

# Resources to promote students' sense of belonging in organic chemistry courses

**BCCE 2026**

---



Jennifer L. Muzyka | Centre College  
Tiffany Malinky Gierasch | U. Maryland, Baltimore County  
Winn Huynh | Los Angeles Pierce College  
Kameyo J. Johnson | University of Pikeville

# Stereotypes about Scientists

- Stereotypes about who does science may influence career choices for male and female students (Wyer 2010)
- Women and minorities historically discouraged from pursuing science (Graves 2022)
- Examples of diverse scientists may help improve student sense of belonging (Edwards 2022)



# Why Diversity Matters in Science

- Diverse teams produce better work. (Aminpour 2021; Bang 2017; Nielsen 2017)
- Underrepresented scientists are more innovative. (Hofstra 2020)
- Ethnic diversity is correlated with scientific impact. (AlShebli 2018)
- Publications with gender diversity among authors are cited more than those with gender homogeneity. (Campbell 2013)



# Scientist Spotlights (Schinske, 2016)

- Counterstereotypical scientists highlighted (women, nonwhite people)
- Diversity – socioeconomic, gender, hobbies, career paths, sexual orientation, country of origin
- Student perspectives shifted away from the stereotypes, when comparing end of the semester to beginning of semester.



# Scientist Spotlights - Research

- Important to humanize the scientists (Costello, 2024; Schultheis, 2024)
- Role model portrayals (Gladstone, 2021)
  - Competent and successful
  - Meaningfully similar to students
  - Success shown as attainable
  - From traditionally underrepresented groups



# Existing Resources for Representation

- Olson (2011) – Named Reactions Discovered and Developed by Women
- Ries (2022) – Introducing Diverse Chemists in Chemistry Courses
- Becker (2021 & 2022) – ...Fail on Gender Disparity; ...Aid and Abet Racial Disparity
- Gee (2022) – Not All Chemists are White Men
- Sunasee (2023) – Incorporating Diversity, Equity and Inclusion Awareness and Knowledge in a First-Semester Organic Chemistry Classroom
- Fulfer – Forgotten Innovators



