The Lion Ledger

Fall 2025

Cover Art by Nora Margulis, 2nd year BMS PhD Student

Note from the Editors:

As the leaves turn golden and the semester hits its midterm stride, the LTS Editorial Team is here to bring you the Fall Edition of the Lion Ledger – packed with science and a little seasonal spice! To start us off, Jay provides a fascinating deep-dive into the neuroscience of near-death experiences, followed by Shyrun's timely exploration of Seasonal Affective Disorder—a must-read for anyone feeling the shorter days creep into their mood. Habiba highlights one of evolution's strangest twists in *An Ant Walks into a Genetics Lab and Clones Another Species*, a story that proves biology never stops finding ways to surprise us. If you're looking to learn about current global events and make an impact beyond the bench, head to Chris's article to learn about the conflict in the Democratic Republic of Congo. Brainstorming dishes to bring to Friendsgiving? Try Alex's High Protein Buffalo Chicken Dip, Megan's warm and nostalgic Wassail, Allison's Pumpkin Chocolate Chip Cookies, or Natale's Autumnal Quinoa Kale Salad. Finally, when you need a little pick-me-up after the pumpkin spice latte wears off, give a listen to Natale's audiobook picks that are perfect for keeping you company at the bench. Whether you're diving into spooky science, thought-provoking reads, or seasonal recipes, take a moment to savor the season and a sweet treat! If you have ideas for a Lion Ledger piece, reach out to us at lionstalkscience@gmail.com and we'll be happy to include it in the next (Winter) edition of the Lion Ledger!

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This Season in Science

Back From the Dead: The Science of Near-Death Experiences

By: Jay Kang

My favorite part of any medical drama is when a patient's monitor is flat-lining, the family members cover their faces in grief – but, the doctor or nurse or EMT continues fighting for their patient's life, doing everything possible to revive them. The drama and the emotion are all played up to increase the suspense in a scene, but these near-death experiences are rooted in reality. You may have heard stories of family members or strangers "moving toward the light" or hearing the voices of their loved ones when describing a near-death experience, but did you know that there is some science behind these potentially otherworldly scenarios?

Death is medically defined as 1) an irreversible stop to blood circulation and breathing or 2) a complete stop to all brain function of the entire brain, including the brain stem. Both criteria revolve around necessary physiological processes needed to survive: we need oxygen delivered to our body, and we need our brain to facilitate oxygen transport from the air to our organs. However, it can be difficult as a physician to identify the exact moment of death using these criteria.

Considering the first criteria: the stopping of all respiratory and cardiac function will indeed *eventually* lead to death, but it does not capture the exact moment of death. An average person can hold their breath for 30-90 seconds, and patients have been reported to live 3-4 minutes after their heart stops. In terms of the second criteria, the available medical technology limits our ability to measure complete cessation of all brain activity. Doctors very rarely have access to MRI scans or EEG devices to hook up their patients to definitively declare a patient dead. Both procedures can be very costly for a patient who may not have much time to live.

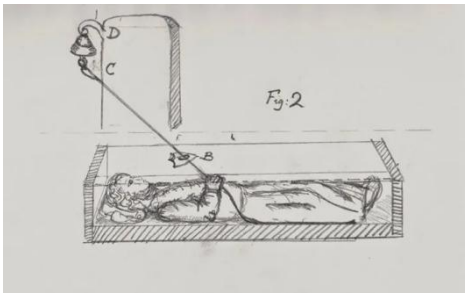

Figure 1: Coffins used to have bells attached to them so that people who were mistakenly declared dead would be able to ring them and alert the grave keepers that they had buried a still-living person.

Let's be clear: it is impossible to revive someone who has been clinically declared dead for longer than 5-10 minutes. However, medical death and true death are two different situations whose overlaps creates a gray area in which a person can be "revived" from the dead. Scientists have always been curious about human nature, and in turn the science of death. Unfortunately, death is a difficult subject to study; as such, scientists use near-death experiences to investigate what goes on after life. In 1975, a scientist named Raymond Moody interviewed 150 patients who claimed to have had a near-death experience. Moody summarized each experience with 15 elements including "traveling through a dark tunnel", "out of body experiences", and "meeting with a being of life". Moody's original description has been updated with additional data points and included criteria for experiences where illnesses led to loss of consciousness or there were no signs of coma-associated phenomena.

