

Natural Selections

A NEWSLETTER OF THE ROCKEFELLER UNIVERSITY COMMUNITY

Sustainability at Multiple Levels

AUDREY GOLDFARB

Individual action to fight climate change and habitat destruction is important. Plastic waste from just one person can have devastating consequences on wildlife, as exemplified by [viral footage](#) of a sea turtle with a straw stuck in its nose.

However, when considering the big picture, it is easy to feel powerless. How could the actions of one person influence the rampant and pervasive destruction of our planet? That single straw becomes much less meaningful in the context of the entire ocean. To significantly abate climate change at large, top-down policy changes are exceedingly more effective. Universal guidelines and initiatives incite cultural changes, which in turn demand more significant top-down policies. Both components are essential for progress.

Ainhoa Perez, a Research Associate in the Stellar Lab at The Rockefeller University, is an advocate for sustainability and personally leads a [zero-waste lifestyle](#). She supports both individual and campuswide actions, but believes that neither are on pace with what the Earth is demanding. “There are things that can be done, but we are moving much slower than what we could and what we should,” Perez said. “We need support top-down from the university to provide the opportunity to do the right thing.”

Incentives from the government and from the university have been motivational in the past. The New York City Mayor’s Office of Sustainability launched the Carbon Challenge to encourage private institutions, including Rockefeller, to reduce their carbon emissions by 30% in ten years. Rockefeller joined the challenge in 2007, the same year the Sustainability Committee was established, and by 2019 the university had reduced emissions per square foot by 32%. “Some of the most impressive changes happened when the University got into a city-wide competition,” Perez said. “We were one of the first institutions to reduce carbon emissions, I think just because we had a challenge and had that as a goal.”



Photo Courtesy of ALEX KOGAN

Milo Martinovic and Peter Selestrin, the chief engineer and assistant chief engineer of the power house, stand in front of the new boiler.

The success is largely attributed to a switch from oil to gas as a fuel source, in addition to the construction of LEED-certified buildings; in the last ten years, 33% of our campus received LEED silver status [certification](#). The university is now committed to reducing its carbon footprint by 40% by 2025. However, Perez advocates for more ambitious goals. “One of the important things is for the university to commit to be zero waste and carbon-free,” she said. “It would make a huge difference just to have that as a goal.”

Alex Kogan, the Associate Vice President of Plant Operations and Housing Departments since 2001, is the driving force behind Rockefeller’s central sustainability initiatives. His efforts are focused on university-wide, quantifiable initiatives that benefit Rockefeller financially in addition to aiding the planet, such as using less fossil fuels and electricity. “Our approach has always been about carbon footprint reduction,” Kogan said. “We try to achieve this systematically campuswide. We

can control the amount of heat content and cooling content we distribute to all buildings on a macro level.”

Rockefeller’s power house, which contains the heating and cooling plants, sits underneath the Rockefeller Research Building and Hospital Building. It provides heating throughout campus from the President’s house to Faculty House and Scholar’s Residence, and cooling to every building except for housing. Touring the massive facility leaves a lasting impression; slight adjustments to central heating and cooling—i.e. lowering the maximum temperature in the winter and raising the minimum in the summer—is a powerful and quantifiable mechanism to reduce emissions.

However, the practices of individual labs are up to the heads of labs and their lab members. “Laboratories are inherently terrible energy hogs because you can’t recirculate the air,” Kogan said. “For obvious safety rea-

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sons, laboratories require a certain amount of 'air-changes' in order operate. The best thing a scientist can do is to lower the setpoint in the winter and raise the setpoint in the summer."

Some Rockefeller lab heads prioritize sustainability more than others. Daniel Mucida is a great example of this. "Daniel has been one of our biggest champions," Kogan said.

The Mucida lab **reuses and recycles** wherever possible. Ainsley Lockhart, a graduate fellow in the Mucida Lab, notes that these practices have little impact on the lab's efficiency. "It probably takes me an additional ten minutes total per week," she said.

Though these practices have been in place in the Mucida lab for ten years, few have followed suit to the same degree. "Not many labs do this," Mucida said. "You walk around the labs and you want to have a heart attack because it's so bad."

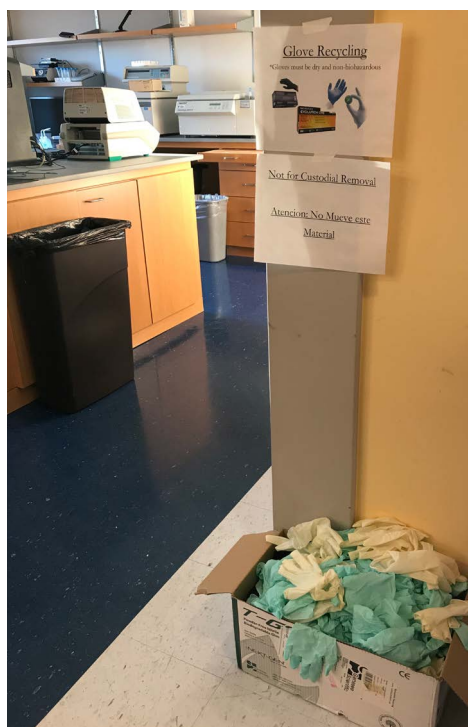
Mucida was inspired to take action as a post doc at La Jolla Institute for Allergy and Immunology after attending a meeting in Japan. He saw how efficiently and conscientiously the labs there functioned, and started advocating for his lab in La Jolla to do the same. However, it wasn't until Mucida started his own lab that he was able to implement meaningful cultural changes. Now, he wants to fight for sustainable practices campuswide.

The use of disposable containers in the cafeteria is a big issue. Though the bottoms of takeaway containers are compostable, the lids are plastic. Neither are reusable, and both are superfluous. "I've been trying to change this for ten years," Mucida said. "I wish there were zero disposable containers. I think people would adapt very easily."

Habits become second nature quite quickly, and sustainable practices demand significantly less effort than most New Year's resolutions. For most people, carrying a reusable container for lunch is much less challenging than committing to a workout routine. Central guidelines and regulations would expedite these transitions. Once green practices like proper recycling become part of the culture, it will be effortless to comply. "This is very simple," Mucida said. "It should be like brushing your teeth."

"Many people believe that those goals are very hard or impossible to achieve," Perez said. "But that's just because we got so used to this wasteful, single-use-based lifestyle. It's so engrained in our routines that we tend to think that there are no alternatives."

While reducing carbon emissions and other waste helps the environment and is



A glove recycling system in the Darnell Lab at The Rockefeller University.

financially advantageous, it is also personally rewarding. "It has a lot of benefits for the people working at the university," Perez said. "It brings people together. We are the perfect place to be doing this because we already have a sense of community."

Having Kogan lead central carbon emission policy has proven to be effective. These initiatives are organized, quantifiable, and growing. "We're on the cutting edge of HVAC and electrical infrastructure, we have a very good idea what our peers are doing, and we're well connected in the [academic] facilities community," Kogan said.

