FRANK BROWN CLOUD

Educator, public scholar, cultural worker.

frankbrowncloud.com

I build public knowledge and create opportunities for diverse groups of people to work towards a brighter, more hopeful future. My efforts leverage scientific expertise—grown from over a decade as a research scientist, with academic credentials including a Ph.D. in biochemistry from Stanford—alongside extensive writing and teaching/curriculum design in settings that range from universities to schoolhouses to our county jail. I am also the primary caregiver for my family's two young children.

My research and teaching interests include the production of scientific knowledge, the natural sciences, cognition, evolution (particularly human evolution), ethics, animal behavior, mythology, families and caregiving, polyamory, economics, cultural and literary criticism, feminism, food systems, neurodivergence, radical inclusion and access for children and adults, trauma-informed mentoring and community care, the climate crisis, and mass incarceration.

EDUCATION

Ph.D. in Biochemistry, Stanford University **2005-2011**

- Investigated cellular biology of vesicle transport, particularly receptor recognition, with Suzanne Pfeffer (2007-2011) and the kinetics and thermodynamics of enzymatic catalysis with Dan Herschlag (2006-2007).
- Dissertation: "Molecular analysis of vesicle tethering at the Golgi."
- Peer-reviewed journal articles:
    - Multiple Rab GTPase binding sites in GCC185 suggest a model for vesicle tethering at the trans-Golgi (*Mol Bio Cell*, 2009).
    - GCC185 plays independent roles in Golgi structure maintenance and AP-1-mediated vesicle tethering (*J Cell Bio,* 2011), first author.
- Invited review:
    - An update on transport vesicle tethering (*Mol Membr Biol*, 2010), first author.
- Mentored graduate and undergraduate students in methodology and communication.

B.A. in Chemistry, Northwestern University **2001-2005**

- Performed density-functional-theory-based calculations to model the vibrational after-effects of electronic transitions of DNA bases with Tamar Seideman (2003-2005).
- Synthesized potential drug candidates to inhibit human neuronal nitric oxide synthase with Richard Silverman (2002- 2003).

- Focused coursework in economics (8 graduate level courses) and mathematics (linear algebra, multivariable calculus I and II, differential equations).

Summer research intern, Indiana University School of Medicine **Summers 2001, 2002**
- Investigated a novel mutation implicated in leukemia.
- Presented research findings at the Ruth Lilly Research Symposium.
- Co-authored peer-reviewed journal article:
    - AML1-FOG2 fusion protein in myelodysplasia (*Blood, 2005*).

TEACHING COLLEGE-LEVEL BIOLOGY

Adjunct Instructor
Ivy Tech Community College, Bloomington campus **2024-present**
- BIOL 105 - Biology I - Molecular and Cellular Processes
- BIOL 107 - Biology II - Diversity of Life

Adjunct Instructor
Indiana University, Bloomington campus **2026-present**
- BIOL L112 - Foundations of Biology: Biological Mechanisms

COLUMN WRITING, EDITING, AND GRAPHIC DESIGN

Book Department Editor, *The American Biology Teacher*
National Association of Biology Teachers **2022-present**
- Select books for review in the NABT journal (*American Biology Teacher*, 14,000+ circulation) from over 20 publishers and coordinate shipping to nationwide staff of reviewers.
- Support writers and edit team submissions for readability, structure, and scientific accuracy asynchronously through shoulder-to-shoulder coaching and feedback for nine journal issues yearly.
- Craft critical essays on special-interest topics including human evolution, animal cognition, the biology of sex and gender, and the nature of science aimed at biology educators across the country.
- Review and approve final page proofs before publication.

Food and Family Columnist
***Herald Times* / USA Today Network** **2017-2022**
- Wrote popular monthly column, syndicated across the Midwest and with a local readership of over 80,000.
- Commented on community, food systems, current events, and wellness through the lens of parenting and caregiving.

- Developed and photographed family-friendly plant-based recipes for publication.

Graphic Design and Logistics & Marketing Associate
Kitchen 17 Restaurant **Chicago, IL** **2017-2025**
- Created fliers, merchandise, cookbooks, and shirts.
- Consulted on logistics, promotions, and recipe development.
- Co-authored and maintained website promotional copy.
- Communicated with customers and consult on customer service policies.

I also write a recurring essay column for my website.