Near-death experiences aren't as common as medical dramas make the out to be, but they aren't completely unheard of either. About 17% of people who nearly die report experiencing a near-death experience, referring here to one of these supernatural-like "tunnel" or "out-of-body" experiences. While science would love to learn more about these experiences, how they would go about doing that is the rate-limiting step. Perhaps we will never know what goes on in the great beyond, but at the very least, I advise that you don't go towards the light.

It's Big SAD Season

By: Shyrun Karandikar, M.Ed., NCC

As autumn leaves fall, many enjoy the crisp air, the glowing foliage, and the shift in campus atmosphere. Yet for some, the shortening days bring more than just a change in weather; they can also signal the onset of Seasonal Affective Disorder (SAD). SAD is a form of depression that follows a seasonal pattern, most commonly emerging in late autumn and persisting through winter. It is not classified as a separate disorder, but rather as a specifier, "with seasonal pattern," applied to Major Depressive Disorder or Bipolar Disorder.

The Science Behind the Season

While SAD affects an estimated 2–5% of adults in the United States, many more experience milder seasonal mood fluctuations. Numerous studies have proven that reduced sunlight during autumn and winter disrupts the body's circadian rhythms and alters serotonin and melatonin regulation, which in turn affects mood, energy, and sleep. However, more recent research suggests that other seasonal changes, such as foliage and temperature, may also play a role in the onset of SAD. A 2023 study by Kim and colleagues examined how seasonal color changes in forest environments – from green-to-autumn hues, to fallen leaves, to temperature fluctuations – affected mood states of university students. Participants were evaluated indoors first, then immersivity exposed to forest environments at different seasonal times. The authors found that participants reported greater energy levels and lower stress in spring environments with greener foliage and moderate temperatures, compared to autumn or winter conditions. These findings suggest that visual and environmental cues, not just daylight duration, play an important role in emotional regulation during seasonal transitions. Moreover, for students in medicine and graduate programs, whose schedules often limit daylight exposure, these biological shifts can compound the stress of rigorous academic and clinical demands.

Recognizing the Signs

Students experiencing SAD often report a persistent low mood or irritability accompanied by a loss of

SAD Infographic

interest in activities they typically enjoy. Many describe oversleeping or struggling to wake up in the morning while still feeling fatigued throughout the day. Concentration may become more difficult, and cravings for carbohydrates or sweets often increase, sometimes leading to weight gain. Feelings of hopelessness or guilt can also develop as the semester – and season – progresses.

To meet diagnostic criteria, these symptoms must follow a recurrent seasonal pattern for at least two consecutive years with remission during another season and no nonseasonal episodes in the same period. While SAD is most often associated with the fall and winter months, some individuals experience a less common spring or summer subtype.

Evidence-Based Approaches

Fortunately, a range of effective and evidence-supported treatments are available. Light therapy, which involves exposure to a 10,000-lux light box each morning, remains one of the most widely recommended interventions. Cognitive Behavioral Therapy tailored for SAD guided by a mental health counselor helps individuals reframe negative thoughts about the season and increase engagement in meaningful activities. Antidepressant medications, such as selective serotonin reuptake inhibitors, can also be effective for those with moderate to severe symptoms, of course under your doctor's advisement.

In addition to these treatments, several lifestyle strategies can make a difference. Maintaining a consistent sleep routine, prioritizing physical activity, and staying socially connected all help protect mood stability. Paying attention to nutrition and checking vitamin D levels can also be beneficial, especially for those who spend much of the day indoors.

For Our College Community

Both graduate and medical students navigate demanding coursework, research responsibilities, and clinical experiences that can intensify as daylight fades earlier each day. Campus counseling centers, wellness programs, and peer support networks are valuable resources. Recognizing the early signs of SAD and reaching out for help can make a meaningful

difference. Remember that seasonal change can affect more than just the landscape. Prioritizing mental health is not only essential to personal well-being but also to becoming a compassionate and effective health professional.

Spooky Scary Skeletons: The Science Behind Our Noisy Joints

By: Chris Pallés

If you spend enough time around me, you'll know that I love to crack my joints. I'm usually met with one of two responses: either "I also love cracking my joints!" or an equally emphatic "please never do that ever again." Often, people ask me if it's safe to crack my joints — you may have heard the claim that the popping sounds that come from our bones are related to developing arthritis or other conditions. Since I'm also interested in studying osteoarthritis, I decided to finally look for a definitive answer.

