Building Capacity in Crystallography

Thoughts from the ACA region Presented by Cora Lind-Kovacs But.... Many thanks to all who have contributed ideas and events – especially the entire ACA IYCr2014 taskforce – you're the ones making this possible!

ACA's IYCr Task Force



The ACA Region – "Lands of Many Opportunities"

- In contrast to countries with less developed scientific infrastructure, the North American region has many well developed branches of science that offer lots of opportunities
 - Crystallography "competes" with many other fields for attention, resources and students
- Formal crystallography teaching is declining
 - Fewer departments offer crystallography courses
 - No formal crystallography degrees, certificate with online classes is being discussed
 - Often regarded as a "service profession"

In Search of Appreciation and Excitement

- Excite the general public and especially potential future crystallographers about crystallography

 K-12 and community outreach
 Schools, museums, scouts, seniors...

 More recognition for crystallography from colleagues in related fields

 Professional outreach
- Improving the appreciation for crystallography in general

- Crystallography in mass media, educational materials

Competition Time!

- First U.S. National Crystal Growing Contest
 - Organized by Jason Benedict at University of Buffalo
 - 70 alum crystals from 8 states (grades K-12)
 - Mainly online advertising and personal contacts
- Canada received their first perfect crystal submission in the 2014 contest!
- Wisconsin Crystal Growing Contest
 - Organized by Ilia Guzei at University of Wisconsin
 - 500 teachers contacted, 26 schools participated, 78 crystals of CuSO₄·5H₂O submitted
 - Half of the participating schools recruited through booth at a science teacher conference
 - Unanswered question: How to reach homeschooled students

Competition Time!



Video Contest

- Only eight entries were received
 - Partially based on misinterpretation of contest rules by teachers
 - Timing was not the best, as many schools did not have enough time after the beginning of the school year
- Videos covered anything from describing experiences with crystal growing to student visits at synchrotrons to students enacting nucleation and crystal growth
- <u>https://www.facebook.com/IYCr2014VideoContest</u>
 <u>?ref=aymt_homepage_panel</u>

YSSIG: Successful Outreach

- The Young Scientists Special Interest Group of the ACA started an outreach project in 2012 (Boston meeting) that has since been expanded on (runs every year at meeting site, Boston teacher is continuing tradition on his own)
 - Spearheaded by Eric Montemayor
 - Provide an opportunity to high school students local to the site of the national meeting to experience and learn about protein crystallization (2 schools, 80 students)
 - Generous support by Hampton Research (all reagents and crystallization supplies)
 - Visit a research X-ray/graphics facility (Boston University, ~20 students participated)
 - Data collection on crystals grown by students
 - Have a select few students attend the national ACA meeting and present their results (2 students & their instructors)

High School Lysozyme Project



Outreach To Other Societies

- Outreach to teachers: "Crystallography World of Wonders" went on the road
 - Originally 1 day teacher workshop offered at Chicago, Boston and Albuquerque ACA meetings (free registration for teachers)
 - http://www.nmsta.org/c-wow/
 - NSTA national meeting in Boston, April 2014
 - NSTA regional meeting in Long Beach, December 2014
- AIP included diffraction and symmetry in their 2014 SOCKs kits
 - Distributed to SPS chapters for school outreach in the fall
- MSA requested materials for their summer Materials Camps
 - 40 one week camps across the US
 - 25 teachers per camp
 - Educational handouts, career suggestions etc.

Outreach To Other Societies

Outreach To Other Societies

- Special sessions celebrating IYCr were held at:
 - APS User Meeting
 - ACS National Meeting in Dallas
 - Biophysical Society Meeting in San Francisco
 - The Minerals, Metals & Materials Society Meeting in San Diego
- ACA and ACS joined forces to present two webinars on crystallography
 - First webinar held May 15 on crystallography and everyday materials
 - 465 attendees, 22% international attendance
 - Second webinar on biological applications on October 16
 - 619 attendees

Workshops & Schools

- Many annually occurring schools are continuing
 - Canadian Chemical Crystallography Workshop at the University of British Columbia
 - ACA Summer School for Small Molecule Crystallography at Notre Dame IN in June 2014 (24 attendees)
 - Second DUPAN powder workshop at Duquesne (72 registered, ~45 stayed for hands-on session)
 - Rietveld workshop at 2015 North American Solid-State Chemistry Conference
- The Colombian and Venezuelan Societies for Crystallography co-hosted a workshop on single crystal methods and are planning a powder workshop soon
 - Two US crystallographers will lend their expertise to the powder workshop

Leaving a Legacy

- We had one International Year for Crystallography but crystallography will continue to be important!
 - We need to continue to increase appreciation for our science!
 - Funding opportunities will be influenced by how the public feels about crystallography
 - Need to make sure that future crystallographers exist!
- Continue to maintain a website to collect materials
 - Contests, educational materials, history...
 - A dream: Multilingual availability of materials (Americas: English, French, Portuguese, Spanish)

Grassroots Efforts

- The best way to get schools, teachers, scouts etc. involved in anything crystallography related is through <u>establishing personal contacts</u>
 - Provides expertise and motivation
 - Does require time and effort by individual crystallographers
- Keep excitement alive by following up

 Make clear this "matters", not just a one-time deal
- Grow level of expertise of teachers/leaders
 - Goal: Self-sustaining, continue to teach crystallography related content

To Leave a Legacy: Example Toledo (Ohio, USA)

- Visited 5 high school chemistry classes with a total of 91 students
 - Several classes participated in first US National Crystal Growing Contest as a result
 - Two Toledo schools placed!
 - One teacher reports that especially the AP class is still making connections to structure/bonding
 - Possibly will become an annual visit
- Pilot program with a girl scout group
 - Growing crystals, teaching some very basic concepts
 - Girl scout leaders are eager to continue collaboration
 - Kids are still excited and remember



It is <u>OUR</u> Responsibility to Leave a Legacy: We all Need to be Crystallography Ambassadors

Thank you!!!