Careers in Chemistry Workshop: Pursuing Academic Positions in Canada

39th IUPAC Congress &
86th CSC Conference & Exhibition
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John Andraos
(jandraos@yorku.ca)

York University
Department of Chemistry
Toronto, Ontario, CANADA
http://www.careerchem.com

Selecting Potential Research Advisors

=> Key criterion for choosing advisors:
the degree to which advisor's students are sought after by other academics and by chemical industry

=> Read biographies of top scientists in
Biog. Mem. Fellows Roy. Soc.; Biog. Mem. Natl. Acad. Sci. USA

=> Read Istvan Hargittai's books:
Candid Science* series,*The Road To Stockholm

=> Determine if advisor is an innovator ("digger") or a follower ("driller")

Key patterns of successful academics:

- **Learn by example; emulate advisor**
- **Seek people of influence who promote their scientific efforts and ideas**
- **Seek people who can steer them in the path of other "good connections"**
- **Seek professional allies from within and outside your area of science as early as possible (peers and higher ranking people) => scientific pedigrees**
- **Seek mentors who made no distinction between excellence in research and excellence in teaching**
- **Actively participate in the whole research/teaching process: writing proposals, writing a scientific paper, lecturing undergraduate courses, giving talks at conferences**
- **Are proficient in using the scientific literature; clarify their scientific ideas, maintain focus on those ideas, and pursue them tenaciously**
- **Willingly open themselves to criticism from others and show resilience, stamina, and belief in their academic goals**

"A scientific career is peculiar in many ways. Its *raison d'etre* is the increase of natural knowledge. Occasionally, therefore, an increase of natural knowledge occurs. But this is tactless, and feelings are hurt. For in some small degree it is inevitable that views previously expounded are shown to be either obsolete or false. Most people, I think, can recognize this and take it in good part if what they have been teaching for ten years or so comes to need a little revision; but some undoubtedly take it hard, as a blow to their *amour propre*, or even as an invasion of the territory they have come to think as exclusively their own, and they must react with the same ferocity as we can see in the robins and chaffinches these spring days when they resent an intrusion into their little territories. I do not think anything can be done about it. It is inherent in the nature of our profession; but a young scientist may be warned and advised that when he has a jewel to offer for the enrichment of mankind some certainly will wish to turn and rend him."

- Sir Ronald A. Fisher, BBC interview 1947

NextWave Article Highlights

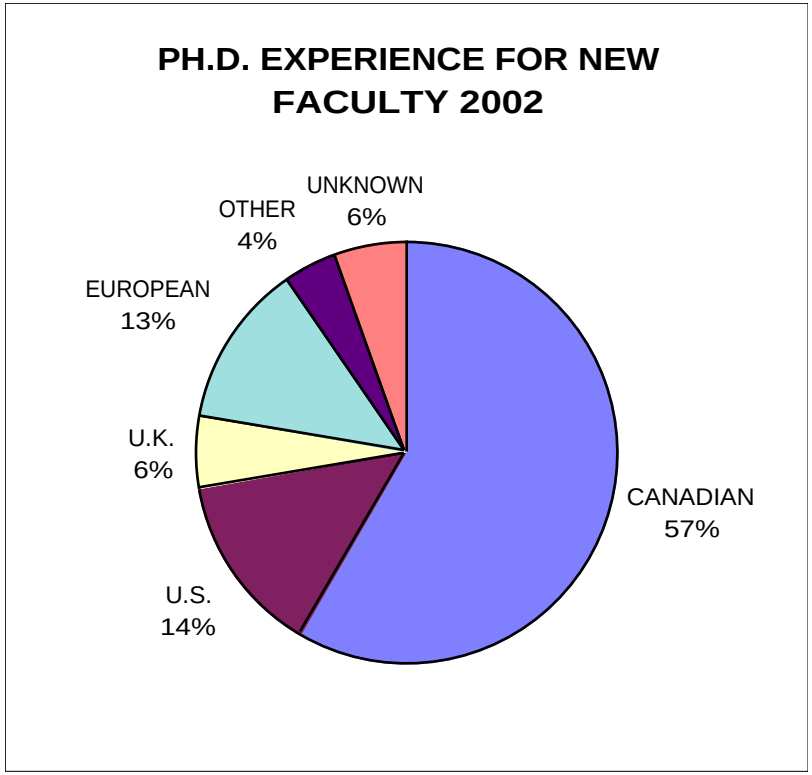
Advantages and Disadvantages for choosing
(1) Young Faculty
(2) Mid-Career Faculty
(3) Senior Faculty