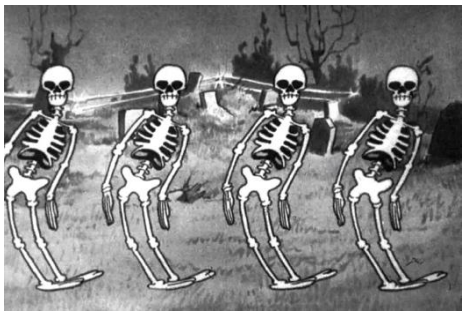

Image Credits: New York's Intelligencer

Firstly, the medical term for any noise heard when joints move is *crepitus* [KREP-ih-tus]. There are many different types of sounds that can emanate from our joints and even more potential causes. Essentially, it turns out that the cracking, popping, or grinding, which may or may not be painful, can result from benign air bubbles in joints, ligaments popping over bones or other ligaments, or the much-feared joint damage. With all of this variety, there is some debate over what phenomenon results in what specific sound emanating from your bones, and scientists haven't settled on a concrete answer. If your joint cracks repeatedly every time you repeat a motion, like if your knee pops every time you crouch down, it is more likely to be ligaments snapping over other structures. Alternatively, if you crack your knuckles and can't crack them again for some time, called a refractory period, this suggests that the sound might be originating from cavitation bubbles that form when you stretch your joints.

Cavitation bubbles result from the generation of negative pressure inside of the joint capsule. For example, when you stretch out a joint, this increases the volume of the joint space, leading gases to come out of the synovial fluid, or the thick fluid that lubricates joints, thus forming a bubble. The refractory period is believed to come from the need of the gases to re-dissolve in the synovial fluid of the joint. Whether the sharp sound coming from your joints when you "crack" them is due to the formation or collapse of these cavitation bubbles is still undecided. To get to the bottom of this question, one study performed real-time MRI on finger joints to see which event caused a sound. While taking an MRI video, a device held the participants' fingers one at a time, then pulled on the finger via a cable until the subject reported that the joint popped. While they found that a sound was generated only during bubble formation, the force generated by the bubble didn't explain why it was so loud, suggesting more factors at play. Contradicting these results, a different team's mathematical model demonstrated that the forces resulting from cavitation bubble collapse accurately mimicked the real audio profile of cracking joints. Whether the sound of popping joints is called by the cavitation bubble forming, collapsing, or a combination of both, these studies show that cracking your knuckles isn't scary at all!

Now, we still have the spooky question of whether noisy bones are associated with the development of arthritis. In a systematic meta-review analyzing the prevalence of knee crepitus and osteoarthritis, researchers determined that crackling knees is found in about 41% of the general population and is associated with a more than threefold risk of developing arthritis. Nonetheless, this study and others could not determine that joint popping *causes* arthritis. In other words, there is no evidence indicating that purposefully cracking your joints will lead to arthritis, so experts do not consider knuckle cracking a cause of arthritis. For now, you will absolutely see – or rather, hear, me continue this habit.

Science in the News

An Ant Walks into a Genetics Lab and Clones Another Species

By: Habiba Abdelhalim

In a discovery that sounds straight out of a science fiction novel, researchers have found an ant species that gives birth to another species. The study reveals that *Messor ibericus*, a European harvester ant, has evolved an extraordinary reproductive strategy: its queens produce not only offspring belonging to their own species but also males from a completely different species, *Messor structor*. This remarkable system blurs the boundaries of what it means to belong to a single species and forces scientists to rethink how cooperation and reproduction evolve in nature.

