Synthesis M. M. Faul, A. Fürstner Editorial

SYNTHESIS Special Issue in Honor of Professor Sarah Reisman

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It is an honor for us to be able to contribute to this Special Issue of SYNTHESIS dedicated to Professor Sarah Reisman, the 2019 recipient of the Dr. Margaret Faul Women in Chemistry Award sponsored by Thieme Chemistry and *Science of Synthesis* (https://science-of-synthesis.thieme.com).

The Women in Chemistry Award was initiated in 2019 to encourage and support the careers of young women of any nationality within the first 15 years of their independent career. It is awarded in recognition of a candidate's outstanding achievements in organic chemistry, broadly defined. The first recipient of the award was Professor Sarah Reisman, from the California Institute of Technology, who was recognized for her outstanding contributions to the field of organic synthesis and for being an excellent role model for women in chemistry. This issue of SYNTHESIS contains 15 articles from Professor Reisman colleagues in recognition of her achievements.

Sarah Reisman was born and raised in Bar Harbor, Maine. She received her undergraduate degree from Connecticut College in New London, CT, where she worked in the laboratory of Professor Timo Ovaska, graduating with honors in 2001. In the fall of that year, Sarah enrolled in graduate studies at Yale University and joined the research group of Professor John Wood. She earned her Ph.D. in chemistry in 2006 for her thesis on the total synthesis of the natural product welwitindolinone A isonitrile.[1] For her postdoctoral work, Sarah pursued studies in the field of asymmetric catalysis as an NIH fellow, working with Professor Eric Jacobsen at Harvard University on the development of asymmetric catalytic reactions of oxocarbenium ions.[2] In 2008, Sarah joined the faculty at the California Institute of Technology where she is now a Professor of Chemistry and a Heritage Principal Investigator. During her career Sarah has impacted the field of organic chemistry through her contributions to natural product synthesis and the development of new methods for organic transformations, and also as an advocate and spokesperson for diversity and inclusion in chemistry.

Sarah's research program is delivering world-class results in several interrelated but distinct areas. In the area of total synthesis Sarah has completed numerous syntheses of complex natural products that have all been exceedingly innovative, involving the development of novel transformations that have enabled the efficient assembly of molecules that had remained unsolved problems despite decades of effort in multiple laboratories. Early in her career Sarah reported the impressive total syntheses of very different classes of natural products (salvileucalin B, pyrroloindolines, and maoecrystal Z).[3–5] These efforts were marked by significant and original methodological advances to deliver truly elegant and efficient strategic approaches. Her work on conjugate addition/asymmetric protonation represented a major and completely original discovery that would be significant on its own merits but was even more impressive when integrated so beautifully into her pyrroloindoline total synthesis efforts. In a similar manner, her arene cyclopropanation methodology provides a powerful and potentially general approach to sterically congested carbon frameworks, whilst its elegant application in the salvileucalin B synthesis makes it more compelling by showcasing its utility as a new strategy for complex molecule synthesis.

In recent years Sarah's total synthesis efforts include the epipolythiodiketopiperazine natural products (–)-lansai B and (+)-nocardioazines A and B,[6] ryanodol,[7] pleuromutilin[8] and ritterazine B.[9] These syntheses display a signature combination of innovation on the methodological side and incredibly elegant strategic design. One of the major high-

lights of her natural product work is the completion of the synthesis of ryanodol, which she presented for her Women in Chemistry Award Lecture at the 21st European Symposium of Organic Chemistry (ESOC) in Vienna in 2019. Ryanodol is the hydrolysis product derived from ryanodine, the natural product namesake of an important family of intracellular calcium ion channels known as ryanodine receptors (RyRs), and both ryanodol and ryanodine have long been targets of interest to the synthetic community due to their interesting structures and pharmacology. Sarah's synthesis of ryanodol featured a Rh-catalyzed intramolecular Pauson–Khand reaction to build the anhydroryanodol carbon framework, and then a remarkable SeO_2-mediated oxidation that installed three critical oxygen atoms in a single step. This synthesis is an extraordinary example of the application of strategic oxidation reactions to minimize protecting group and redox adjustments. In a subsequent study, Reisman discovered that a key intermediate from the ryanodol synthesis could be esterified to incorporate the pyrrole-3-carboxylate ester directly, allowing the total synthesis of ryanodine in only 18 steps from (*S*)-pulegone.[10] Reisman's synthetic platform uniquely positions her group to develop synthetic ryanoids that were simply inaccessible through semi-synthesis.