ADDITIONAL TEACHING AND MENTORING

Jail Educator and Read to Me Volunteer
New Leaf, New Life **Bloomington, Indiana** **2016-present**
- Design curriculum and teach weekly classes at the Monroe County (Indiana) Jail.
- Provide poetry and creative writing instruction with an emphasis on philosophy, personal growth, shared connections, and overcoming trauma.
- Create curriculum for one-off sessions on evolutionary biology, astronomy, and other topics of interest.
- Public outreach and fundraising through poetry readings, public speaking, and library workshops.
- Help incarcerated people record children's book read-alouds for their loved ones in partnership with the Monroe County Public Library.

Elementary School Student Support Volunteer
Monroe County Community Schools **Bloomington, Indiana** **2019-present**
- Run individual and small group remediation and enrichment weekly.
- Design accessible, inclusive science lessons for groups of students in grades K-6.
- Support youth development in engineering and digital design, coding, mathematics, and creativity.

Associate Cross-Country and Track Coach
Monroe County Community Schools **Bloomington, Indiana** **2011-present**
- Provide personalized mentorship and coaching to over 50 student athletes yearly at Bloomington High School South.
- Assess stride, running form, and overall athlete well-being in real time during 1-3 training runs weekly.

Troop and Camp Volunteer
Girl Scouts of Central Indiana **Bloomington, Indiana** **2022-present**

- Facilitate activities and badge requirements for an inclusive multi-age Girl Scout troop focused on celebrating neurodivergence, grades 2-12.
- Help troop and camp leaders plan and implement STEM, outdoor, and creative activities.

Organic Chemistry Teaching Assistant
Stanford University **Stanford, California** **2005**
- Co-planned and facilitated curriculum for once-weekly small-group TA sections of first-year organic chemistry.
- Wrote quizzes, graded assessments, and provided feedback and coaching for a total of seventy students.

Gateway Science Mentor for Chemistry and Physics
Northwestern University **Evansville, Illinois** **2003-2005**
- Led twice-weekly one-hour workshops for small groups of students learning first-year organic chemistry and physics.
- Supported development of student understandings of nomenclature, resonance structure, steric hindrance, reaction dynamics, and synthesis across the curriculum.
- Collaborated with calculus-based physics team to deliver high-quality instruction and support.

GED Tutor
Jane Addams Resource Center **Chicago, Illinois** **2003-2004**
- Conducted twice-weekly three-hour evening sessions to support adults learning GED mathematics.

COMMUNITY AND CULTURAL WORK

Board Member and Project Lead
Pages to Prisoners Project **Bloomington, Indiana** **2015-present**
- Facilitate collaborative decision-making and problem-solving to ensure shipment of free books to over 500 incarcerated people yearly across a service area of ten states.
- Update databases, select books, and correspond with people requesting materials.
- Co-organize volunteer “pack-a-thon” events for members of the greater Bloomington community.

Co-founder and Event Organizer
BloomingVEG **Bloomington, Indiana** **2013-2020**
- Supporting plant-based food choices and animal advocacy through restaurant and community outreach.
- Ran cooking classes at grocery stores, religious organizations, and libraries for over 100 people.

- Wrote funded grants to support taste-testing events and organizational collaborations.
- Organized community gatherings and celebrations.

Event Organizer and Workday Coordinator
PEAK Animal Sanctuary **Salem (now in Freedom), Indiana** **2013-2014**
- Assisted with construction and reclamation of abandoned farm materials.
- Organized carpools and staffing for volunteers traveling from over an hour away.
- Graphic design for publicity materials.
- Fundraising through bake sales, charity events, and taste testing.

Monthly Bookstore Donations Manager, Cashier, and Room Monitor
Friends of the Palo Alto Library **Palo Alto, California** **2008-2011**
- Organized and stocked donated books.
- Recommended books and provided literacy advice on request to families with young children.
- Created a positive check-out experience for patrons.

PUBLISHED WRITING AND EDITING

Peer-refereed research and lesson design in human evolution education:

- **"Teaching a more accurate model of the evolution of human skin color."** Co-authored with Kirstin Milks. *The American Biology Teacher*, October 2024.