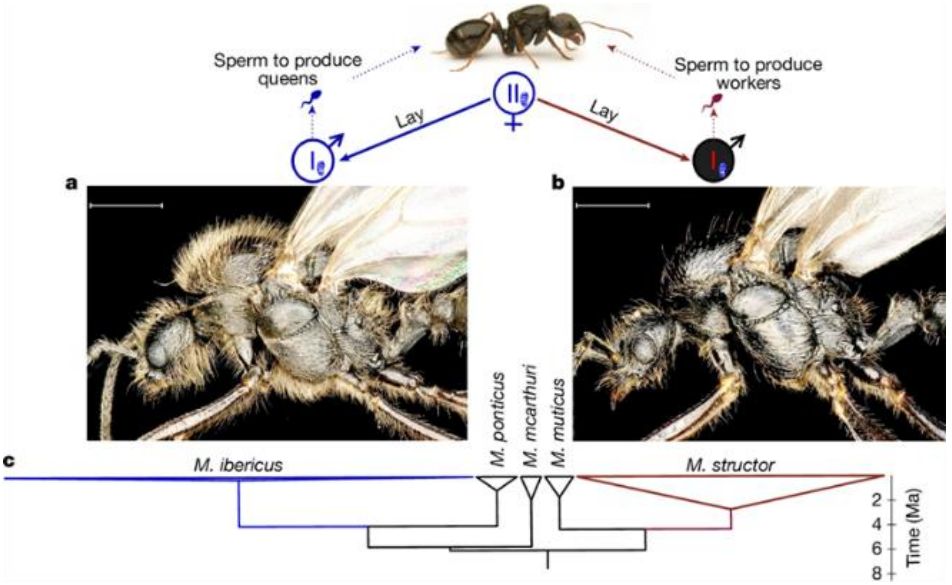

Figure 1: *M. ibericus queens produce males of two different species—M. ibericus (blue, hairy, a) and M. structor (red, hairless, b)—which differ in appearance and genetics (c). All share the same M. ibericus mitochondria (blue). Adapted from Juvé et al.*

Normally, animals produce offspring of their own species. Ants are no exception: colonies typically arise from a single queen who lays eggs that become queens, males, or workers – the sterile female ants that perform all the labor in a colony, all of her own species. But when analyzing the genomes of 390 ants from five closely related *Messor* species across Europe, a team of researchers discovered that *M. ibericus* breaks that rule. The results showed that *M. ibericus* workers had far more genetic diversity than expected, about 15 times higher than queens or workers of the other species analyzed. Further genetic tests confirmed that the mothers of these genetically diverse workers were *M. ibericus* and the fathers were *M. structor*, making the worker ants hybrids, or animals that carry genetic material from two distinct species. The mystery deepened, however, when scientists realized these hybrid colonies exist in places where *M. structor* doesn't even live, including Sicily, over 1,000 kilometers from the nearest known population of *M. structor*. How could *M. ibericus* queens still produce hybrids there?

The answer turned out to be even stranger. When researchers examined the males inside the hybrid colonies, they identified distinct populations of both *M. ibericus* and *M. structor* males. This meant that *M. ibericus* queens were laying eggs that became males of another species, something that has *never* been observed before in animals! Scientists theorize that this system may have originated from a kind of sperm parasitism, in which *M. ibericus* queens initially relied on nearby *M. structor* colonies for sperm but eventually evolved to produce their own *M. structor* males inside its nests, maintaining a self-sufficient clonal line. These cloned *M. structor* males then fertilize the queen's eggs, producing hybrid workers that keep the colony running. This led researchers to coin a new term to describe *M.ibericus* females: xenoparous, meaning "foreign birth", which is defined as when a female must give birth to another species as part of her life cycle.

The discovery of xenoparity challenges traditional definitions of individuality and reproduction. It shows that evolution can merge distinct species into a single functional unit, achieving levels of cooperation once thought impossible. This "two-species superorganism" might represent a new kind of evolutionary partnership, one that forces us to reconsider where one organism ends, and another begins. In the world of *Messor ibericus*, motherhood truly knows no species boundaries.

Get Involved

We Didn't Start the Fire…But It's Up to Us to Fight

By: Chris Pallés

Introduction

Fortunately or unfortunately, history and humanity are no strangers to turmoil, as is often reflected through many timeless songs. Even so, our generation has a distinct perspective from growing up with the internet and social media. Now there's instantaneous updates from around the world – and the bombardment never ends. With the constant flood of information, it feels even harder to process what we're seeing. The endless barrage of horror has led many people to normalize the destruction or become overwhelmed by it. Indeed, it's a daily struggle to find balance between taking care of daily necessities and fully empathizing with others. However, I believe that it is our duty as scientists – whose profession drives us to work towards a better future – to remain informed about global events, and active in our communities. One international crisis that has perhaps been glossed over by mainstream media is the ongoing conflict in the Democratic Republic of the Congo, or the DRC, which spans decades and has lead to the deaths of millions.

