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CHEMICAL & ENGINEERING NEWS

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COVER STORY

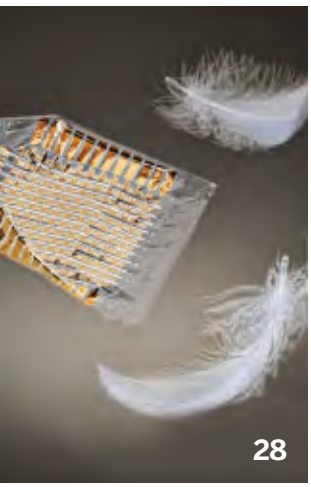
GLOBAL TOP 50

Chemical industry's growth in 2012 was stagnant; BASF remains top producer for seventh consecutive year. PAGE 13

QUOTE OF THE WEEK

"Scientists should provide solutions to social problems and dreams for people."

EIICHI NAKAMURA, PROFESSOR OF CHEMISTRY, UNIVERSITY OF TOKYO PAGE 31



NEWS OF THE WEEK

BUSINESS

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BOOKS

246TH ACS NATIONAL MEETING

THE DEPARTMENTS

COVER: *Hu Wenkui (left) and Li Shiling inspect a C_2 hydrogenation reactor, which converts acetylene into ethylene, at the BASF-YPC joint venture in Nanjing, China. BASF*

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COURTESY OF JOHANNES BURKHARD

FOUR GENERATIONS Evans displays his Roger Adams Award medal, flanked by academic descendants. Clockwise from bottom: Evans; Carreira; Doug Frantz of the University of Texas, San Antonio; and graduate student Bobbi Neff.

ORGANIC'S PAST IS PROLOGUE

Chemists celebrate history of cutting-edge research at NATIONAL ORGANIC SYMPOSIUM

CARMEN DRAHL, C&EN WASHINGTON

IT CAN BE TOUGH to leave a memorable impression when you are the last conference speaker of a long day, three days into a scientific conference. The University of Tokyo's Eiichi Nakamura, however, wasn't fazed.

"I promise you this won't be boring," Nakamura assured an auditorium's worth of chemists at the 2013 National Organic Chemistry Symposium (NOS). "I'm going to show you molecular movies."

As the conference-goers settled in, some surreptitiously sipped wine they secreted in from the evening's banquet, past the watchful eyes of ushers instructed to keep food and drink out of the hall. Not long after the lights dimmed, Nakamura clicked "play" on black-and-white footage of real molecules twisting and turning inside carbon nanotubes, visible to human eyes in a way unimaginable a generation ago. Nakamura and his collaborators began making microscopic motion pictures in 2007, and they continue to explore new questions with the technology.

Nakamura didn't stop at the science. He talked about the geopolitical implications of looming element shortages. He even put forth this PowerPoint manifesto for how chemists should contribute to society: "Scientists should provide solutions to social problems and dreams for people."

This kind of forward-looking talk fits well at a 21st-century NOS. A premier meeting for molecular architects, the symposium is a place for them to break bread, talk shop, and set a course for their field's future. It's been this way since the meeting's beginnings in the 1920s, when Massachusetts Institute of Technology's James Flack Norris predicted on its stage that chemists would one day make synthetic rubber from petroleum.

But last month's symposium in Seattle also looked back. It featured two poster presentations about the meeting's history, by Edward E. Fenlon of Franklin & Marshall College and Brian J. Myers of Ohio Northern University. The duo published their work in the *Journal of Organic Chemistry* (*JOC*), with the journal timing publication to June's meeting (2013, DOI: 10.1021/jo302475j).

It has lists of every single conference location and speaker in the gathering's 88-year history and highlights several people who made notable marks on the field.

"These folks left no stone unturned," raved University of Richmond chemist and historian Jeffrey I. Seeman. "They've assembled a stupendous piece of historical research. It's a gift to the chemistry community."