> *In popular materials designed to teach American students about the evolution of human skin color, students are steered toward a model in which ancestral latitude predicts levels of skin pigmentation. While this model agrees with data from people whose ancestors practiced intensive agriculture in Europe, Asia, and Africa, this model does not match data from other human populations across the globe, including the predicted skin pigmentation of ancient hunter-gatherer populations who maintained long-term settlements in these same regions. In this review, we discuss findings from ancient genome sequencing and provide guidance on teaching an updated model on the evolution of human skin color. With this update, we hope to help students avoid common misconceptions about human evolution – particularly, that the evolutionary pressures encountered by those who adopted a single human culture would apply to all humans, everywhere – and leverage authentic data and argumentation to convey the anti-racist reality that people with a wide range of skin colors thrived in high-latitude regions for many thousands of years, just as students with a wide range of skin colors can thrive in whatever place they currently call home.*

- **"Investigating 'humanity': Reconstructing human evolution using skulls, maps, tools, and the history of science."** Co-authored with Kirstin Milks and Armin Moczek. *The American Biology Teacher,* February 2025.

Although the central principles of evolution by natural selection can feel both abstruse and culturally-fraught for learners of all ages, evolutionary logic is at the core of biological science: once students have a solid understanding of evolution, they can better understand everything else in biology. We present here a hands-on experience, coupled with intentional questioning strategies, that inspires students to use high-level evolutionary thinking and to begin asking excellent questions about what we know and how we know it. This activity leverages skull replicas of humans, chimps and hominins to tap into young people's natural curiosity about where we come from and what it means to be a person—fundamental topics of inquiry for young people just coming into their own identities. Along the way, students are also exposed to important data and create arguments about what the archaeological record can currently tell us about the story of how people like us came to be.

Peer-refereed scientific research and review articles:

- **"GCC185 Plays Independent Roles in Golgi Structure Maintenance and AP-1-mediated Vesicle Tethering."** First-authored research article. *The Journal of Cell Biology*, August 2011

GCC185 is a long coiled-coil protein localized to the trans-Golgi network (TGN) that functions in maintaining Golgi structure and tethering mannose 6-phosphate receptor (MPR)–containing transport vesicles en route to the Golgi. We report the identification of two distinct domains of GCC185 needed either for Golgi structure maintenance or transport vesicle tethering, demonstrating the independence of these two functions. The domain needed for vesicle tethering binds to the clathrin adaptor AP-1, and cells depleted of GCC185 accumulate MPRs in transport vesicles that are AP-1 decorated. This study supports a previously proposed role of AP-1 in retrograde transport of MPRs from late endosomes to the Golgi and indicates that docking may involve the interaction of vesicle-associated AP-1 protein with the TGN-associated tethering protein GCC185.

- **"An Update on Transport Vesicle Tethering."** First-authored review. *Molecular Membrane Biology*, November 2010 (first author).

Membrane trafficking involves the collection of cargo into nascent transport vesicles that bud off from a donor compartment, translocate along cytoskeletal tracks, and then dock and fuse with their target membranes. Docking and fusion involve initial interaction at a distance (tethering), followed by a closer interaction that leads to pairing of vesicle SNARE proteins (v-SNAREs) with target membrane SNAREs (t-SNAREs), thereby catalyzing vesicle fusion. When tethering cannot take place, transport vesicles accumulate in the cytoplasm. Tethering is generally carried out by two broad classes of molecules: extended, coiled-coil proteins such as the so-called Golgin proteins, or multi-subunit complexes such as the Exocyst, COG or Dsl complexes. This review will focus on the most recent advances in terms of our understanding of the mechanism by which

tethers carry out their roles, and new structural insights into tethering complex transactions.

- "**Multiple Rab GTPase Binding Sites in GCC185 Suggest a Model for Vesicle Tethering at the Trans-Golgi."** Research article first-authored by Garret Hayes. *Molecular Biology of the Cell*, January 2009.

GCC185, a trans-Golgi network-localized protein predicted to assume a long, coiled-coil structure, is required for Rab9-dependent recycling of mannose 6-phosphate receptors (MPRs) to the Golgi and for microtubule nucleation at the Golgi via CLASP proteins. GCC185 localizes to the Golgi by cooperative interaction with Rab6 and Arl1 GTPases at adjacent sites near its C terminus. We show here by yeast two-hybrid and direct biochemical tests that GCC185 contains at least four additional binding sites for as many as 14 different Rab GTPases across its entire length. A central coiled-coil domain contains a specific Rab9 binding site, and functional assays indicate that this domain is important for MPR recycling to the Golgi complex. N-Terminal coiled-coils are also required for GCC185 function as determined by plasmid rescue after GCC185 depletion by using small interfering RNA in cultured cells. Golgi-Rab binding sites may permit GCC185 to contribute to stacking and lateral interactions of Golgi cisternae as well as help it function as a vesicle tether.

