COLLABORATIVE RESEARCH FOR HORIZONTAL MENTORING ALLIANCES

Facilitating the advancement of senior women chemistry and physics faculty members at liberal arts institutions to the highest ranks of academic leadership

National Science Foundation ADVANCE Partnerships for Adaptation, Implementation, and Dissemination (PAID) Awards: NSF-HRD-061840, 0619027, 0619052, and 0619150
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Left to right:
Miriam Rossi,
Laura Wright,
Bridget Gourley, &
Kerry Karukstis
(1) Short History of women in science
(2) Short History of Women’s Education in US and UK
(3) How education and mentoring can produce effective workplace leading to career satisfaction. Example from crystallography
(4) What is going on at PUI – LAC institutions now?
   Contrast two realities:
   a. Female students (situation is arguably the best that it’s ever been)
   b. Female Faculty members (situation still needs improvement).
(5) How to improve this situation for faculty:
   (a) NSF- ADVANCE grant for mentoring;
   (b) career development issues
<table>
<thead>
<tr>
<th>Category</th>
<th>Name</th>
<th>Nationality</th>
<th>Years</th>
<th>Achievements</th>
</tr>
</thead>
<tbody>
<tr>
<td>ASTRONOMY</td>
<td>Sophie</td>
<td>Danish</td>
<td>1556–1643</td>
<td>and Tycho Brahe (sister-brother)</td>
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<td></td>
<td>Caroline</td>
<td>English</td>
<td>1750–1848</td>
<td>and William Herschel (sister-brother)</td>
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<td></td>
<td>Maria Mitchell</td>
<td>USA</td>
<td>1818–1889</td>
<td>first woman member of the American Academy of Arts and Sciences in 1848 and of the American Association for the Advancement of Science in 1850; first professor at Vassar College</td>
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<tr>
<td>PHYSICS-MATH</td>
<td>Laura Bassi</td>
<td>Italy</td>
<td>1711-1778</td>
<td>first woman to officially teach at a college in Europe (University of Bologna, Italy), and the second woman to obtain a doctorate (in philosophy). <em>The first was also in Italy, University of Padova, Elena Lucrezia Cornaro Piscopia, 1646–1684.</em></td>
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<tr>
<td>PHYSICS-CHEMISTRY</td>
<td>Marie Curie</td>
<td>Poland/France</td>
<td>1867-1934</td>
<td></td>
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<tr>
<td></td>
<td>Lise Meitner</td>
<td>Austria</td>
<td>1878-1968</td>
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<tr>
<td>CHEMISTRY</td>
<td>Ellen Swallow Richards</td>
<td>USA</td>
<td>1842-1911</td>
<td>Vassar graduate, MA Chemistry</td>
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<td></td>
<td>Rosalind Franklin</td>
<td>UK</td>
<td>1920-1958</td>
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<td></td>
<td>Dorothy Hodgkin</td>
<td>UK</td>
<td>1910-1994</td>
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<td></td>
<td>Ada Yonath</td>
<td>Israel</td>
<td>1939-</td>
<td></td>
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### Nobel Prize to Female Scientists

#### The Nobel Prize in Physics
- **1963** Maria Goeppert-Mayer
- **1903** Marie Curie

$\Delta = 60$ yr

#### The Nobel Prize in Chemistry
- **2009** Ada E. Yonath
- **2008** Françoise Barré-Sinoussi
- **1964** Dorothy Crowfoot Hodgkin
- **1935** Irène Joliot-Curie
- **1911** Marie Curie

$\Delta = 24$ yr, 29 yr, 45 yr!!

