ewe's mate
58. Near-Miss. state?
59. German candy brand
63. Malaysian palm
66. Humiliate
69. Place for prison guards?
76. Apple implement
77. Pasta, in product names
78. Off course, of course
79. Point of no return?
82. ___ Paulo, Brazil
83. Word with dash or happy



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86. Prof's e-mail address ender
87. Chiropractor's diary?
93. Local, at times?
97. Don Draper's domain
98. Gets game
100. Aggravate
101. "Norma ___"
103. Actors Dillon and Damon
105. Grps. of Boy or Girl Scouts
106. He's a card
111. Annie Leibovitz, to her fans?
116. X, Y, or Z
117. Collect data or data collector

119. Acronym in the news for gravitational wave detection
120. Start of Massachusetts' motto
121. Criticize, slangily
122. Admire Jagger or Richards on social media?
126. They may amend xword clues
127. Rubber seal
128. Grievance, slangily
129. Caught, as a butterfly
130. Susan of "The Partridge Family" and "L.A. Law"
131. Ministers
132. NYC subway line
133. Tool box item

Down

1. Loren's director-husband
2. Like helium, neon, or argon, but not necessarily xenon
3. Some jazz combos
4. Flag-waver, of a sort
5. Rhine whine?
6. Flytrap
7. Laugh line
8. On the verge of
9. Eponymous general on a menu
10. Palindromic pop group
11. ___ al-Maliki (Iraqi prime minister from 2006-2014)

CONTINUED TO P.9

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|------------------------------------------------|-------------------------------------------------------|-----------------------------------------------------------|--------------------------------------------------|
| 12. Simmering, perhaps | 42. Okemah, OK-to-Duluth, MN dir. | 71. It often follows a pun | 99. Sweet German bread |
| 13. California beach town with a racetrack | 44. Emulate the Pied Piper | 72. Is under the weather | 102. Domain |
| 14. Eponymous ice cream maker | 45. "Easy ___!" | 73. Create, as havoc | 104. Dirty |
| 15. Dig | 47. Actress/director Lupino | 74. Betty ___ (author of "Embraced by the Light") | 106. Blasé |
| 16. Latin lover's declaration | 48. Fish that may be electric | 75. Jim who broke the four-minute mile as a high schooler | 107. Rust, for one |
| 17. Goodbye, in Grenoble | 49. Rockefeller subj. for Avery, MacLeod, and McCarty | 79. Doctors' org. | 108. ___-face (smooching) |
| 19. Pharmacopoeia selection | 50. Bar mitzvah highlight | 80. Fred's "Silk Stockings" partner | 109. Father or son actor Alan or Adam |
| 23. Actresses de Havilland and Newton-John | 51. Bridge seat | 81. Subside | 110. ___ in sight (interminable) |
| 24. Where many fed. workers reside | 53. Warren Buffett's hometown | 84. Swiss peak | 112. Pre-weekend shout |
| 29. Kitchen appliance | 56. Bolger and Haley's 1939 co-star | 85. Serving | 113. It might take 10 yrs. to mature |
| 31. "Triumph of the Will" director Riefenstahl | 60. Amniotic ___ | 88. Buenos ___ | 114. Ed who voiced Carl in "Up" |
| 32. Univ. mil. group | 61. "Evil Woman" grp. | 89. Peter or Paul, but not Mary | 115. Marsh growth |
| 33. Bean-sprouts bean | 62. Like Ibsen, to his countrymen | 90. Pinup's leg | 118. Gets game |
| 35. Innocent | 64. Prefix with centric or thermal | 91. Pencil part | 122. His wife became a pillar of their community |
| 38. It may be picked | 65. Completely dominates | 92. Comedian MacFarlane or Meyers | 123. Sash for Madama Butterfly |
| 40. California's state bird | 67. E and G, e.g., in D.C. | 94. ___ out (exhausted) | 124. Econ. yardstick |
| 41. Nerdy neighbor on "Family Matters" | 68. In great demand | 95. Many a sitcom rating | 125. Nice seasoning |
| | 70. Some tides | 96. Pre-Raphaelite painter-poet | |