- **"AML1-FOG2 Fusion Protein in Myelodysplasia."** Research article first-authored by Edward Chan. *Blood*, June 2005.

*Core binding factor (CBF) participates in specification of the hematopoietic stem cell and functions as a critical regulator of hematopoiesis. Translocation or point mutation of acute myeloid leukemia 1 (*AML1*)/*RUNX1*, which encodes the DNA-binding subunit of CBF, plays a central role in the pathogenesis of acute myeloid leukemia and myelodysplasia. We characterized the t(X;21)(p22.3;q22.1) in a patient with myelodysplasia that fuses* AML1 *in-frame to the novel partner gene* FOG2/ZFPM2. *The reciprocal gene fusions* AML1-FOG2 *and* FOG2-AML1 *are both expressed. AML1-FOG2, which fuses the DNA-binding domain of AML1 to most of FOG2, represses the transcriptional activity of both CBF and GATA1. AML1-FOG2 retains a motif that recruits the corepressor C-terminal binding protein (CtBP) and these proteins associate in a protein complex. These results suggest a central role for CtBP in AML1-FOG2 transcriptional repression and implicate coordinated disruption of the AML1 and GATA developmental programs in the pathogenesis of myelodysplasia.*

Book reviews for *The American Biology Teacher*, the journal of the National Association of Biology Teachers:

- "Not all the early technologies fossilized." *The American Biology Teacher*, December 2025.
- "Ancient genomics is amazing, but not a scrying ball." *The American Biology Teacher*, September 2025.

- "The cures are here, the deaths are there." *The American Biology Teacher*, August 2025.
- "Mistreated mice might not actually resemble city-dwellers." *The American Biology Teacher*, February 2025.
- "Extractive capitalism & exploration of the ocean deep." *The American Biology Teacher*, September 2024.
- Review of "Blight: Fungi and the Coming Pandemic." *The American Biology Teacher*, August 2024.
- Review of "Bitch: On the Female of the Species." *The American Biology Teacher,* April 2024.
- Review of "Indigenous Ingenuity." *The American Biology Teacher*, March 2024.
- Review of "Performance All the Way Down." *The American Biology Teacher,* January 2024.
- Review of "Lucy & Andy Neanderthal." *The American Biology Teacher,* January 2024.
- Review of "The Parrot in the Mirror." *The American Biology Teacher*, August 2023.
- Review of "How Fast Did T-Rex Run?" *The American Biology Teacher,* May 2023.
- Review of "Lessons in Chemistry: A Novel." *The American Biology Teacher,* March 2023.
- Review of "A Natural History of the Future." *The American Biology Teacher,* March 2023.
- Review of "Origin: A Genetic History of the Americas." *The American Biology Teacher*, January 2023.
- Review of "Testosterone: An Unauthorized Biography." *The American Biology Teacher*, November 2022.
- Review of "Phallacy: Life Lessons from the Animal Penis." *The American Biology Teacher*, August 2022.
- "Books on Human Evolution." *The American Biology Teacher*, May 2022.
- Review of "Why Fish Don't Exist." *The American Biology Teacher*, April 2022.
- Review of "For Young Scientists: The Human Body." *The American Biology Teacher*, March 2020.
- "Human Evolution." *The American Biology Teacher*, September 2017.