However, there is no department at the university dedicated to reducing waste in the cafeteria, ensuring proper recycling, and educating scientists on sustainable lab practices. "The recycling here is a mess," Perez said. "Nobody even knows how it works. All the bins look exactly the same. It is very poorly organized and advertised."

There are a multitude of opportunities to improve, but the organized manpower to fight for them is limited. The students and postdocs that compose the Sustainability Committee move away from Rockefeller after several years, making it difficult to establish long-term plans. These members are also dedicated to their own research, which must take priority over membership to the committee. "It is all dependent on who is coming to the meetings and who is able to invest time and effort on these initiatives, which is not very much because we don't have much extra time,"



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Perez said. "People come and go from the university. It's important to have continuity and permanence of initiatives that are started."

Another issue that many Rockefeller employees may be unaware of concerns the University's investment options. "Our pension money is invested through a pension plan in fossil fuels, and there is no way to change that," Perez said. "This is unbelievable. A research institution forcing their employees to give money to companies that are funding climate change denial?"

Though it will require substantial effort and cultural changes, Kogan, Mucida, and Perez are optimistic that Rockefeller can be a leader of sustainable biomedical research. "We need people to engage and to take action," Perez said. "We can do it! It would be easy, it would be cheap, it would be better, it would be extremely impactful... and we have the responsibility to do it." ■

Mardi Gras, or Let the Good Times Roll

AILEEN MARSHALL

Mardi Gras this year is Tuesday, February 25th. What is Mardi Gras, you ask? Some of you readers may know Mardi Gras as Fat Tuesday or Shrove Tuesday. While it has religious origins, it has become synonymous with a big party in New Orleans, Louisiana. This holiday has evolved over millennia to become the major tourist attraction that it is today.

Some believe that its origins go back to ancient Rome. Saturnalia was a boisterous festival celebrating the arrival of spring and fertility, dating back to 131 BC. However, most of the rites of Mardi Gras can be traced back to the spread of Christianity around the world. Fat Tuesday is the day before Ash Wednesday, the beginning of the season of Lent in the Christian church. Lent is a time when followers spend days fasting, abstaining from meat, and practicing other means of personal sacrifice. Therefore, Fat Tuesday is the last day to indulge and have fun before the six weeks of Lent. The early church decided it would be easier to incorporate the tradition of Saturnalia, rather than try to prevent it.

Fat Tuesday, or Mardi Gras in French, is a day to eat a lot of rich foods, hence the name. Some places recognize a whole season called "Carnival". This stretches from the Epiphany, or Three Kings Day, on January 6th, until Fat Tuesday. The word carnival derives from the Latin *carnelevarium* meaning to take away meat. The word "shrove" in Shrove Tuesday derives from the word shrive, meaning to absolve.

While these festivities started out as religious practices, Carnival and Mardi Gras were gradually adopted as secular celebrations. They are celebrated in various ways around the world. In some countries in Europe, Latin America, and the Caribbean it is traditional to eat rich fried pastries and pancakes, so the holiday there is called Pancake Tuesday. In Belgium, people dance throughout the city of Binche all day. This Carnival of Binche is recognized by UNESCO, as are the door-to-door processions in the Czech Republic. Venice, Italy has a big celebration known for its decorative masks, and residents of the Italian city of Ivrea stage the Battle of Oranges. There is a record of the Carnival celebration in Nice, France going back to 1294. Quebec, Canada has its Winter Carnival, with a host of snow related activities. Brazil has its famous Carnival in Rio de Janeiro consisting of a week of parades full of samba dancers in elaborate costumes that attracts millions of tourists from all over the world.

One of the most famous Mardi Gras event takes place in New Orleans. In 1699, the king of France sent two brothers, Pierre Le Moyne d'Iberville and Jean-Baptiste Le Moyne de Bienville, to defend his claim to the Louisiana Territory. They made camp on March 6th



New Orleans Mardi Gras maskers, c. 1915, from old postcard. Note, women carry whips to fend off any unwanted attentions.

of that year at a spot about 60 miles south of where New Orleans is today, and named the location after the day, *Point du Mardi Gras*. Bienville went on to found Mobile, Alabama in 1702, and actually the very first planned U.S. Mardi Gras celebration took place here the following year. There is still an annual festival in Mobile today. Iberville founded New Orleans in 1718. A record from 1743 indicates that costume balls were already an annual tradition there. The first Mardi Gras parade in New Orleans was in 1837. Mardi Gras was declared a legal holiday in Louisiana in 1875 and is the only state in the country to do so.

The New Orleans Mardi Gras festivities are run by social clubs, known as "krewes." These started out as secret organizations of white businessmen. The oldest, the Mystic Krewe of Comus, was established in 1856. The next year they held a torchlight parade with marching bands and floats. The Rex Krewe was founded in 1872. They started the practice of having parades in the daytime and having a King of the Carnival, or the "Rex". Some krewes elect someone from their club, whereas others will pick a celebrity. In 1892 the Rex Krewe established the colors of the New Orleans events, green, gold, and purple. They were chosen because the Grand Duke of Russia was visiting that year and those are the colors of the Romanoff family. The Rex Krewe says that green stands for faith, gold for power, and purple for justice.

In 1909, in response to these restricted clubs running the festivities, the Zulu Social Aid and Pleasure Club was formed by a group of Creole and African American people. They had their own parade with a king in a tin can crown and a banana stalk scepter to mock the Rex. They are known today for the hand

painted coconuts they toss to the crowds. Today these clubs are open to anyone who pays membership dues and any members of the clubs are allowed to ride on the floats.

The New Orleans Mardi Gras celebrations go on for a week, with balls and parades every day, ending on Fat Tuesday. There are many traditions associated with Mardi Gras in New Orleans. Since the 1870s, "throws" have been used as items that are tossed or handed out to float spectators. Common throws are doubloons, wood or aluminum coins with the name of the krewe or the name of the float. The most famous kind of throw are the strings of beads. Over the years these beads have gone from glass, to metal, to plastic, and now back to glass. Sometimes the beads are in the shapes of animals or people or other objects; some are limited edition. Sometimes stuffed animals, small plastic toys, plastic cups, or individually wrapped moon pies are thrown out. And there are the aforementioned coconuts. These started out as gold painted walnuts from the Zulu Krewe, hence they are often referred to as golden nuggets. By law, these coconuts now must be handed to the crowds rather than thrown because of injuries. The tradition of *flambeau*, or torch carrying, has evolved into dance performances by the torch bearers. People will tip the flambeau performer with dollar bills. It is common for both parade participants and spectators to wear costumes or masks. These costumes tend to be of animals or mythical creatures, or medieval dress. On the other hand, there is also a tradition of people being in various levels of undress. These costumes can be very revealing, and women are known to flash their breasts for throws or

Photo Courtesy of WIKIMEDIA COMMONS

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to walk around topless. This practice, documented since 1889, goes with the theme of indulging before Lent. The French phrase *Laissez les bons temps rouler*, meaning “Let the good times roll,” has become the slogan of these celebrations. King cake, a bundt shaped cake covered with sugar in the three Mardi Gras colors, is served during this season. Some people will hide a plastic baby inside and whoever gets the baby has to host the next party.