Sarah is also dedicated to the education of students and young-career faculty in the organic chemistry community. At Caltech, she has served as the Executive Officer of Chemistry since 2015, a position that charges her with overseeing academic affairs for the undergraduate and graduate chemistry options. In this role she has focused on improving the undergraduate chemistry curriculum to provide resources to faculty on best practices to improve learning outcomes and has been instrumental in overhauling the curriculum for the introductory chemistry course taken by all incoming first-year undergraduates at Caltech. Sarah has been a member of the Board of Editors of *Organic Syntheses* since 2016, ensuring the reproducibility of procedures published in the literature. In this role she co-organized two workshops on Synthetic Organic Chemistry for Young Investigators, where 15 pre-tenured faculty presented their research as 'Chalk-Talks' and were provided mentorship on securing federal funding and navigating early career challenges. She was also a mentor at the 2015 NIH Mentoring Workshop for New Faculty in Organic and Biological Chemistry.

Sarah is a strong supporter of diversity in chemistry and was recognized in 2018 with the Caltech Dr. James King, Jr. award for supporting student diversity. At the national level, in 2020, she published an impact article: '*Organic Chemistry: A Call to Action for Diversity and Inclusion*'.[11] This perspective editorial, jointly published in *The Journal of Organic Chemistry*, *Organic Letters*, *ACS Central Science*, and *Organometallics*, in response to an anti-progressive article that appeared, however briefly, in another major chemistry journal, denounced inequality and advocated for diversity and inclusion, with specific guidance on what they mean, why they matter, how things stand now, and what specific steps we as a community can and should be taking to advance our science and profession through equity and inclusion. The editorial exemplifies the vision and guidance needed from its most influential leaders to develop a diverse chemistry community.

Sarah is a passionate and effective advocate for women in the field of organic synthesis. In 2013 she encouraged the founding of Caltech's Women in Chemistry program, for which she continues to serve as the Faculty Advisor. She has been engaged with Empowering Women in Chemistry (EWOC) efforts both at the National and local Southern California (SoCal) chapters (https://ewochem.org). She has hosted EWOC networking sessions, was a speaker for the 2021 conference and is a founding member of the SoCal (EWOC SoCal) chapter, established in 2020, that supports the collaboration of academic and industry partners in southern California and is a great resource for students and faculty on many topics important to women in the chemistry community.

Prof. Reisman has authored >68 publications, has given >100 presentations, and in recognition of her accomplishments, has received many major awards including the Elias J. Corey Award for Outstanding Original Contribution in Organic Synthesis by a Young Investigator, the Thieme Chemistry Journals Award, the Camille and Henry Dreyfus Teaching-Scholar Award, the Tetrahedron Young Investigator Award and the Dr. Margaret Faul Award for Women in Organic Chemistry sponsored by Thieme and *Science of Synthesis*, to mention but a few. Awards are an important advantage in retaining female and diverse talent in the field of organic chemistry through recognition by peers and students. Having visible female role models in academia will enable the continued attraction of women into the field of organic chemistry, providing a critical talent pool for years to come.

Our second recipient of the Dr. Margaret Faul Women in Chemistry Award is Professor Cristina Nevado, University of Zurich (Switzerland), who is also acknowledged as a rising star in the field of synthetic organic chemistry. She was recognized for the breadth and diversity of her work which spans the development of new catalytic methods and the elucidation of underlying mechanisms, important contributions in the synthesis of medicinally relevant natural products, and the development of bioactive chemical probes.

The SYNTHESIS Editorial Board members Prof. Mark Lautens and Prof. Corinna Schindler have agreed to be joint editors for a future special issue of SYNTHESIS that will recognize the achievements of Professor Nevado.

Conflict of Interest

The authors declare no conflict of interest.

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