QUOTABLE QUOTE

*Commonplace miracle:
that so many commonplace miracles happen...
A miracle, just take a look around:
the world is everywhere.
An additional miracle, as everything is additional:
the unthinkable
is thinkable.*

**Maria Wislawa Anna Szymborska, 1923 – 2012,
Nobel Prize for Literature 1996**

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nseditors@rockefeller.edu.
Quotes can be philosophical, funny, clever, anecdotal - but
NOT too salacious or outright unpublishable - and short
enough not to need copyright permission.*



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NATURAL SELECTIONS OPEN MEETING

On behalf of the Natural Selections Editorial Board, it is my pleasure to invite you to attend our Open Meeting on **Wednesday, May 18th at 5:30pm at Rockefeller University Faculty Club**. This is a great opportunity to learn about the monthly on-campus publication, the Editorial Board, and the various ways you can get involved.

Writers, editors, artists, or people who are just curious about the production and content of Natural Selections are welcome to attend. Refreshments will be provided.

Please RSVP to jfkeller@gmail.com so that we can gauge how much food to order.

The Natural Selections Editorial Board (<http://selections.rockefeller.edu/>)



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Purple Reign

DEANE MORRISON AND GEORGE BARANY

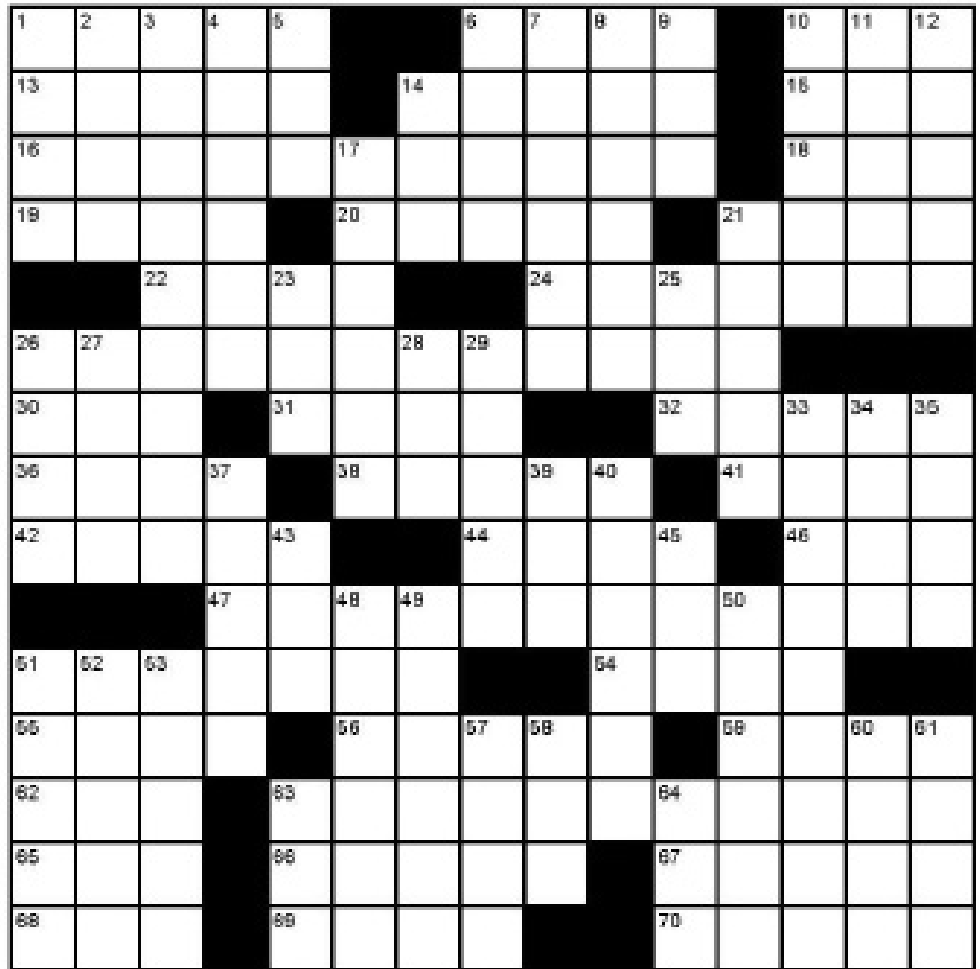
George Barany is a Rockefeller alum (1977) currently on the Chemistry faculty of the University of Minnesota–Twin Cities. Deane Morrison, a distinguished science writer, is his U of M colleague. For more about this specific puzzle, including a link to the answer, visit [here](#). More Barany and Friends crosswords can be found [here](#).