In 2006, after Hurricane Katrina devastated New Orleans, there was some debate as to whether to have the Mardi Gras celebrations that year. But the festivities went on as a morality boost for the residents and for the economic benefit from the tourism. Some floats had been damaged in the floods and several incorporated this into the designs. A number of floats poked fun at the situation by mocking things like the Federal Emergency Management Agency trailers and the Army Corps of Engineers.

While New York City does not have any official Mardi Gras events, many bars, restaurants, or clubs will have promotions. Or if you happen to be in New Orleans this February 25th, the famous revelries are a must see. ■



Mardi Gras time in New Orleans, 2009.



Mardi Gras Fan Gal, 2004, Bywater neighborhood.

Health: On Mindful Meditation and The Skill of Being Present

ANNA AMELIANCHIK

If you are determined to make 2020 your healthiest year yet, now might be the time to add one more item to your list of New Year's resolutions. While better nutrition and exercise can bring you closer to your fitness goals, your physical health and emotional well-being will most likely further benefit from mindful meditation. Although the practice of meditation dates back to 5000 B.C., meditation as a secular and therapeutic activity in the past several decades brought renewed attention to the ancient practice. In the traditional context, meditation is a mental practice designed to improve concentration, increase awareness of the present moment, and allow for the spiritual exploration of one's mind. However, a more contemporary definition of meditation refers to the practice of focused attention, mindfulness, and compassion designed, among other things, to reduce stress and promote relaxation.

Meditation has also received a lot of attention in the scientific literature, where its benefits on brain function and cardiovascular health have been extensively studied. Scientific studies focusing on the neuroscience of meditation report both short- and long-term changes in brain electrical activity that occur

as a result of dedicated meditation practice. These changes include the activation of the frontal cortex of the brain (associated with meta-awareness), the sensory cortex and the insula (associated with body awareness), the hippocampus (linked to cognitive function and memory), and cortical areas (linked to self- and emotion regulation). Scientific studies have also evaluated the effect of meditation on multiple cardiovascular risk factors, such as physiological response to stress, blood pressure, and smoking and tobacco use. These studies concluded that meditation possibly reduces cardiovascular risk. In fact, in 2017, the American Heart Association stated that meditation is a useful therapeutic tool for cardiovascular risk reduction when used as an adjunct to more traditional medical recommendations.

Although multiple forms of meditation exist, mindful meditation, which originated from Buddhist teachings, has been popularized in Western culture by people like Jon-Kabat Zinn, Ph.D., the creator of the Mindfulness-Based Stress Reduction (MBSR) program, and Sharon Salzberg. Salzberg is a meditation teacher and a New York Times bestselling author who played a major role in

bringing meditation and mindfulness to the West in the 1970s. In December 2019, Salzberg visited The Rockefeller University where she gave a public talk on compassion and guided a short meditation practice. Salzberg described meditation as a skills training which is available to everyone, regardless of religious affiliation or worldview. These skills include concentration, mindfulness, and compassion. “Most of us would describe ourselves as fairly scattered or distracted,” said Salzberg, adding that when we let our attention go to the past or the future, the feelings of regret and anxiety cost us energy. This is why the first principle of meditation is gathering—gathering the attention, learning how to settle, and learning how to center. Salzberg defined the second skill acquired through meditation—mindfulness—as a quality of awareness in which our perception is not distorted by biases, like old fears or pain. Finally, the third skill—compassion—is central to mindful meditation, as this form of meditation teaches one to accept all that arises as a consequence of the practice without judgement. Salzberg highlighted the importance of self-compassion and described

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it as resilience against the pain of not having fulfilled something or having made a mistake.

The foundational technique of mindful meditation taught by Salzberg and other experts involves choosing an object of awareness, resting all of one's attention on that object, and bringing the attention back when it wanders without self-inflicted judgement. Commonly, the central object of awareness is the feeling of breath. However, many people find it difficult to continuously focus on breathing and eventually fill their mind with thoughts, which causes them to lose their object of awareness. Salzberg teaches that being able to start over is an important part of meditation: "The healing and the empowerment is in being able to come back. Having self-compassion is not the same thing as being lazy—it's the source of tremendous strength, not a weakness. Self-compassion is the best way to have a sustained effort toward learning something or making a change."

Whether you are new to meditation or trying to improve your existing practice, consider following these steps to learn concentration, mindfulness, and compassion:

1. Sit as comfortably as you can.
2. Close your eyes or keep them open—however you feel most at ease.
3. See if you can find the place where your breath is strongest and clearest for you: in the nostrils, the chest, or the abdomen.
4. Unlike in some yoga traditions, in meditation the breath is natural—do not try to make it deeper or different from your normal breath.
5. When you find the place where the breath is the clearest for you, bring your attention there and rest.
6. If you like, you can use a quiet mental notation, such as "in-out" or "rise-fall", to help support the awareness of the breath.
7. If images, sounds, sensations, or emotions arise, let them flow, unless they cause you to lose the feeling of the breath.
8. If you lose the feeling of the breath, it is your chance to let go and begin again by bringing your attention back to your object of awareness.

Salzberg recommended finding a formal dedicated time period for meditation practice—ideally about ten minutes a day during which your only goal is to hone your medi-

tation skills. Although some meditation teachers encourage their students to meditate in the morning, Salzberg believes that the best time for meditation should be determined by you. In addition to dedicated practice, the "short moments many times" type of meditation can help you be present when you are under the most pressure and during the most complex times of the day. Consider taking a few mindful breaths before making a phone call, writing an email, or attending an important meeting. However, just like weight training makes your muscles stronger and prevents you from strain-induced injury, dedicated meditation allows you to practice being present to protect your physical and emotional health from the stresses of modern life.

Last March, Ann Campbell, MSN, MPH, an occupational health nurse practitioner at The Rockefeller University and a Nalanda Institute fellow, and the late Dr. Bruce McEwen, the head of Rockefeller's Harold and Margaret Milliken Hatch Laboratory of Neuroendocrinology, formed an interdisciplinary steering committee which currently includes scientists and non-scientists who are interested in measuring the effect of mindfulness practices on health and expanding the available classes on campus.

McEwen's research indicated that mindfulness practices might have an impact on public health. Campbell was interested in clinical translation of mindfulness practices as a clinical practitioner. Before the steering committee was formed, there were no free yoga classes on campus. Currently there are five yoga classes and two free 30-minute meditation sessions available to the members of the Rockefeller community for free. In addition to expanding mindfulness practices on campus, the committee is working to develop clinical protocols to measure the effect of mindfulness practices on various health outcomes in patient populations, such as patients with rheumatoid arthritis. In particular, they will focus on the effect of mindfulness practices on the results of blood tests, levels of inflammatory markers, and gene expression. Additionally, they are organizing a journal club and bringing speakers to increase awareness of the benefits of mindful meditation.