# Diverse OrganicERs Spotlight

Diverse OrganicERs Spotlight .XLSX

File Edit View Insert Format Data Tools Help

100% Calibri 11

| First name(s)     | Last name  | McMurry section | Topic                                                   | Resource                                                                                                                                                                                                                                  | Resource 2                                                                                                                                                                                                                                                                                                                                                                             | second slide                                                                 | Link to Slide                 |
|-------------------|------------|-----------------|---------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------|-------------------------------|
| Gloria Long       | Anderson   | 13.01           | F-19 NMR                                                | <a href="https://en.wikipedia.org/wiki/Gloria_Long_Anderson">https://en.wikipedia.org/wiki/Gloria_Long_Anderson</a>                                                                                                                       | <a href="https://en.wikipedia.org/wiki/Fluorine-19_nuclear_magnetic_resonance_spectroscopy">https://en.wikipedia.org/wiki/Fluorine-19_nuclear_magnetic_resonance_spectroscopy</a>                                                                                                                                                                                                      | Anderson-Gloria-Long .pptx                                                   | Gloria Long Anderson.pptx     |
| Kaori             | Ando       | 10.07           | organometallic coupling                                 | <a href="https://doi.org/10.1021/acs.orglett.1c0421">https://doi.org/10.1021/acs.orglett.1c0421</a>                                                                                                                                       | <a href="https://www.researchgate.net/profile/Kaori-Ando">https://www.researchgate.net/profile/Kaori-Ando</a>                                                                                                                                                                                                                                                                          |                                                                              | Ando-Kaori.pptx               |
| Thomas Nelson     | Baker Jr.  | 25.09           | glycogen                                                | 2011 article in Bull. Hist. Chem. (updated URL)                                                                                                                                                                                           | <a href="https://www.ideals.illinois.edu/items/134882">https://www.ideals.illinois.edu/items/134882</a>                                                                                                                                                                                                                                                                                |                                                                              | Baker-Jr-Thomas-Nelson.pptx   |
| Alice Augusta     | Ball       | 21.03           | esterification                                          | <a href="https://go.nature.com/YoutubeWomenUntold">https://go.nature.com/YoutubeWomenUntold</a>                                                                                                                                           | <a href="https://go.nature.com/AliceAugustaBall">https://go.nature.com/AliceAugustaBall</a>                                                                                                                                                                                                                                                                                            |                                                                              | Ball-Alice-Augusta .pptx      |
| Zhenan            | Bao        | 21.09           | step-growth polymers                                    | <a href="https://en.wikipedia.org/wiki/Zhenan_Bao">https://en.wikipedia.org/wiki/Zhenan_Bao</a>                                                                                                                                           | <a href="https://www.nature.com/articles/nchem.24">https://www.nature.com/articles/nchem.24</a>                                                                                                                                                                                                                                                                                        |                                                                              | Bao-Zhenan.pptx               |
| St. Elmo          | Brady      | 20.04           | substituent effects on acidity                          | <a href="https://www.acs.org/content/acs/en/education/whatischemistry/african-americans-in-sciences/st-elmo-brady.html">https://www.acs.org/content/acs/en/education/whatischemistry/african-americans-in-sciences/st-elmo-brady.html</a> | <a href="https://www.sciencehistory.org/historical-profile/st-elmo-brady">https://www.sciencehistory.org/historical-profile/st-elmo-brady</a> ;<br><a href="https://chemistry.illinois.edu/twenty-whites-on-e-other-st-elmo-brady-first-african-american-phd-chemistry">https://chemistry.illinois.edu/twenty-whites-on-e-other-st-elmo-brady-first-african-american-phd-chemistry</a> | Brady-Elmo.pptx                                                              | St. Elmo Brady.pptx           |
| Jeanette          | Brown      | 21.03           | synthesis with carboxylic acids and their derivatives   | <a href="https://www.thehistorymakers.org/biography/jeannette-brown-42">https://www.thehistorymakers.org/biography/jeannette-brown-42</a>                                                                                                 |                                                                                                                                                                                                                                                                                                                                                                                        |                                                                              | Brown-Jeanette.pptx           |
| Rachel Fuller     | Brown      |                 | discovered/developed first polyene macrolide antibiotic | <a href="https://sites.google.com/view/diversityinchemistry/organic-chemistry?authuser=0">https://sites.google.com/view/diversityinchemistry/organic-chemistry?authuser=0</a>                                                             | <a href="https://en.wikipedia.org/wiki/Rachel_Fuller_Brown">https://en.wikipedia.org/wiki/Rachel_Fuller_Brown</a>                                                                                                                                                                                                                                                                      | Brown-Rachel-Fuller.pptx                                                     | Rachel Fuller Brown.pptx      |
| George Washington | Carver     |                 | agricultural chemistry                                  | <a href="https://en.wikipedia.org/wiki/George_Washington_Carver">https://en.wikipedia.org/wiki/George_Washington_Carver</a>                                                                                                               | <a href="https://www.acs.org/content/acs/en/education/whatischemistry/landmarks/carver.htm">https://www.acs.org/content/acs/en/education/whatischemistry/landmarks/carver.htm</a>                                                                                                                                                                                                      |                                                                              | Carver-George-Washington.pptx |
| Marta             | Catellani  | 10.07           | organometallic coupling                                 | <a href="https://en.wikipedia.org/wiki/Marta_Catellani">https://en.wikipedia.org/wiki/Marta_Catellani</a>                                                                                                                                 | <a href="https://en.wikipedia.org/wiki/Catellani_reaction">https://en.wikipedia.org/wiki/Catellani_reaction</a>                                                                                                                                                                                                                                                                        |                                                                              | Catellani-Marta.pptx          |
| Asima             | Chatterjee | 2.03            | alkaloids                                               | <a href="https://en.wikipedia.org/wiki/Asima_Chatterjee">https://en.wikipedia.org/wiki/Asima_Chatterjee</a>                                                                                                                               |                                                                                                                                                                                                                                                                                                                                                                                        |                                                                              | Chatterjee-Asima.pptx         |
| Kelly             | Chibale    | 10.07           | 3,5-Diaryl-2-aminopyridines as antimalarials            | <a href="https://en.wikipedia.org/wiki/Kelly_Chibale">https://en.wikipedia.org/wiki/Kelly_Chibale</a>                                                                                                                                     | <a href="https://doi.org/10.1021/jm301476b">dx.doi.org/10.1021/jm301476b</a>                                                                                                                                                                                                                                                                                                           | <a href="https://doi.org/10.1021/jm3001373">dx.doi.org/10.1021/jm3001373</a> | Chibale-Kelly.pptx            |
| John R.           | Cooper     | 8.10            | fluorine-containing polymers                            | <a href="https://www.acs.org/content/acs/en/education/whatischemistry/african-americans-in-sciences/john-r-cooper.html">https://www.acs.org/content/acs/en/education/whatischemistry/african-americans-in-sciences/john-r-cooper.html</a> | <a href="https://docs.google.com/presentation/d/1uTSIXFY-ZKxKB0iMCva5wYeJ0kNq9ibZ/edit?slide=id.p12#slide=id.p12">https://docs.google.com/presentation/d/1uTSIXFY-ZKxKB0iMCva5wYeJ0kNq9ibZ/edit?slide=id.p12#slide=id.p12</a>                                                                                                                                                          |                                                                              | Cooper-John-R .pptx           |