#### The Nobel Prize in Physiology or Medicine
- **2009** Elizabeth H. Blackburn
- **2009** Carol W. Greider
- **2008** Françoise Barré-Sinoussi
- **2004** Linda B. Buck
- **1995** Christiane Nüsslein-Volhard
- **1988** Gertrude B. Elion
- **1986** Rita Levi-Montalcini
- **1983** Barbara McClintock
- **1977** Rosalyn Yalow
- **1947** Gerty Cori
Women’s Education in USA

Prominent women educators

- **Countess Benigna von Zinzendorf**, 1742, *Bethlehem Female Seminary*, Bethlehem, PA (today Moravian College)
- **Sister Elisabeth Oesterlein** (Moravian), 1772, *Little Girls’ School*, Winston-Salem, NC (today Salem College)
- **Emma Willard**, 1814, *Middlebury Female Seminary*, Middlebury VT; 1821, Troy Female Seminary, Troy NY (today Emma Willard School, high school)
- **Mary Lyon**, 1837, *Mount Holyoke Female Seminary*, South Hadley, MA (today Mt. Holyoke College)
- **Mary McLeod Bethune**, 1904, *Literary and Industrial Training School for Negro Girls*, Daytona, FL (today Bethune-Cookman University)
- First coeducational college was *Oberlin College*, 1833
- First established all-women’s college was *Vassar College*, 1861
- First school to offer PhD for women was *Bryn Mawr College*, 1885
United Kingdom first women’s Colleges

- Cambridge University, UK
  - 1869, Girton College, founded by Emily Davies
  - 1872, Newnham College, by Anne Clough and Henry Sidgwick
    - did not award degrees to women until 1921
- Oxford University, UK
  - 1878, Lady Margaret Hall College, Somerville College
  - 1886, St Hugh's College
  - 1893, St Hilda's College
    - did not award degrees to women until 1920
Finding the right academic climate that contributes to career performance

Example from crystallography

• WH Bragg and WL Bragg not only chose women for their research groups but they could work part-time if they had families; WH had 61% women; WL 50% women

• JD Bernal also had over 70% women in his research group

• Dorothy Hodgkin (Nobel Prize 1964) was at a women’s college, and trained two generations of women crystallographers.
The right academic climate that is conducive to career performance

Asterisk * refers to women crystallographers

Somerville College, Oxford
Current Situation for undergraduate women in chemistry in US at PUI and LAC colleges

Students:
• Increased undergraduate research experiences, increased skills, confidence, and motivation to seek a science career
• relationships with mentors
• opportunities to present research papers at state and national meetings.
• American Chemical Society. In 2007, women earned 55% of the chemistry bachelor's degrees, 54% of the master's degrees, and 38% of the Ph.D.s. [ 1997, they earned 48% of the bachelor's degrees, 46% of the master's, and 32% of the Ph.D.s. ]

Institution: Greater awareness; more emphasis on retaining women and other underrepresented groups in science.
What about female faculty at PUI and LAC?

- PROBLEMS HAVE NOT GONE AWAY – are MORE SUBTLE; workplace still UNBALANCED.
- Problems that the ADVANCE grant awards have addressed.
- Senior faculty comprise small number of positions. Isolation.
How to address issues?

contrasts and similarities with R1 Universities

Two important factors:
  institutional culture
  field of study

Some institutions are open while others remain difficult to penetrate. Physics and certain areas of chemistry are still mostly male.

• Mentoring – Horizontal Peer Mentoring: ADVANCE Grant.
• Career development issues for senior faculty at liberal arts institutions (Kerry Karukstis, Harvey Mudd College)
CONCLUSIONS: Impact on personal and professional lives of alliance members

Most commonly cited benefits include:

- sharing and receiving advice and support of peers
- increased confidence to speak up for oneself and accept due recognition for professional work and contributions
- permission to focus on one’s professional goals
- genuine friendships that will last beyond the initiative
- transfer of gains and lessons learned to one’s own institution
- opportunities for professional collaboration
- relief of isolation
- opportunity to expand professional interests
CONCLUSIONS: Impact on departments and/or institutions.

• new leadership provided by alliance members at both department and institutional level
• reduced teaching loads at one institution
• introduction of a new interdisciplinary course at one institution

CONCLUSIONS: Impact of campus outreach efforts

• opportunities and venues for discussions on career issues and career planning
• influence on new faculty orientation
• raised awareness of equity issues in hiring and salaries
ACKNOWLEDGMENTS

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