It can be advantageous to do meditation in guided sessions versus on your own because when someone guides you, this helps you understand barriers and create an awareness of "inner landscape."

You can attend one of these mindfulness practice sessions on Tuesdays at 12 p.m. or 12:30 p.m. in Rockefeller Research Building 110. ■

Natural Expressions

Performance

This February, Santa Maria Pecoraro Di Vittorio of the Rice Laboratory will be performing as a violist in several events:

On Friday, February 14th at 7:30 p.m., Di Vittorio will perform as an orchestral musician with the Chamber Orchestra of New York in Weill Hall at Carnegie Hall. This Valentine's Day concert features Mozart's *Divertimento in D Major*, multiple works by Boccherini, and Beethoven's *Grosse Fuge* in celebration of the 205th anniversary of Beethoven's birth. Tickets are \$40-\$50 (\$30 for students) and 25% off with discount code CNY32442. Visit the event [website](#) for tickets and more information.

On Saturday, February 15th at 7:30 p.m. and Sunday, February 16th at 3 p.m., Di Vittorio will accompany the St. Petersburg Ballet Theatre at the Brooklyn Academy of Music as they perform Tchaikovsky's *Swan Lake*. These performances are the United States debut of the St. Petersburg Ballet Theatre, featuring Russian prima ballerina Irina Kolesnikova. Tickets range from \$45 to \$135 and can be purchased [online](#).

Digital

Bernie Langs of The Rockefeller University Development Office announces the release of his book, *The Plot*, authored by Langs and co-edited by Development's Mary Jane Folan. Langs' novella follows two actors filming a story of espionage in Florence, Italy. As they film, the fiction of their script begins to creep into their reality. For more information or to purchase *The Plot*, visit the [Amazon Kindle Store](#).

Email Megan E. Kelley at mkelley@rockefeller.edu to submit your art/music/performance/sporting/other event for next month's "Natural Expressions" and follow @NatSelections on Twitter for more events. ■

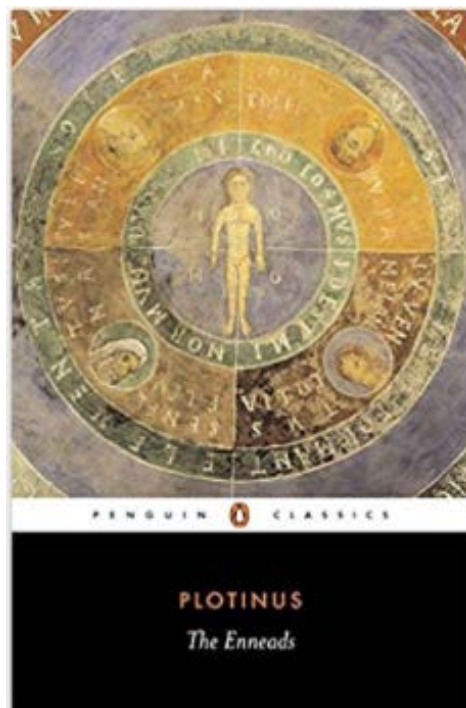
Culture Corner: Comparing Ancient and Contemporary Ideas of Time: The Writings of Plotinus and Carlo Rovelli

BERNIE LANGS

Plotinus (A.D. 204-270) founded the school of Neoplatonism and selections of his work, *The Enneads*, reveal his ideas which blend the thoughts of Aristotle, Plato, and other schools of ancient Greek philosophy. If one has read some of the works of Plato, Aristotle, and great thinkers of the Pre-Socratic school, *The Enneads* is highly approachable and understandable. The powerful and enlightening insights delivered by *The Enneads* complete an ancient system of thought as well and serve as a new beginning of spiritual mysticism. The book contains hints of the Christian philosophy that would soon flourish after the passing of Plotinus. Plotinus may have been exposed to many other religions and mystic ideas during his time in Rome.

Plotinus centers his philosophy on three levels. The first level or the One, also known as The Good, The Transcendent, or The Absolute, is indescribable, much like the name of God in the Pentateuch or Old Testament. Nothing can be said about it and it has no body, history, shape, or presence in our world, yet is the source of all. The second level is The Intellectual-Principle or Intelligence and Divine-Thought, acting as a go-between between The One and the third level, The All-Soul. The latter is where our physical universe and the life-forms on Earth exist. The beings at the lowest level are created by the second as a mirror image, a stamped second-tier impression of the pure Essence originating from the first. The first level is well-known in philosophy as the Platonic Forms, and it renders all we know and see in our own world as imperfect reflections. I've always had a problem accepting the unquestioned reality of ideal Forms, and Plotinus' work revolves heavily around a more detailed and philosophically agreeable use of the concept.

The editors of the Penguin edition of *The Enneads* introduce the book's Seventh Tractate by stating that it is of importance as the only extended discussion in ancient philosophy of the theory of Time, apart from that of Aristotle in *Physics*. Early in 2019, I read a fantastic book, *The Order of Time*, by Carlo Rovelli, on the current state of the study of time in physics, related to his own research conducted as the director of the quantum gravity group at the Centre de Physique Théorique at the Aix-Marseille University. He is considered to be one of the founders of the loop quantum gravity theory. Rovelli embellishes his highly readable journey on the history of the study of time by peppering the short



Plotinus, The Enneads, Penguin Classics; (November 5, 1991), 688 pages, paperback

work with quotes and summaries not only by those studying physics and other relevant scientific fields, but poets, writers, religious leaders, and modern and ancient philosophers. Noticeably absent, however, is a mention of Plotinus and his important tractate on the subject.

On a mission to see where Rovelli bridges mathematical theories with those of humanistic and philosophical Time, I reread the chapter on Time by Plotinus and much of the book by Rovelli. As I read Plotinus, I understood that one has to allow for a high level of speculative thinking in approaching his concepts. The basis of ancient Greek scientific thought presented, for example, by Aristotle or in older works describing a world resting on an invisible atomic substructure, was often created from the sheer intuitive process of these thinkers of the time. Rovelli gives many nods to this idea, writing, "The ability to understand something before it's observed is at the heart of scientific thinking," and gives examples of this by citing the works of Anaximander, Copernicus, and Einstein. Yet, Rovelli argues many times in his book that we can't trust these instincts. For example, he writes the following about Einstein's realization that time was slowed down by speed: "The consequence of this discovery for our basic intuitive perception of time is the most

devastating of all." In addition, there are many intuitive ideas that a modern scientist deems worthy of detailed exploration as compared to those that are often regarded as spiritual or philosophical in nature, dismissed from the start for initiating any objective and rational follow-up and pursuit.