**OrganicERs**  
community  
innovation  
transformation

# Examples from our Collection

12345678910111213

1234567

## Gertrude Elion

Wellcome Research Laboratories

NC1=NC2=C(N1)N=CN2C(=O)N[C@H]3CC[C@@H](C3)O

Acyclovir

[https://en.wikipedia.org/wiki/Gertrude\\_B.\\_Elion](https://en.wikipedia.org/wiki/Gertrude_B._Elion)



**Key words:**  
One of handful of Nobel laureates without a doctorate, development of acyclovir, developed systematic approach to produce drugs based on biochemistry knowledge

Photo from Wikipedia page on Ms. Elion, [https://en.wikipedia.org/wiki/Gertrude\\_B.\\_Elion](https://en.wikipedia.org/wiki/Gertrude_B._Elion)

Acyclovir structure is from Wikipedia, <https://en.wikipedia.org/wiki/Aciclovir>

Some of Gertrude Elion's publications are listed:

Proc. Natl. Acad. Sci USA vol 74, no 12, pp 5716-5720, Dec 1977

Journal of Biological Chemistry 2008, vol 283, No 19, pp e11-e13

Ms. Elion's Nobel Lecture was reproduced in In Vitro Cellular & Developmental Biology, Apr., 1989, Vol. 25, No. 4 (Apr., 1989), pp. 321-330 and is available from JSTOR at <https://www.jstor.org/stable/20171419>

# Examples from our Collection

| Gertrude Belle Elion<br>1918-1999                                                                                                                                                                                                                                                                                                                          |                                                                                                                                                                                                                                                                                                                                                                                 |                                                                                                                                                                                                                                                                                                                                      |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Human</b><br>Daughter of Jewish immigrants<br>Born on January, 23, 1918 in New York City<br>Her grandfather was her motivation for studying chemistry and cancer research as he passed away from stomach cancer in 1933<br>Hardworking and motivated student and was able to skip several grades while she was in school<br>Described as a shy bookworm | <br>MS in chemistry from NYU in 1941<br>Worked at Burroughs Wellcome (now Glaxo-Smith-Kline) while working toward her PhD at Brooklyn Polytechnic Institute but didn't finish because they wanted her to quit her job<br>The first woman to be induced in the Inventors Hall of fame in 1991 | <b>Scientist</b><br>Synthesized numerous antivirals and pharmaceuticals for cancer treatment.<br>Published 225 research papers.<br>One of the first to show that virus-specific enzymes could be used in treatment<br>Cain Award from the American Association of Cancer Research in 1984<br>Shared the 1988 Nobel Prize in Medicine |

Keywords: pharmaceutical chemistry, synthesis, viral enzymes, metabolism

Photo from The Nobel Foundation (<https://www.nobelprize.org/prizes/medicine/1988/elion/biographical/>)

Sources:

Rayner-Canham, Marelene; Rayner-Canham, Geoffrey. Women in Biochemistry. Women in Chemistry: Their Changing Roles from Alchemical Times to the Mid-Twentieth Century; History of Modern Chemical Sciences; American Chemical Society, 1998; pp 152-156.