The Democratic Republic of the Congo

Unsurprisingly, the current events in DRC are linked to the past. The Rwandan genocide, a modern holocaust that took place in the early 1990s and was carried out by government-backed armed forces, drove many to flee across Rwanda's borders to the DRC – including both innocent refugees and those directly involved with the violence. The militants who escaped punishment garnered support in the eastern provinces of the DRC. Eventually, the government of Rwanda accused Mobutu Sese Seku, former dictator of the DRC (then known as Zaire), of harboring criminals who were still a threat to Rwandan ethnic minority groups. After this, the Rwandan government partnered with the DRC's opposition leader, Laurent Kabila, and they invaded the DRC, marking the start of the First Congo War.

After the end of that conflict, Kabila became President of the DRC, and accusations arose of human rights violations against Rwandan refugees. To combat these allegations, Kabila switched his alliances and began fighting against Rwanda and his own former supporters, thus beginning the Second Congo War. After a coup attempt and assassination of Laurent Kabila, his son Joseph Kabila became President of the DRC and initiated peace talks, ending the Second Congo War. Amidst this chaos, a group known as the March 23 Movement, or M23, began rising in popularity with the backing of the Rwandan government.

Despite Kabila declaring the M23 movement defeated in the early 2010s, the M23 group experienced a recent resurgence after the contentious election of Félix Tshisekedi for his second term. Akin to the United States, there's been increasing debate about the reliability of elections and accusations of fraud which combines poorly with the still-festering wounds of recent conflicts. The violence led to appalling increases in war crimes and human rights violations by both Kabila's government and M23 rebels. People are being tortured and executed without trial, and violence is perpetrated against ethnic minorities, women, children, and LGBTQIA+ communities. Roughly seven million people have been displaced, with some calling this "one of the world's largest humanitarian crises," and a "silent genocide." Having attracted the attention of international organizations like The Human Rights Watch, Amnesty International, and the International Crisis Group, many across the world have taken sides in the conflict and debate peacekeeping methods for the region.

Recently, former President Kabila was found guilty of treason for collaborating with the M23 against the DRC in a Congolese court. The military tribunal declared that President Kabila was convicted of war crimes, murder, and torture – among other things. Supporters of Kabila cite this as a purely political act meant to silence opposition. Despite recent agreements to a ceasefire this month, many remain skeptical. Peace talks occurred this year in June, July, and August but conflict continues as both sides accuse the other of having already broken the ceasefire agreement. Only time will tell what the future holds.

What Now?

With everything that's happening in our own personal lives as well as in larger communities, it can feel very overwhelming not knowing what – if anything, one can do to help in these

situations. Perhaps these events happening in other countries makes you feel powerless to effect any changes. Remember: *you are never alone*. Not everybody is a protester, but we can all do something to help the causes we care about. Some may organize, while others may focus on educating the public, and still others may advocate for direct aid. Whatever your ability and capacity, know that being aware and having open conversations is the first step to changing lives. We all can make the world a better place, even if it is one act, one person, or one day at a time – even if it means just getting yourself through today. Don't lose hope.

Fall Recipes

Harvest Apple and Golden Quinoa Kale Salad

By: Natale Hall

Now that we are reaching the peak of the fall season, the time has come for me to share my perhaps infamous harvest salad recipe. A Hall family special, this salad is as versatile as it is delicious, sure to keep you satiated through long days in lab and be a fan favorite at your next Friendsgiving. Fair warning: this is a bit of a more *involved* salad recipe, but if seeing me eat this in the hallway dozens of times each year is proof enough, it is 100% worth it and will become your new favorite salad!

Image Credits: Cooking Classy

Ingredients (makes 6-8 servings):

Salad

- 1 cup uncooked golden or tricolor quinoa (makes 3 cups cooked)
- ½ cup chopped walnuts
- 8 cups chopped kale
- 1 large or 2 small apples of any variety
- ½ cup dried cranberries
- 8 ounces crumbled goat cheese
- 2 tablespoons extra virgin olive oil, for massaging kale
- 2 tablespoons lemon juice, for apples

Dressing

- ½ cup extra virgin olive oil
- ½ cup lemon juice
- 2 teaspoons Dijon mustard
- 2 tablespoons maple syrup or honey
- Salt to taste

Instructions:

1. Cook quinoa according to package instructions and allow to fully cool to room temperature.
2. Preheat oven to 325 °F.
3. Spread chopped walnuts on a nonstick baking sheet. Once oven is ready, cook for 5 minutes until lightly toasted, then immediately remove from baking sheet and place onto room temperature plate, bowl, or other surface to stop cooking. Allow to fully cool to room temperature.
4. While the quinoa and walnuts are cooling, de-stem the chopped kale and add to large mixing bowl.
5. Mix dressing ingredients in a mason jar or other container.
6. Massage the kale with olive oil for 5 -10 minutes until tender, then add the room temperature quinoa and toss kale and quinoa mixture with about ¼ of the total dressing.
7. Allow kale-quinoa to rest in fridge for about 10 minutes.
8. While the kale-quinoa rests, chop up the apple into bite sized pieces and toss with lemon juice. This will prevent the apple from browning!
9. To the kale-quinoa, add cooled toasted walnuts, dried cranberries, apples, and goat cheese and mix with the remaining dressing.
10. Serve immediately or divide into portions and store in the fridge for up to 5 days.

High Protein Buffalo Chicken Dip

By: Alexandra Evans

The cold months are upon us and if you are like me, you know that this time of year means trying out cozy recipes to keep you warm. No matter if you are football fanatic (Go Birds!), potluck enthusiast, or avid meal

prepper, I have just the recipe for you. As someone who is lactose intolerant, a huge pro of this dish is that it is 100% lactose-free while still being able to maintain its warm and conforming essence. Additionally, if you, like me, are always looking to up your protein intake while also enjoying comfort foods, I find that this dish hits the spot every time. This recipe makes 5 servings of delicious dip, which contains 56.75 grams of protein with only 9.75 grams of carbs and 460 calories per serving! And what's better is that it costs under $30 to make (based on the cost of products at Walmart).

Image Credits: mariannas_pantry

Ingredients:

- ½ cup Frank's original buffalo sauce
- ¾ cup Lactaid cottage cheese
- ¾ cup Fage lactose free Greek yogurt
- 2 cups of Swanson shredded chicken breast
- ¾ cup shredded Cabot fat-free shredded cheese
- 1 tsp garlic powder
- 1 tsp onion power
- 1 tsp chives

Instructions:

1. Pre-heat oven to 375 °F and grease bakeware with a non-stick cooking spray
2. Add cottage cheese to a blender or food processor and mix until smooth
3. To a mixing bowl, add 2 cups of shredded chicken breast, Greek yogurt, blended cottage cheese, hot sauce, ½ cup shredded cheese, garlic powder, and onion powder
4. Mix contents until well combined and add into baking dish; if you have a hand-mixer, I recommend using it if one is available
5. Top with ¼ cup shredded cheese to form a thin, even layer of shredded cheese on top of the mixture
6. Place in the oven for 20 minutes
7. Once done, take out of the oven and top with dried chives if desired
8. Enjoy with tortilla chips, veggies, or make it a slider with dinner rolls and enjoy!

Wassail: A Warming Drink of Old

By: Megan Brennan

A fall staple for me is a warm drink on a cool day, which will be increasingly common as we head towards fall. While I primarily choose tea and coffee, I have a soft spot for special autumnal drinks, including apple cider and pumpkin spice anything. I always want to get festive when it comes to the cooler months. Apparently, the Anglo-Danes of the ancient U.K. agreed with me based on their cold-weather drink of wassail! Below is a modern recipe for a (non-alcoholic) wassail, a drink used during fall and winter celebrations for centuries that is still delightful today!

Image Credits: The Pioneer Woman

Ingredients (makes 4 servings):

- 32 ounces of apple cider (can substitute a different type of cider or a weak beer)
- 1 ½ teaspoons of ground cinnamon, or 1 cinnamon stick
- 1/8 teaspoons of ground cloves, or 3 whole cloves
- ¼ teaspoons of ground nutmeg, or a pinch of fresh shaved nutmeg
- ¼ teaspoons of ground ginger, or a few slices fresh ginger
- Fruit of choice! Options include apples, pears, cranberries, oranges, currants, cherries, plums, quinces, and anything that makes you feel warm and spicy! (can substitute dry fruit or juice/ concentrate)
- Honey or sugar to taste, for sweetening

Instructions:

1. Start by heating apple cider in a pot to a simmer.
2. When the cider is at a simmer, add spices and stir to combine.
3. After adding the spices, add cut fruit of choice to the mix.
4. Let this simmer together for 20-30 minutes for the flavors to combine and then serve!