Rovelli is on an exciting mission to spread the newly discovered truths about time and use the study of physics to educate and end the common and popular misconception that time is linear. Time does not move, using my own analogy here, like film flowing through an old projector system, passing through the light of the camera's lens for one immeasurable moment of the now, and with no possibility of return or vision of what will be shown in future frames. Instead, Rovelli makes the case for the nonlinearity of time. He quotes the poet René Rilke on this subject, "The eternal current/Draws all the ages along with it..." and describes how we grab on to the idea of persistent time, its slippage and "anxiety about the future." But the reality is in the elementary laws that describe the mechanisms of the world, where there is no such difference between past and future or cause and effect. *The Order of Time* is at its best when it lays out for the non-specialist reader the history of time in physics, from the disconnect between Aristotle's and Newton's theories to the groundbreaking discoveries of Einstein and discussions on subjects and areas of study such as entropy, gravity, the second principle of thermodynamics, and many others.

Rovelli's area of study is loop gravity, and it works without a variable of time in its equations. His research focuses on the fields that form matter, photons, electrons, subatomic particles, and gravitational fields: "all on the same level and seeking only a coherent description of the world as we understand it so far." In this world, time and space are no longer containers or general forms of the world and act as approximations of quantum dynamics which itself knows neither space nor time. He states it is representative of a world of "only events and relations. It is a world without time of elementary physics."

The Order of Time describes how Plato had the "excellent" idea to translate mathematics and physics using atomists' (i.e. Democritus) insights. Rovelli notes, "But he [Plato] goes about it the wrong

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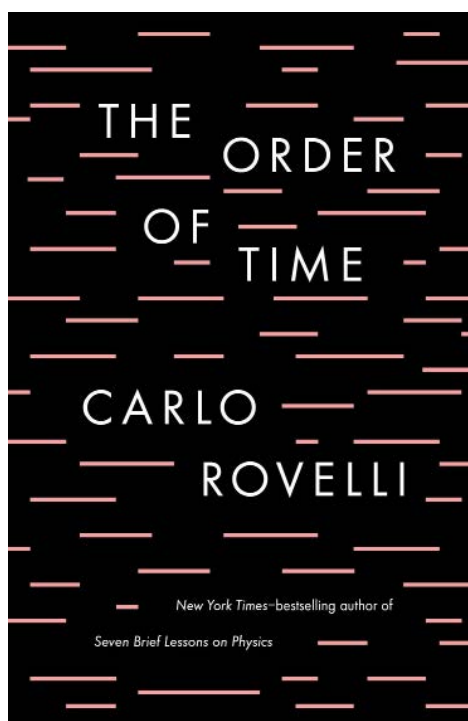
way: he tries to write the mathematics of the *shape* of atoms, rather than the mathematics of their *movements*.” He also states that “For a long time, we have tried to understand the world in terms of some primary *substance*. Perhaps physics, more than any other discipline, has pursued this primary substance. But the more we have studied it, the less the world seems comprehensible in terms of something that *is*. It seems to be a lot more intelligible in terms of relations between events.”

Plotinus is in agreement with Rovelli that the world of substance is not to be trusted as a source of anything absolute in terms of knowledge or fact. He would never pursue a study of a “primary substance,” as Rovelli says physics has mistakenly done in the past, since he believes it to exist only in the unreachable realm of Forms and that’s all that we as humans comprehend of it. Plotinus also notes that the study of movement has nothing to do with Time, and that the observer of movement has nothing to do without Time outside of being a convenient tool of measure.

Another concordance between Plotinus and Rovelli is that language in itself will always be an imperfect conduit in describing ultimate theories, whether it be The One or a “theory of everything,” a belief in a single quantum equation that ties all fields in a neat packaging. Plotinus writes, “Let them [beings] have it [Time], present to them and running side by side with them, and they are by that very fact incomplete; completeness is attributed to them only by an accident of language” and “[Eternity] can have no contact with anything quantitative since its Life cannot be made a thing of fragments...it must be without parts in the Life as in the essence.”

Rovelli and Plotinus are both in agreement that there is no difference in past, present and future, with the latter saying in terms of physics, “Being can have no this and that; it cannot be treated in terms of intervals, unfoldings, progression, extension; there is no grasping any first or last in it” and “The Primals, on the contrary, in their state of blessedness have no such aspiration towards anything to come: they are whole, now...therefore, seek nothing, since there is no future to them, nothing eternal to them in which futurity could find lodgement.”

The Enneads strays farthest from any semblance of what would be thought of today as recognizable scientific study in its systematic and unwavering belief of how and why this world exists. Plotinus writes, “Time, as noted by Plato, sprang into Being simultaneously with the Heavenly system, a reproduction of Eternity, its image in motion, Time necessarily



Rovelli, Carlo, *The Order of Time*, Riverhead Books; (May 8, 2018), 256 pages, hardcover

unresting as the Life with which it must keep pace: and 'coeval with the Heavens because it is this same Life (of the Divine Soul) which brings the Heavens into being; Time and the Heavens are the work of the one Life." Science, with good cause, prefers the mathematic study of "infinity" over speculative notions of an "Eternal". Plotinus writes that we, as human souls, must attempt to rediscover our vision of and relationship with the realm of Forms, a perfect Good, a beacon appearing only in our Intellect through study and Buddhist-like meditational transcendence. For Plotinus, concepts such as the Eternal don't offer much towards revelation—they are ideas to ponder while trying to reach that higher plane of pure unwavering perfection, which knows no Eternity.

Rovelli writes how he agrees with the late philosopher of science, Hans Reichenbach, that, "in order to escape from the anxiety time causes us...we have imagined the existence of 'eternity,' a strange world outside of time that would like to be inhabited by gods, by a God, or by immortal souls....The opposite emotional attitude, the veneration of time – Heraclitus, or Bergson – has given rise to just as many philosophies, without getting us any nearer to understanding what time is. Physics helps us to penetrate the layers of that mystery...the hope of being able to study the nature of time free from the fog caused by our emotions."

That said, all of Rovelli's philosophical quotes and anecdotes are truly poetically placed in his book so the reader knows he's not just a physicist in an ivory

tower with knowledge of what only concerns his area of study. He's a man of the wider world and has read a vast number of books in the humanities. I came to believe during my second reading of *The Order of Time* that he may actually believe that many of these works offer little in terms of the hard science of physics on time outside of their importance in the historical narrative of misconceptions on the subject.

Towards the end of the book Rovelli notes, "The vision of reality and the collective delirium that we have organized has evolved and has turned out to have worked reasonably well in getting us to this point," and in closing his work says, "And it seems to me that life, this brief life, is nothing other than this: the incessant cry of these emotions that drive us, that we sometimes attempt to channel in the name of a god, a political faith, in a ritual that reassures us that, fundamentally, everything is in order, in a great boundless love – and the cry is beautiful." I would beg to differ. Our "collective delirium" has been the source of the deaths of tens of millions of people (see the wars of the 20th century alone) and that our emotional "beautiful cry" is far too often more one of pain than glory. It is unrealistic to believe that science will ever cast a wider net when choosing which of the intuitions of philosophy it deems worthy of research, especially given philosophy's close relationship to the fool's gold so often offered up by the schools of theology. After all, Plotinus himself admits that we can say nothing more about The One outside of that it exists and should be strived for internally through Intellect. There's nothing there to study at length, and no purpose would be served in "locating" the primary level since it's more of an invisible axiom than a tangible theorem in space or time. Yet it has purpose as a vital pursuit, one that could well serve as a motivator in the back of the mind of any individual seeking a wider understanding and awareness of the world.