Chung, K.-T. Women pioneers of medical research: biographies of 25 outstanding scientists; McFarland & Company, 2010. The Nobel Prize. Gerturde B. Elion Biographical. <https://www.nobelprize.org/prizes/medicine/1988/elion/biographical/> (accessed 23 July 2025).

Michalovic, Mark; Gertrude Elion, Biochemist. Distillations Magazine, December 4, 2007. (<https://www.sciencehistory.org/stories/magazine/gertrude-elion-biochemist/>).

Science History Institute. George Hitchings and Gertrude Elion. Scientific Biographies, Scientific History Institute, <https://www.sciencehistory.org/education/scientific-biographies/george-hitchings-and-gertrude-elion/>.

Other educational resources:

Videos

Olusoga, David; Johnson, Steven; Gertrude Elion's Role in Developing Drugs Made Her a Pioneer of Modern Medicine. Extra Life: A Short History of Living Longer. PBS. YouTube, June 21, 2021. <https://youtu.be/z6EZ55eE3ao?si=RNAvBfG5hsklHB9T>

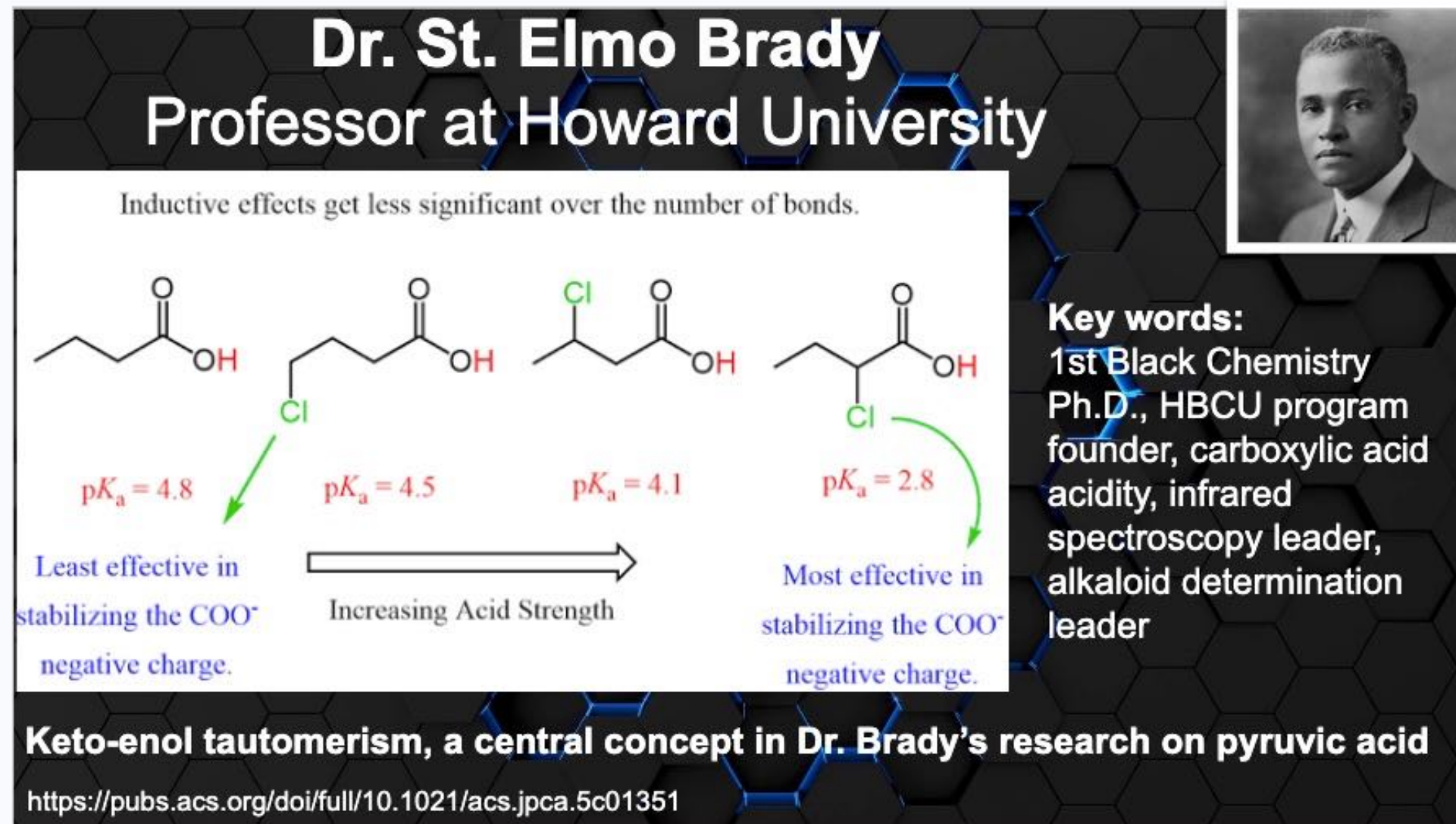
Other Scientist Spotlight Formats

Diversity in Chemistry: <https://sites.google.com/view/diversityinchemistry/medicinal-chemistry>

Scientist Spotlights Initiative: <https://scientistspotlights.org/scientist/gertrude-elion/>



# Examples from our Collection



Kate Ries' Diversity in Chemistry site has a slide about St. Elmo Brady,  
<https://docs.google.com/presentation/d/1uTSIXFY-ZKxKBoiMCva5wYeJ0kNq9ibZ/edit?slide=id.p1#slide=id.p1>



# Examples from our Collection

| St. Elmo Brady                                                                                            |                                                                                                                                      |                                                                                                                               |
|-----------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------|
| <b>Human</b>                                                                                              |                                                   | <b>Scientist</b>                                                                                                              |
| Born in Louisville, Kentucky in 1884                                                                      |                                                                                                                                      | PhD in chemistry from the University of Illinois in 1916                                                                      |
| Was the editor of Fisk University's monthly newspaper for multiple years during his undergraduate studies |                                                                                                                                      | Characterized the acidity of carboxylic acids based on their structure and the presence of various functional groups          |