Pumpkin Chocolate Chip Cookies

By: Allison Krebs

Every fall, the smell of pumpkin and cinnamon takes over my kitchen, and it always starts with this family recipe for pumpkin chocolate chip cookies! Passed down and perfected, these cookies are soft, cake-like, and perfectly spiced… the kind of treat that will disappear faster than you can say, "grad school stress baking!"

Image Credits: Allison Krebs

Ingredients (makes 24 cookies):

- ½ cup shortening
- 1 cup sugar
- 1 egg, beaten
- 1 cup pumpkin puree
- 1 tsp baking soda
- 2 tbsp milk
- 2 cups flour
- 1 tsp cinnamon
- 1 tsp salt
- 2 tsp baking powder
- 1 tsp vanilla
- 2 cups semi-sweet chocolate chips (Optional: use miniature chips! These are my favorites)

Instructions:

1. Preheat oven to 375°.
2. Cream together shortening and sugar.
3. Add egg, beat well.
4. Add pumpkin puree, mix.
5. Dissolve baking soda in milk in a separate bowl, then add to the above mixture.
6. Add remaining dry ingredients and mix until blended.
7. Add vanilla and chocolate chips.
8. Drop by spoonful onto an ungreased cookie sheet.
9. Bake 10-12 minutes and enjoy!

The Only Apple Pie Recipe You'll Ever Need

By: Chris Pallés

This fall, I went apple picking for the first time and, as someone who never really liked apple pie, I've already made this recipe twice this fall – and I'm likely going to make a few more. I highly recommend using Granny Smith or other tart apples because it will really complement the sweetness in the pie. I hope that you enjoy making (and eating) this family recipe as much as I do!

Image Credits: Chris Pallés

Ingredients:

<u>Pie Crust</u>

- 1 stick of cold butter, cut into cubes
- 1 ¾ cups (12 oz) chilled vegetable shortening, cut into cubes
- ½ cup ice water
- 3 cups + 2-4 tbsp of all-purpose flour
- 1 tsp salt
- 1 egg white, beaten

<u>Filling</u>

- 4 cups of apples, pared and cubed
- ½ cup sugar
- 1/3 cup firmly packed light brown sugar
- 2 tbsp cold butter, cut into pieces
- ¼ cup all-purpose flour
- ½ tsp ground cinnamon
- ½ tsp ground nutmeg
- Dash of salt
- Optional: 2 tbsp white wine/liqueur (Chablis, Chardonnay etc., or our family favorite, Irish Cream)

Instructions:

1. Make sure your ingredients are cold! This will help the ingredients be easier to work with and result in a flakier crust.
2. Add flour and salt to a large bowl.
3. Cut in the butter and shortening until it looks like coarse meal. If you have a pastry-cutter, you can use that. If not, you can use two butter knives or a fork.
4. Sprinkle ¼ cup of ice water evenly over the dough and stir with a fork until the dough is evenly moistened. If your dough still appears crumbly and doesn't stick together, add ice water in small amounts and mix until it can form a ball.
5. Cut the dough in half and wrap both pieces in plastic wrap and store in the fridge until the dough feels cool to the touch.
6. On a lightly floured surface, roll out one ball of dough. Work from the middle outwards until the dough is about 1/8 of an inch thick.
7. Transfer the dough to your pie dish and make sure it sits well inside it.
8. With a sharp knife, cut the excess pie crust dough, leaving roughly ½ of an inch overhang.
9. Brush the bottom and sides of the unbaked pie shell with the beaten egg white. Let dry. This will seal the crust and keep it from getting soggy. To help speed the process, I usually let it sit on my (cold) stovetop with the fan running.
10. Preheat the oven to 375 F.
11. In a large bowl, add the apples, sugars, flour, salt, cinnamon, and nutmeg, and white wine/liqueur and mix well.
12. While the apples sit, roll out the leftover pie crust dough.
13. Once the pie shell is dry, spoon the apple mixture into the pie shell.
14. Sprinkle the butter chunks over the top of the apples.
15. Lay the rolled-out pie crust dough on top of the pie. Crimp the edges (I use a fork), then use a sharp knife to cut off the excess pie crust from the edges and cut slits into the top to allow the steam to vent.
16. Brush the remaining egg white over the top of the pie and sprinkle with white sugar.
17. Bake for approximately 60 mins.
18. Let cool and enjoy!