Plotinus may have introduced in his Tractate on Time an early inkling of the concept of the multiverse, and it is a hopeful one at that. He writes, "Thus when the universe has reached its term, there will be a fresh beginning, since the entire Quantity which the Cosmos is to exhibit, every item that is to emerge in its course, all is laid up from the first in the Being that contains the Reason-Principles... There is nothing alarming about such limitlessness in generative forces and in Reason-Principles, when Soul is there to sustain all. As in Soul (principle of Life) so in Divine Mind (principle of Idea) there is this infinitude of recurring generative powers; the Beings there are unailing." ■

African Americans and the Year of the Vote

TRACY ADAMS

It is without doubt or hesitation that African Americans have deep-seated roots in the cultivation, development, design, and fabric of this blessed country, the United States of America. Carter Godwin Woodson, the “Father of Black History,” expressed his beliefs that “Blacks should know their past in order to participate intelligently in the affairs in our country.” With the support of schools, key organizations and the general public, Woodson founded Negro History Week, the forerunner to Black History Month. He centered his work around the idea that “Blacks should be proud of their heritage and that other Americans should also understand it.” The Association of the Study of African American Life and History (ASALH) has declared, “The year 2020 marks the centennial of the Nineteenth Amendment and the culmination of the women’s suffrage movement. The year 2020 also marks the sesquicentennial of the Fifteenth Amendment (1870) and the right of black men to the ballot after the Civil War.”

HISTORY – THE TURNING OF THE AGES

In a time when substantial economic and social differences divided how the northern states and the southern states existed, those differences were the driving forces that dictated those lifestyle choices. While the North was experiencing well established industrial and manufacturing periods of development and growth, the South was heavily dependent on a system of agriculture which was even more tightly tied to its dependency on human capital for domestic servitude and forced labor. Tensions were already at a boiling point, and Abraham Lincoln, “the Great Emancipator,” had just one guiding rule: “My policy is to have no policy.” He put the country on a course of no return.

The end of the American Civil War, also known as the War Between the States, fought from 1861 to 1865 between the North and the South, ushered in a new era for Black people—particularly freedom from enslavement and the basic right to be counted as equal. (Post-Civil War some four million slaves were freed.) The Thirteenth Amendment to the Constitution in 1865 abolished slavery and forced servitude and the Fourteenth Amendment to the Constitution in 1868 gave Black people the right to citizenship. These were followed by the ratification of the Fifteenth Amendment



Photo Courtesy of PETER PETTUS | LIBRARY OF CONGRESS

Demonstrators walk down a street during the civil rights march from Selma to Montgomery, Alabama in 1965.



to the Constitution in 1870 which prohibited the government from prejudicially denying voting privileges to any citizen. This move was tremendously significant in the step towards healing the wounds and forbidden hope of decades of oppression, but this did not come without huge cost that would be paid by African American men and women throughout the country for almost a century to come.

The southern states used various means to disenfranchise African Americans, including exercising poll taxes, literacy tests, fraud, force, and intimidation to discourage (and eliminate) Black men from voting. The fight for African American suffrage raged on for decades. This unfair treatment was debated in the press, in Congress, and on the street through numerous protests and marches, rallies, and petitions, sometimes leading to death. A full fifty years after the Fifteenth Amendment passed, Black Americans still found it difficult to vote, especially in the South. “What a Colored Man Should Do to Vote” lists many of the barriers African American voters faced.

MOVING AHEAD ... DESPITE THE ODDS

In 1963, Dr. Martin Luther King Jr. gave his famous “I Have a Dream” speech to 250,000 people on the steps of the Lincoln Memorial during the March on Washington for Jobs and Freedom. Demonstrators, black and white, rich and poor, stood together to fight for equal rights of black people and fair and equal voting rights for all. It would take the passage of the Voting Rights Act of 1965 before the majority of African Americans in the South were registered to vote. Prior to this only 23% of voting-eligible Blacks were registered to vote, but by 1969 that number rose significantly to 61%. The Voting Rights Act strengthened the Civil Rights Movement and began to eliminate the fundamental barriers that had historically prevented equality while laying the foundation for a new normal of diversity and inclusion throughout our society.

From 1928 to the present day, ASALH dedicates each year to a unique theme that

CONTINUED TO P. 9

inspires continuous learning and activism. “Over the years, the themes reflect changes in how people of African descent in the United States have viewed themselves, the influence of social movements on racial ideologies, and the aspirations of the black community.” This year’s theme is “African Americans and the Vote.” Black voters are considered a key voting alliance with the Democratic Party. A recent [survey](#) of 1200 Black voters showed that Black Americans are more interested in voting in the upcoming election than they were in the election of 2016.

As [reported](#) by the Pew Research Center, Blacks, Hispanics, Asians and other racial or ethnic minorities accounted for 26.7% of voters in 2016, a share unchanged from 2012.

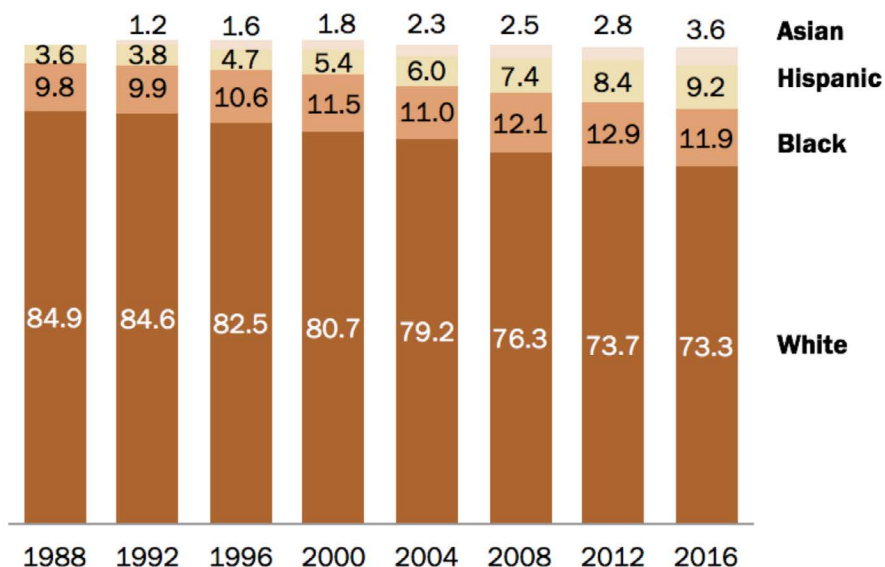
PRESENT DAY – THE TIME IS NOW

There could not be a more important time in the history of recent elections where standing for ideals that promote the continuity of life matter more. Our society paints the idea that if we collectively, as a people, desire the same social, economic, civil, and cultural advancements, then opportunities to fulfill those wants are accessible to all. It has been roughly 155 years since slavery was abolished and voting rights have been mandated—yet voter turnout in the black community is still low due to jaded minds that the change our forefathers fought and died for will never truly be fully realized.