| Dedicated educator                                                                                        | First African American inducted into Phi Lambda Upsilon and to earn a chemistry PhD in the USA                                       | Extracted and characterized several natural products                                                                          |
|                                                                                                           | Founded the chemistry department at Tuskegee University                                                                              | Established a summer program in infrared spectroscopy at Fisk after raising money to buy the first IR spectrometer at an HBCU |
|                                                                                                           | Helped to found the chemistry graduate programs in chemistry at Howard and Fisk (the first two chemistry graduate programs at HBCUs) | Honored with a National Historic Chemical Landmark designation for his work developing chemistry departments at HBCUs         |
|                                                                                                           | Wrote a series of booklets called Household Chemistry For Girls aiming to further the education of girls and women in basic sciences |                                                                                                                               |

Keywords: functionalization, acid strength, organic acids, organic structure, IR spectroscopy

Photo from the University of Illinois Archives

(<https://archon.library.illinois.edu/archives/index.php?p=digitallibrary/digitalcontent&id=7948>)

Sources:

Science History Institute. St. Elmo Brady. Scientific Biographies, Scientific History Institute,

<https://www.sciencehistory.org/education/scientific-biographies/st-elmo-brady/>

Martin, Dean F.; Mainz, Vera V.; Girolami, Gregory S. St. Elmo Brady (1884-1966). The first African American chemistry doctorate recipient. Bulletin for the History of Chemistry 2021, 46 (1), 83-107.

[https://chemistry.illinois.edu/system/files/2022-02/St.%20Elmo%20Brady%20Bull.Hist.\\_Chem\\_.2021\\_46\\_83.pdf](https://chemistry.illinois.edu/system/files/2022-02/St.%20Elmo%20Brady%20Bull.Hist._Chem_.2021_46_83.pdf)

Brady, St. Elmo. Household Chemistry for Girls; Tuskegee Normal and Industrial Institute, 1916.

[https://iiif.lib.harvard.edu/manifests/view/drs:31156549\\$1i](https://iiif.lib.harvard.edu/manifests/view/drs:31156549$1i)

Other educational resources:

Podcasts

Eralie, Dylan Tharpe. St. Elmo Brady and HBCUs. Cowboy Chemistry. February 9, 2023.