The publication "is a tour de force," added Harvard University chemist Elias J. Corey, whose eight talks at NOS are an all-time record, according to the pair's research.

IT WASN'T EASY to unearth all that information. "The very rich history of this meeting had largely been forgotten," explained NOS 2013 organizer Scott M. Sieburth of Temple University, praising the work during his opening remarks. Fenlon embarked on the project at 2011's NOS, when meeting organizers took the stage asking for help in recovering missing information.

"At the time, I turned to the colleague sitting next to me and whispered, 'It can't be THAT hard to find this missing stuff,'" Fenlon recalled. Little did he know the quest would take two years and enlist Myers along with countless archivists.

The fruits of that labor are more than a collection of factoids. The report tracks the evolution of organic chemistry, scientifically and culturally. For instance, by categorizing every talk, Fenlon and Myers made a chart following the ebb and flow of subfields. "It's not a perfect measure," Fenlon cautions. "We did have to pigeonhole many talks."

Yet some trends are unmistakable. For example, talks focused on physical organic chemistry—the study of the relationships

Most talks by one person in NOS history, by E. J. Corey: **8**

Number of NOS talks, 1925–2013: **563**

"The very rich history of this meeting had largely been forgotten."

between structure and reactivity—declined sharply after 1985. The reason? "Physical organic is a field that has been diminished by changes in funding," in particular a shift toward applied science, said longtime practitioner Jerome Berson of Yale University.

While the money may have dried up, the field isn't dead, physical organic elder statesman John D. Roberts of Caltech told C&EN. In his experience, scholars applied their expertise to other problems.

Keynote speaker David A. Evans of Harvard counts himself among that group. "I'm a closet physical organic chemist," Evans said during his acceptance address for the Roger Adams Award, the American Chemical Society's highest honor for organic chemistry.

Talks on synthetic methods, meanwhile, have remained relatively constant over the years. In Seattle, several speakers paid homage to that rich legacy. For example, the University of Pittsburgh's Peter Wipf explained how his lab put a new twist on Uhle's ketone, a historic tricyclic building block for alkaloids. "This was the first time I've talked about our work from a historical perspective," Wipf told C&EN. "NOS is a meeting with a sense of tradition that I thought I could tap into."

Two speakers drew parallels to Evans' pioneering work in the 1970s and '80s generating chirality with the help of auxiliary groups. Scripps Research Institute Florida's William R. Roush described an inexpensive route to chiral alcohols with a modified take on Evans' concepts (C&EN, July 15, page 24). Jin-Quan Yu of Scripps Research Institute California presented what he dubbed an "Evans auxiliary-like" directing group for transforming C–H bonds into a plethora of other things, including, most recently, C–I bonds (C&EN, July 22, page 27).

Female NOS speakers, all time:
18

AS THE PHYSICAL organic subfield has slowed down, other subfields have taken off. For example, the numbers of biochemistry talks have increased over the years. That tracks with the growing integration of biology and organic chemistry, says two-time NOS speaker Alanna Schepartz of Yale. "I once had a student who came back from NOS worried, because her poster was the only poster on a topic outside the traditional core of organic chemistry," she remembered. Now that student is a professor herself, Schepartz said proudly, "and today nobody comes back from NOS with that concern."

This year, the chemistry-biology interface was well represented, both in the poster session and onstage. For instance, McGill University's Hanadi Sleiman described DNA nanostructures, Joanna Fowler of Brookhaven National Laboratory talked about radiotracers and neurochemistry, and Erick M. Carreira of the Swiss Federal Institute of Technology, Zurich, shared his team's insights into the mechanism of inflammation.

Largest reported attendance, NOS 1957:
1,400

Carreira's talk was historic in its own right. Fenlon and Myers' research shows that more than half of NOS speakers throughout history can be placed on just 13 academic "family trees." Carreira's appearance completes the longest NOS family tree—seven consecutive generations of advisers and students who have given a talk at the meeting.