The time is now. Former President Barack Obama said in his February 5th, 2008 speech to supporters, “Change will not come if we wait for some other person or some other time. We are the ones we’ve been waiting for. We are the ones we seek.” This election has each of our names handwritten on it. The nation is changing its views on respect, sustainability, enrichment, resilience, religious freedoms, and well-being. Each one, each voice, each vote has the power to literally change the world—and impact how the world sees us. This upcoming 2020 electoral race for the White House has emboldened twenty-seven candidates, both politically seasoned, as well as newly sworn in counterparts, to strap on their boots,

Share of voters who are white unchanged in 2016

% among voters



Notes: Based on U.S. citizens who say they voted. Whites, blacks and Asians include only non-Hispanics who reported a single race. Hispanics are of any race. Data for non-Hispanic Asians were not available in 1988.

Source: Pew Research Center analysis of the Current Population Survey, November Supplements for 1988-2016.

PEW RESEARCH CENTER

focus on the most demanding and challenging societal concerns, and head for the finish line. Just the success of gaining the most coveted political position in the nation leaves many with starry eyed hope and ambition to leave their own individual mark on history.

Politically and globally, it is an exhilarating time to engage in issues that affect the worldwide community running the gamut from curing diseases to ensuring clean running water to climate readiness. It is a perfect time to start (if you haven’t already) a new personal initiative to make the necessary adjustments to life as we have known it by getting more involved in community activities and making your own mark on history.

Socially, the country is becoming more aware of the world we are a part of and the concerns (and cries) of our brothers and sisters in neighboring countries. We accept and defend the right to be recognized as a global leader with the

responsibility to set the tone for social wellness the world over. Economically, we are reaching new heights and chartering new territory, with the U.S. taking the lead position in economic health, at just over \$20 trillion in GDP, due in part to high average incomes, a large population of over 327 million people, capital investment, low unemployment rate (3.6%), high consumer spending (71% of GDP), a relatively young population (median age of 38.1 years), and technological innovation. Environmentally, we *MUST* save the planet. With each election year, we see growing interest to make this an enduring priority for the elected officials at the Federal, State, and local levels through environmental protection and preservation initiatives, like the [NYC Carbon Challenge](#), [NYC ZeroWaste](#), and [GreenNYC](#). Visit www.nyc.gov for more information.

We can join the present-day civil rights movement like African American heroes of the past and present: Harriet Tubman, Sojourner Truth, Rosa Parks, Martin Luther King Jr., W.E.B Du Bois, Jessie Jackson, Oprah Winfrey, and Barack Obama, or “Wait for some other person or some other time.” How will you vote?

For more information on voting in NYC, visit <https://www.census.gov/topics/public-sector/voting.html>. ■

“Change will not come if we wait for some other person or some other time. We are the ones we’ve been waiting for. We are the ones we seek.”

– FORMER PRESIDENT OBAMA



Hello Natural Selections readership,

I am somewhat new to the Rockefeller community and very new to this publication, so I thought it might be a good idea to at least briefly introduce this column before jumping into the music. Something I've picked up on since starting research here is that most people listen to music in the lab while they work, and usually it's something unique and maybe not too well known. Maybe it's just how New Yorkers are, but Rockefeller people in particular seem to have an advanced knowledge of good music and the artists that produce it.

With that in mind, I hoped I might reach an audience of music enthusiasts that would be open to a few recommendations. I don't claim to be an authority on all the good music out there, but I figured maybe some other Rockefeller people might be into the material I've come across one way or another. I think these albums (and all subsequent recommendations) are gold, so hopefully you'll enjoy them too.

– Nick

P.S. I realize after writing my recommendations that both albums are petty funk-forward, I'll try to pick different genres next time.



Photo Courtesy of Bandcamp

Vulfpeck - Live at Madison Square Garden

Genre: Funk, Indie

Listen to this if you like: Snarky Puppy, Lettuce, anything on the Daptone label

Description: Some might consider it bold move to have my first recommendation be a live album, because live albums typically sound different than the more well-known original studio recording. For most other bands, I would agree, but Vulfpeck with their Madison Square Garden live album is an exception--this is my favorite album of theirs. If you compare the original and live versions of each song side by side, you'll notice that the live versions not only pay homage to the original, but also that they

are decorated and ornamented in a way that augments and improves each piece. In fact, I find it difficult to go back and hear the original pieces now because they sound so bare-bones. Featuring eighteen performers, this show might be one of the best live performances I've ever seen. And if you want to see it visually it's available on [Youtube](#).

Standout songs:

- "Animal Spirits" - One of Vulfpeck's best studio songs, which was only improved by the energy and spontaneity of a live performance.
- "Wait for the Moment" - Another one of their most popular studio songs. It was not only performed super tight, but after the song normally ends, the band goes into a breakdown where each player individually comes in and progressively layers on top of the previous additions, extending the jam for about another three minutes--the resulting build to the song's ending climax is absolutely incredible.
- "Dean Town" - This song has a very iconic and complicated bassline, and yet the crowd sings along and nails it for like two minutes of the three and a half minute piece.
- "Cory Wong," "Beastly," & "It Gets Funkier" - If you're looking for funky grooves to get lost in, look no further than these three instrumental pieces.



Photo Courtesy of The Arts Desk

L'Impératrice - Matahari

Genre: French indie disco

Listen to this if you like: Daft Punk, Breakbot, Chromeo

Description: It's hard to pin down exactly what kind of sound this French band is

going for. Like some kind of tropical space disco, it's got this dark, smoky, sexy sensibility about it--the atmosphere is everything. Drifting from groove to groove, this album takes you on an odyssey as you get lost in its weird and enticing energy. Because it nails the vibe so well, the whole album is really great to listen to straight through because each plays with the tone in an interesting way. Furthermore, it's hard to specify which songs are the best. Regardless, here are a few of my favorites.

Standout songs:

- "Error 404" & "The Kiss" - These are dreamy, intimate, down-tempo pop jams. The singer, Flore Benguigui, drifts over gleaming synth pads, clean guitar fills, and a bouncy bass line.
- "Forever Nobody" - As one of the funkier tunes on the album, good luck getting the chorus out of your head. The interplay between the bass, drums, guitar, and synth is hypnotizing. ■

Pets of Tri-I

POOJA VISWANATHAN



For this issue, I interview Astérix, the guinea pig who lives with Amélie Cornil (Laboratory Administrator, Strickland lab, The Rockefeller University) and her husband, John. I hope I meet Astérix

Pooja Viswanathan: How old are you? In human years?