<https://cowboy-chemistry.castos.com/episodes/st-elmo-brady-and-hbcus>

Videos

The School of Chemical Sciences & The Department of Chemistry at the University of Illinois at Urbana-Champaign. "Twenty Whites & One Other": St. Elmo Brady, first African American PhD in Chemistry. Liberal Arts & Sciences at Illinois. YouTube, February 5, 2021. <https://www.youtube.com/watch?v=IEIk9iFlpCw>

Other Scientist Spotlight Formats

Scientist Spotlights Initiative: <https://scientistspotlights.org/scientist/st-elmo-brady/>

Diversity in Chemistry: <https://sites.google.com/view/diversityinchemistry/organic-chemistry>



# Diverse OrganicERs Spotlight



## [Collection of Resources](#)

[Suggest new Spotlight subjects](#)

[Volunteer as a contributor](#)

[OrganicERs website](#)

[OrganicERs Facebook Group](#)

Slide deck from 2026 BCCE presentation

[Contribute to OrganicERs on Give Lively](#)

[Forgotten Innovators site](#)



# Acknowledgements

Kay Johnson (aka Kameyo Johnson), University of Pikeville

Kristen Fulfer, Centre College



# References

- (1) Aminpour, P.; Gray, S. A.; Singer, A.; Scyphers, S. B.; Jetter, A. J.; Jordan, R.; Murphy, R.; Grabowski, J. H. The Diversity Bonus in Pooling Local Knowledge about Complex Problems. *Proc. Natl. Acad. Sci. U.S.A.* **2021**, *118* (5), e2016887118. <https://doi.org/10.1073/pnas.2016887118>.
- (2) Bang, D.; Frith, C. D. Making Better Decisions in Groups. *R. Soc. open sci.* **2017**, *4* (8), 170193. <https://doi.org/10.1098/rsos.170193>.
- (3) Costello, R. A.; Driessen, E. P.; Kjellvik, M. K.; Youngblood, R. M.; Zemenick, A. T.; Weber, M. G.; Ballen, C. J. More than a Token Photo: Humanizing Scientists Enhances Student Engagement. *Proc. R. Soc. B* **2024**, *292*, 20240879. <https://doi.org/10.1098/rspb.2024.0879>.
- (4) Costello, R. A.; Ewell, S. N.; Adams, P. E.; Aranda, M. L.; Curry, A.; De Jesus, M. M.; Dunk, R. D. P.; García-Ojeda, M. E.; Gutzler, S. J.; Habersham, L. R. A.; Kjellvik, M. K.; Mateen, M.; Metzger, K. J.; Mulligan, K. X.; Owens, M. T.; Pigg, R. M.; Quillin, K.; Rice, M. M.; Sovi, S.; Schultheis, E. H.; Schultz, J.; Theobald, E. J.; Tracey, E.; Tripp, B.; Yang, S.; Zemenick, A.; Ballen, C. J.; Ovid, D. Highlighting Counterstereotypical Scientists in Undergraduate Life Science Courses. *LSE* **2025**, *24* (2), es1. <https://doi.org/10.1187/cbe.24-02-0082>.
- (5) Edwards, J. D.; Barthelemy, R. S.; Frey, R. F. Relationship between Course-Level Social Belonging (Sense of Belonging and Belonging Uncertainty) and Academic Performance in General Chemistry 1. *J. Chem. Educ.* **2022**, *99* (1), 71–82. <https://doi.org/10.1021/acs.jchemed.1c00405>.
- (6) Gee, H. W.; Gorton, E. S.; Cho, S.; Fynewever, H. Not All Chemists Are White Men: Incorporating Diversity in the General Chemistry Curriculum. *J. Chem. Educ.* **2022**, *99* (3), 1176–1182. <https://doi.org/10.1021/acs.jchemed.1c00632>.
- (7) Gladstone, J. R.; Cimpian, A. Which Role Models Are Effective for Which Students? A Systematic Review and Four Recommendations for Maximizing the Effectiveness of Role Models in STEM. *IJ STEM Ed* **2021**, *8* (1), 59. <https://doi.org/10.1186/s40594-021-00315-x>.
- (8) Graves, J. L.; Kearney, M.; Barabino, G.; Malcom, S. Inequality in Science and the Case for a New Agenda. *Proc. Natl. Acad. Sci. U.S.A.* **2022**, *119* (10), e2117831119. <https://doi.org/10.1073/pnas.2117831119>.
- (9) Nielsen, M. W.; Alegria, S.; Börjeson, L.; Etzkowitz, H.; Falk-Krzesinski, H. J.; Joshi, A.; Leahey, E.; Smith-Doerr, L.; Woolley, A. W.; Schiebinger, L. Gender Diversity Leads to Better Science. *Proc. Natl. Acad. Sci. U.S.A.* **2017**, *114* (8), 1740–1742. <https://doi.org/10.1073/pnas.1700616114>.
- (10) Olson, J. A.; Shea, K. M. Critical Perspective: Named Reactions Discovered and Developed by Women. *Acc. Chem. Res.* **2011**, *44* (5), 311–321. <https://doi.org/10.1021/ar100114m>.
- (12) Ries, K. R.; Mensinger, Z. L. Introducing Diverse Chemists in Chemistry Courses. *J. Chem. Educ.* **2022**, *99* (1), 504–507. <https://doi.org/10.1021/acs.jchemed.1c00394>.
- (13) Schinske, J. N.; Perkins, H.; Snyder, A.; Wyer, M. Scientist Spotlight Homework Assignments Shift Students' Stereotypes of Scientists and Enhance Science Identity in a Diverse Introductory Science Class. *LSE* **2016**, *15* (3), ar47. <https://doi.org/10.1187/cbe.16-01-0002>.
- (14) Schultheis, E. H.; Zemenick, A. T.; Youngblood, R. M.; Costello, R. A.; Driessen, E. P.; Kjellvik, M. K.; Weber, M. G.; Ballen, C. J. “Scientists Are People Too”: Biology Students Relate More to Scientists When They Are Humanized in Course Materials. *LSE* **2024**, *23* (4), ar64. <https://doi.org/10.1187/cbe.24-02-0045>.