Reviews & Recommendations

Audiobook Recommendations

By: Natale Hall

Recently, my weekly podcast rotation has become a bit stale. To help break up the monotony, I dipped my toes into the world of audiobooks, and my main takeaway is I wish I had started listening to audiobooks much sooner! Here are a few that I have thoroughly enjoyed in the last few weeks.

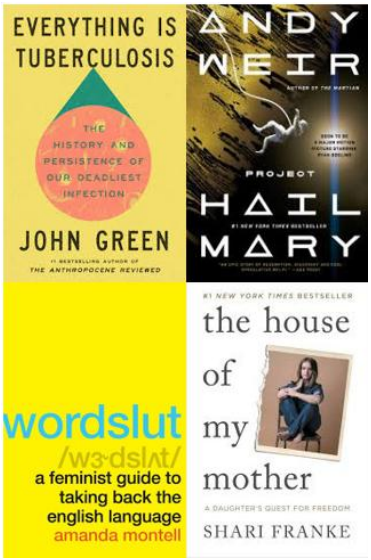

Image Credits: Barnes & Noble

Everything is Tuberculosis written and narrated by John Green

If you have seen me in the last two months, you have probably already heard me recommend *Everything is Tuberculosis*. It's an incredible blend of science, history, and the social determinants of health that may resonate particularly with graduate students, given our proximity to the subject matter. In the book, John Green explores how one of the oldest known diseases has influenced history in both overt and subliminal ways, and why, despite having a cure for more than fifty years, it remains the world's deadliest infectious disease. Intertwined with the analysis is the story of Henry, a Sierra Leonean boy who battled active tuberculosis for much of his childhood and adolescence, which brings the statistics to life in a deeply human way. Unlike many medical books that can feel dense or detached, novelist John Green makes tuberculosis— and the world it has shaped— feel alive.

Project Hail Mary written by Andy Weir, narrated by Ray Porter

Interestingly, this came highly recommended for fans of *Everything is Tuberculosis*, and while I loved both audiobooks, they could not be more different. *Project Hail Mary* follows protagonist Ryland Grace, a microbiologist who became disillusioned with academia (relatable) and left to teach middle school science. He's unexpectedly recruited to help save Earth after the Sun begins to dim, bringing humanity to the brink of complete annihilation. What unfolds is a gripping, high-stakes story that blends science, mystery, and adventure in a way reminiscent of *Jurassic Park*, if *Jurassic Park* took place on a futuristic spaceship hurtling through deep space. Narrator Ray Porter also deserves special mention for bringing the story to life in a captivating, immersive way.

Wordslut: A Feminist Guide to Taking Back the English Language written and narrated by Amanda Montell

Going back to the world of nonfiction, *Wordslut* dives into the patriarchal roots of the English language and explores how words can reflect and reinforce gender bias. The book starts with a historical overview of English through the lens of gender before deconstructing the language to reveal how it has been used to maintain power structures that marginalize women. Other chapters investigate how certain words have changed meaning over time, linguistic differences between groups of men and women, and ultimately, how women can reclaim English to uplift instead of tear down. Amanda Montell's sharp and witty delivery is perfect for the use of clever examples that make linguistic theory feel fresh and relevant. If the title didn't give it away, this book contains a lot of *colorful* language, so listener beware.

The House of My Mother: A Daughter's Quest for Freedom written and narrated by Shari Franke

If you, like me, were equally fascinated and horrified by the story of Ruby Franke and Jodi Hildebrandt—Mormon mommy blogger-slash-cult-leader turned child abusers— then I highly recommend checking out this memoir written by the eldest Franke child, Shari Franke. Shari recounts what it was like to grow up in a YouTube family and examines the darker sides of family vlogging, including child labor, exploitation, and the loss of privacy. She also reflects on the unique interplay of internet success with high-demand religion and religious scrupulosity, and how these factors contributed to her mother's descent into justifying despicable acts. It's a raw and gripping listen that sheds light on what happens when faith, fame, and family collide. Listeners should tread carefully, as it includes discussions of abuse and sexual assault.

Thank you for reading the Fall 2025 Edition of the Lion Ledger! If you have something you'd like to contribute to the next edition, email us at lionstalkscience@gmail.com

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