Fenlon and Myers' annals also indicate that organic chemistry is trying to be more inclusive about who it lets into the family. Chemists of color and women have traditionally been underrepresented in the program. For instance, NOS's first black speaker was Duke University's Bertram Fraser-Reid, in 1983. Besides him, 2013's Richmond Sarpong of the University of California, Berkeley, appears to be the only other black NOS speaker.

The first woman speaker was Marye Anne Fox, then at the University of Texas, Austin, in 1985. Fox, who went on to become the chancellor of the University of California, San Diego, stepping down in 2012, told C&EN that the historical trends Fenlon and Myers describe aren't unique to NOS or organic chemistry—she's witnessed the increases in women attendees and speakers firsthand at a solar photochemistry conference she has attended since the start

"Scientists should provide solutions to social problems and dreams for people."

& MORE ONLINE

TEST YOUR HISTORY METTLE

The history of the National Organic Symposium is more than a list of trivia. But the trivia is pretty cool. Take C&EN's interactive quiz at http://cenm.ag/nos, where you can see how you stack up in NOS knowledge.

SAMPLE QUESTIONS:

In what year did NOS first host a woman speaker:
a) 1969
b) 1971
c) 1985
d) 1993

How many Nobel Prizes have NOS speakers won:
a) 11
b) 18
c) 21
d) 30

of her career. At this year's NOS, in which three of the 14 speakers were women, the University of Toronto's Shana O. Kelley became the first woman NOS speaker to have earned her Ph.D. under another—Caltech's Jacqueline K. Barton.

"We've made a concerted effort at NOS to broaden representation," said Marisa C. Kozlowski of the University of Pennsylvania, chair of the 2015 meeting committee. That's not only in terms of gender or nationality, she noted, but also in terms of universities, government institutions, and companies.

Attendance, NOS 1925:
175

Although pre-Cold War NOS programs had a healthy percentage of nonacademic speakers, it's become harder nowadays to bring in those kinds of talks, Kozlowski added. "We've had people withdraw because they couldn't get their talk past their company's legal department in the end." Undeterred, Kozlowski said she's actively seeking industry speakers for 2015's meeting at the University of Maryland, College Park.

INCREASED DIVERSITY is just one of the cultural changes in organic chemistry that's visible through the lens of NOS. For example, "the meetings are much more informal now, certainly in terms of dress," according to C. Dale Poulter, a University of Utah professor and editor of *JOC*, who attended his first NOS in 1969. "You always wore a suit and tie, or at least a sport coat and a tie." Today, you might see Hawaiian shirts and flip-flops.

Like any meeting, NOS has weathered technological winds of change. Cornell University's Jerrold Meinwald recalled toting his presentation to the 1963 meeting, not on a laptop but on fragile glass slides, about 3 × 5 inches each. "They weighed a ton," he said.

By the late 1960s, glass slides gave way to slides made with camera film. Most slides were hand drawn and then photographed, Poulter said. In humid environments, slides could warp, he explained. "Sometimes, the intensity of the projector lamp would burn the slides. I saw a lot of presenters move rapidly through a talk because their slides were getting burned.

"For someone who's had to go through all that," Poulter continued, "ChemDraw and PowerPoint are like dying and going to heaven."

The Web has brought still more changes to NOS. ACS's Division of Organic Chemistry recorded Evans' award address and has made it available online to division members. Attendees don't seem to want an all-virtual NOS experience, though. Timothy Dore traveled to Seattle all the way from New York University's campus in Abu Dhabi. "I tried to go to a Web conference once," Dore said. "It didn't work." Distractions such as day-to-day lab management kept him from feeling immersed in the conference experience.

Whatever other changes may come, Fenlon is confident NOS and organic chemistry have a bright future ahead. For now, though, he's taking a short break from historical research and returning to the bench. "My curiosity's been satisfied," he said. "It was an obsession for a long, long time."