Astérix: I am 1 year old, and that's 18 human years, so I'm still a teenager.

PV: Is there a story behind your name?

A: Yes! My name is Astérix just like the French comics.

PV: How did you first meet your humans?

A: I was a baby when my human mom held me the first time! I was scared, I thought "This is it! They're going to eat me now!", but then they took me to a huge house and gave me lots of amazing food.

PV: What is your first memory?

A: The first time my humans gave me a bowl of colorful things that didn't look edible, I went to hide for hours. Then I tasted them and now I can't get enough of vegetables!

PV: Where do you live?

A: In a 2-story luxury loft inside my humans' small apartment in Queens.

PV: If you could live anywhere else in the world, where would you live?

A: In Omaha Nebraska, in the giant fields full

of the different hay that I could eat daily!

PV: What are your favorite smells?

A: Green leaf lettuce, apple and banana.

PV: What are your favorite foods?

A: Green leaf lettuce, apple and banana!

PV: What is your favorite weekend activity in NYC?

A: Eat, nap, poop, eat, nap, poop. On Sundays I also get to run in the playpen, and eat and poop in there!

PV: Besides your human roomie, who is your favorite human in the Tri-I community?

A: Aunt Xinzhu from the Memorial Sloan Kettering Cancer Center.

PV: Do you have a funny story to share with us?

A: When I was younger, my human mom tried to make me taste banana multiple times and I would just run away. Since a week ago I am crazy for it and every time they eat a banana I demand a piece!

PV: Is there some way we can see more pictures of you on the interwebs?

A: No, I am afraid of the owls and eagles on social media that might want to have me for dinner.

PV: If you could have any human ability, what would it be?

A: Go to the fridge by myself to get vegetables in the middle of the night! ■





Parasite (CJ Entertainment)



1917 (Universal)

For Your Consideration – And They're Off! Edition

JIM KELLER

The Oscar race is like a horse race in that each studio pins their hopes on their respective films hoping to place. In such an analogy, the studio is the horse's owner, public relations is the jockey, and the actor or film is the horse. In the table below, I've included my rankings as they stood on the eve of Oscar nominations—the number in brackets indicates my placement following nominations. I chose nine nominees for Best Picture out of a possible ten, as determined by the Academy's preferential bal-

lot system. All other categories reflect five nominees. The picks that appear in black text within the table were my original nominee picks, and those in red represent actual nominees that I had not chosen.

This year, I underestimated the Academy's willingness to address the gender parity gap and expected Greta Gerwig to make it into the Best Director category for her rendition of *Little Women*, my number two film of 2019. I also relied on their inability to award my top film last year, Alfonso Cuarón's *Roma*, Best Picture for being a Netflix film, and placed Taron Egerton (*Rocketman*) in the Best Actor category instead of Jonathan Pryce (*The Two Popes*, also a Netflix film). In-

stead, the Academy went all in for *Joker*, my least favorite film of the year. Indeed, it gave this film the most nominations (at eleven), including Best Director.

Unfortunately, I wasn't able to discuss the Best Supporting Actress race this year due to the condensed season (all precursor awards were moved up three weeks to accommodate the early Academy Awards date, February 9th, 2020), but if I had, you would've seen that Katy Bates was in the mix for Richard Jewell, having earned a Golden Globe nomination, but her inclusion was still a surprise.

With that, I give you my current Oscar predictions. May the best men and women win! ■

2020 OSCAR CONTENDERS

	Best Picture	Best Director	Best Actor	Best Actress	Best Supporting Actor	Best Supporting Actress
1	<i>Once Upon a Time in Hollywood</i> (Sony) [3]	Quentin Tarantino - <i>Once Upon a Time in Hollywood</i> [3]	Joaquin Phoenix - <i>Joker</i> [1]	Renee Zellweger - <i>Judy</i> (Roadside Attractions) [1]	Brad Pitt - <i>Once Upon a Time in Hollywood</i> [1]	Laura Dern - <i>Marriage Story</i> [1]
2	<i>The Irishman</i> (Netflix) [5]	Bong-Joon Ho - <i>Parasite</i> [2]	Adam Driver - <i>Marriage Story</i> [2]	Scarlett Johansson - <i>Marriage Story</i> [2]	Al Pacino - <i>The Irishman</i> [3]	Jennifer Lopez - <i>Hustlers</i> (STX Films)
3	<i>1917</i> (Universal) [1]	Sam Mendes - <i>1917</i> [1]	Leonardo DiCaprio - <i>Once Upon a Time in Hollywood</i> [4]	Charlize Theron - <i>Bombshell</i> (Lionsgate) [3]	Joe Pesci - <i>The Irishman</i> [2]	Kathy Bates - <i>Richard Jewell</i> (Warner Bros. Pictures) [5]
4	<i>Parasite</i> (CJ Entertainment) [2]	Martin Scorsese - <i>The Irishman</i> [4]	Antonio Banderas - <i>Pain & Glory</i> (SPC) [3]	Awkwafina - <i>The Farewell</i> (A24)	Tom Hanks - <i>A Beautiful Day in the Neighborhood</i> (Sony) [4]	Margot Robbie - <i>Bombshell</i> [4]
5	<i>Jojo Rabbit</i> (Fox Searchlight) [4]	Greta Gerwig - <i>Little Women</i>	Taron Egerton - <i>Rocketman</i> (Paramount)	Cynthia Erivo - <i>Harriet</i> (Focus) [5]	Anthony Hopkins - <i>The Two Popes</i> (Netflix) [5]	Scarlett Johansson - <i>Jojo Rabbit</i> [2]
6	<i>Joker</i> (Warner Bros. Pictures) [6]	Todd Phillips - <i>Joker</i> [5]	Jonathan Pryce - <i>The Two Popes</i> (Netflix) [5]	Saoirse Ronan - <i>Little Women</i> [4]		Florence Pugh - <i>Little Women</i> [3]
7	<i>Marriage Story</i> (Netflix) [7]					
8	<i>Little Women</i> (Sony) [8]					
9	<i>Ford v Ferrari</i> (Fox) [9]					

OSCARS



Life on a Roll

New York City, Angoulême and the Comics Festival

ELODIE PAUWELS

<https://elodiepphoto.wordpress.com/>

Did you know there is a close relationship between New York City, U.S.A. and Angoulême, France? When Giovanni da Verrazzano discovered the New York Bay area, he named it New Angoulême after French King Francis I, Count of Angoulême.

Angoulême, city of festivals, is mainly known for its International Comics Festival that held its 47th edition a few days ago. This event was even larger this year as the city has recently been integrated into the UNESCO creative cities network, literature category.

If you plan to visit the Comics Museum, you will be welcome by the statue of Corto Maltese, a character from comic book creator Hugo Pratt. ■