# I'm an OrganicER. **Want to join us?**

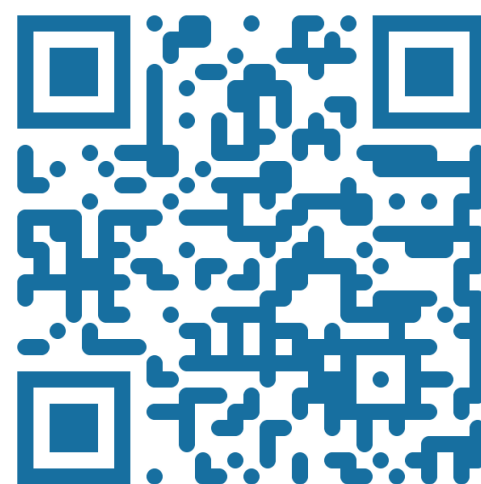
*A free, national community of practice for everyone who teaches organic chemistry.*

## What we do

- Active Learning in Organic Chemistry (ALOC) workshops
- Free, peer-reviewed curriculum resources at [organicers.org](http://organicers.org)
- Online faculty learning communities and mentoring
- Symposia and networking at BCCE and ACS meetings
- Newsletter with classroom ideas from real instructors

### Become a member

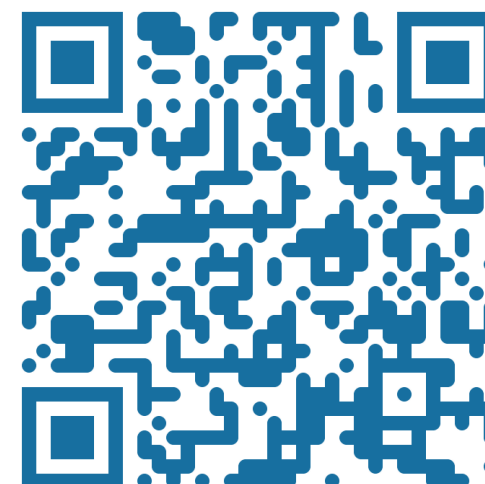
Scan to create your free account



[organicers.org/user/register](http://organicers.org/user/register)

### Join the conversation

Our Facebook group is where it happens



[OrganicERs Facebook group](#)

### Already a member?

Support us: give to Evolving OrganicERs



[Donate via ACS DOC / GiveLively](#)