Across

1. ___ coil (electrical device invented in 1891)
6. Aussie greeting, often followed by “mate”
10. Ballplayer’s headgear
13. They keep the wheels turning
14. Song title shared by “The Sound of Music” and “West Side Story”
15. Put away groceries?
16. Facility whose large glass pyramid would glow purple whenever this puzzle’s honoree was present
18. Obstacle
19. Band boosters
20. Theater chain that merged with AMC in 2006
21. Get bushed
22. ___ moss
24. Concise in speech
26. Billboard’s #1 single of 1984
30. Fish stick?
31. Scott Turow autobiographical bestseller of 1977
32. Get ready to drive, in golf
36. “___ U”
38. Number of Grammys won, as well as pronunciation of a #3 top 40 hit, by this puzzle’s honoree
41. Small force
42. Classified, as blood
44. Land of Esau’s descendants
46. DDE’s wartime command
47. Prince’s followers
51. Big wind
54. Go ___ great length
55. Willing partner
56. Grieve
59. Coffee, tea, or beer
62. No-win situation
63. Song that begins with a spoken eulogy to “this thing called life”
65. Bobbie Gentry wrote one to Billy Joe
66. The ___ Project (“Sleeper”)
67. Quibblers split them
68. Nothing but the bottom of the ___
69. Some mil. awards
70. Old lab heaters named after a volcano

Down

1. Spanish appetizer
2. Oral, e.g.
3. Missed a beat
4. Ameliorate, in a way



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5. Means of communication at Gallaudet Univ.
6. Rubberneck
7. Talks slowly, in a way
8. Lung compartment
9. Hirsute Himalayan
10. Rustic retreat
11. Video game name
12. Georges who wrote “A Void” (novel without the letter “E”)
14. Muscle: Prefix
17. John and namesakes
21. Played around (with)
23. “Much ___ About Nothing”
25. Flat-screen predecessor, for short
26. Order
27. Word with cow or mackerel
28. Center of gravity?
29. Small eel
33. Result of computer overuse, maybe
34. Golden rule preposition
35. Drudge
37. Chapter’s companion
39. They may amend xword clues
40. Emphatic denial, as to news of a tragedy
43. How many it takes to tango in Spain?
45. Dudes
48. Arcade fans
49. Strikingly unusual
50. Dedicated experimentalist or experimental subject
51. Stick with the beat?
52. Tolerate
53. Winter weather woe
57. Exploits
58. NFL linemen
60. Cornell of Cornell University
61. “Swiss Family Robinson” author Johann
63. Bristol boy
64. Revolutionary whose beret was never raspberry



Life on a Roll

QIONG WANG

Rome is a living open museum. Every road leads there. It is impossible to tell stories about an ancient city like Rome. You just don't know where to start. The squares, the fountains, the statues, the cathedrals, the ruins and the monuments... It is "La Grande Bellezza", the great beauty. Rome wasn't built in one day; neither is the visit to Rome. I tried to capture its beauty from the perspective of the locals using my camera. One picture doesn't do it justice at all. ■

All Photo by **QIONG WANG**