Newspaper columns on family and food for the *Herald Times / USA Today* network:

- See open-access sample columns.
- December 5, 2022, October 25, 2022, September 29, 2022, August 17, 2022, July 20, 2022, June 21, 2022, April 27, 2022, March 2, 2022, February 2, 2022, January 5, 2022, December 8, 2021, November 17, 2021, October 13, 2021, September 14, 2021, August 17, 2021, May 26, 2021, April 27, 2021, March 31, 2021, March 3, 2021, February 3, 2021, January 6, 2021, December 9, 2020, November 11, 2020, October 14, 2020, September 16, 2020, August 19, 2020, July 22, 2020, June 24, 2020, May 27, 2020, April 1, 2020, March 4, 2020, February 5, 2020, December 4, 2019, November 6, 2019, October 9, 2019, September 11, 2019, August 14, 2019, July 17, 2019, June 19, 2019, May 22, 2019, April 23, 2019, March 27, 2019, February 27, 2019, January 29, 2019, January 2, 2019, December 4, 2018, November 7, 2018, October 10, 2018, September 12, 2018, August 15, 2018, July 18, 2018, June 6, 2018, May 9, 2018, April 11, 2018, March 14, 2018, February 14, 2018, January 17, 2018, December 20, 2017, November 22, 2017, October 25, 2017, September 27, 2017, August 30, 2017, July 5, 2017.

Selected literary non-fiction:

- "The Theft of Fire," *Palaver*, May 2018.
- "On Austerity," *The Coachella Review*, March 2017.
- "The Search for the Great American Pinball," *Stirring*, October 2016.
- "We've Been Rooting for the Wrong Side in Zombie Wars," *The Weeklings*, August 2016.
- "On Darth Vader and the Homunculus Theory of the Mind," *Literary Orphans*, July 2015

Selected literary fiction:

- "Against Life," *Eastern Iowa Review*, October 2017. *A near-future dystopia in which humans experience the consequences of antibiotic resistance.*
- "Your Line Ends Before the Future," *The Fable Online*, December 2016. *Exploring the danger of mixing tech-startup-style capitalism and bioengineering.*
- "To Live Forever," *The Offing*, November 2016. *In which we consider the lobster in a new light.*
- "The Judicious Use of Words," *The Vignette Review*, October 2016. *Lab-built golems.*
- "Reenactment," *Loud Zoo*, October 2016. *A cautionary fable about reenactors and drone warfare.*
- "War on Suicide," *Sick Lit*, September 2016. *A reimagining of the War on Drugs.*

Poetry:
- *Our Man*. Bloomington zine, August 2018.
- Edited collection: *Poems from the Jail Dorm.* Co-edited with John-Michael Bloomquist. *Monster House Press*, June 2017.

Board and card game reviews: view my current list of game reviews here.

PRESENTATIONS AND POSTERS

- "**Fostering authentic, collaborative science practice and electronics-free engagement in the UTA-led discussion sections associated with a large lecture course for majors."** Poster given at the STEM Teaching Exchange, Indiana University Bloomington, March 2026.

> *Critical reasoning, creativity, and collaboration are vital skills for students pursuing STEM careers. However, for assignments that students complete on their own time, many will rely on algorithms like ChatGPT to generate answers. As educators, we need to create protected spaces and times for students to develop their own skills without reliance on generative algorithms. To foster authentic STEM practice, we are developing a novel curriculum for the discussion sections accompanying a large lecture course in introductory biology, led by undergraduate instructors in a non-laboratory classroom setting. These low-tech projects and simulations, with high alignment to the lecture*

syllabus, each culminate with small groups being given unique prompts to prepare ultra-short presentations with immediate public discussion and feedback. By removing technology as a barrier to attention, memory, and personal effort, we are creating a low-stakes, supportive setting to reinforce key concepts and hone vital STEM skills.

GAME DESIGN

MONOTHEISM is a solitaire in-hand deck destruction game. Players help a small cadre of worshipers discover the deities in their local pantheon, and then, through the strategic use of deck manipulation, pattern building, and special abilities, the worshipers must trick these deities into consuming each other until only one god remains. Winner, 2024 BoardGameGeek in-hand game design contest.

1 player, 15-30 minutes
Components: Four printer pages containing 29 single-sided deity cards & 7 double-sided worshiper cards. Online rulebook. Purchase or download.

FERRETCRAFT is a highly-interactive competitive deckbuilding experience for two to four players. The design integrates the seamless character development of a deckbuilder with the strategic decision-space of a tactical combat game. You'll play as a woodland-creature-turned-sorcerer in a world where magic is deadly for its users!

2-4 players, 60-120 minutes
Components: 181 playing cards, 57 character tiles, 15 combat dice, 16 status counters, 4 character boards, 1 game board.

ADDITIONAL INTERESTS: All-ages taekwondo, physical fitness, music, visual art.