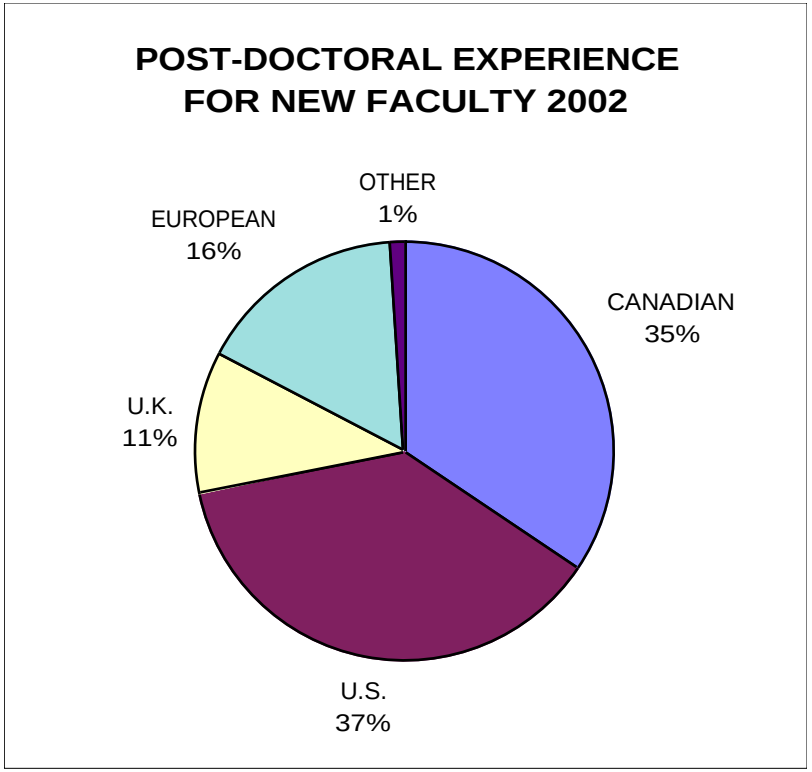
Characteristics of "good" advisor:

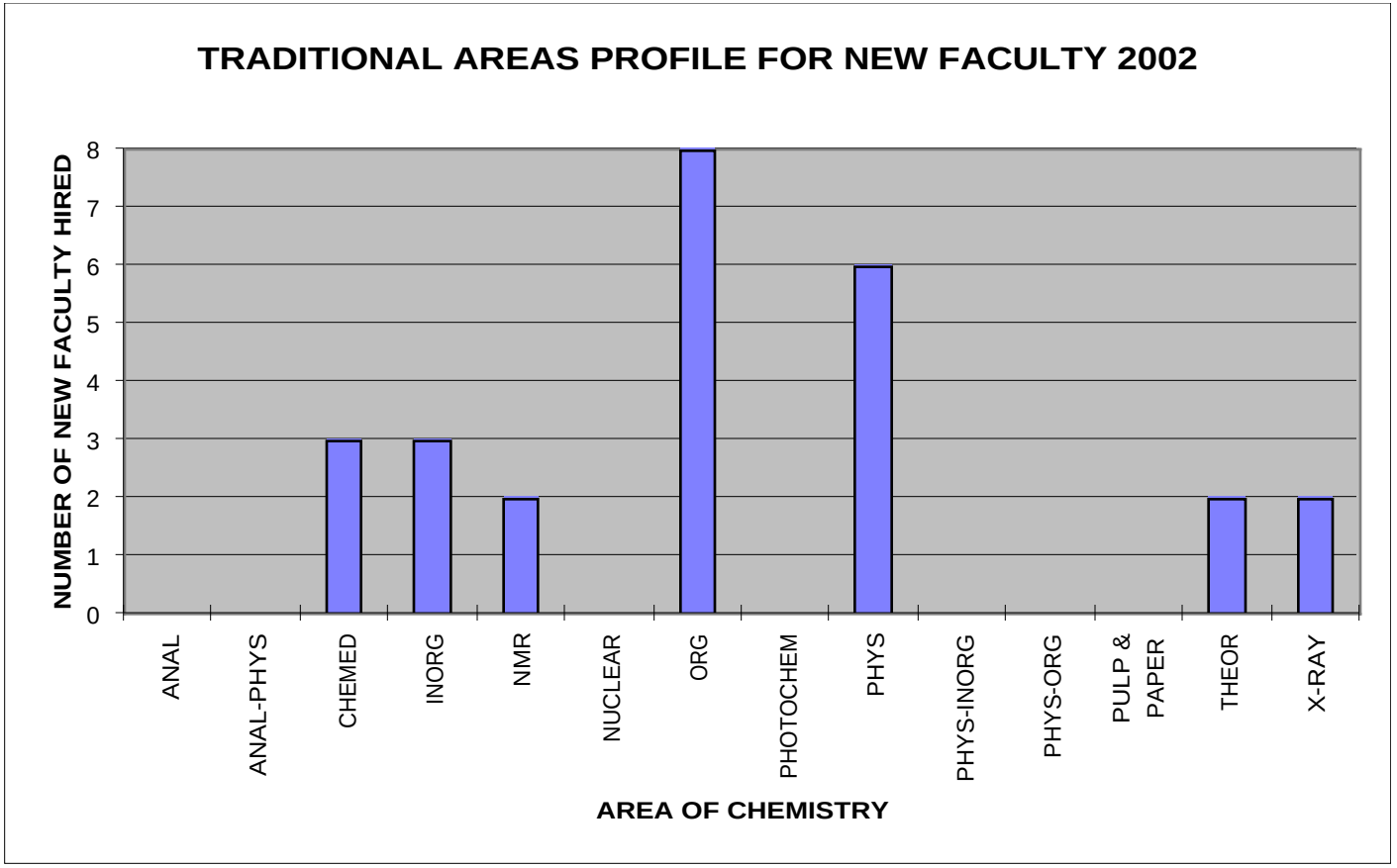
- **promotes their students' achievements to their colleagues and scientific community at large => the "crescendo" effect at doctoral and post-doctoral maturation**
- **allows students to pursue their own scientific questions**
- **allows students to follow up on those questions by carrying out original research and presenting that research to the scientific community**
- **allows students to develop their own self-confidence in doing research/teaching**
- **gives students opportunities to participate in peer review**
- **points students in direction of key scientific literature**
- **points students in direction of key people**
- **makes known to new students achievements of past students**
- **maintains a track record of those that have passed through their research group**
- **is aware of all possible funding channels for their students to take advantage of fellowships, awards, prizes, etc.**
- **makes no distinction between excellence in research and excellence in teaching**
- **pays close attention to questions their students ask**
- **has the ability to manage risk in choosing students, collaborators, projects**
- **exercises good judgement in assigning research projects to graduate students and post-doctoral fellows**
- **has the ability to know when to disagree and to do so without being disagreeable**
- **is a good "people" manager; can get the best out of group members**
- **has proper written agreements between group members and industry for industry related projects**

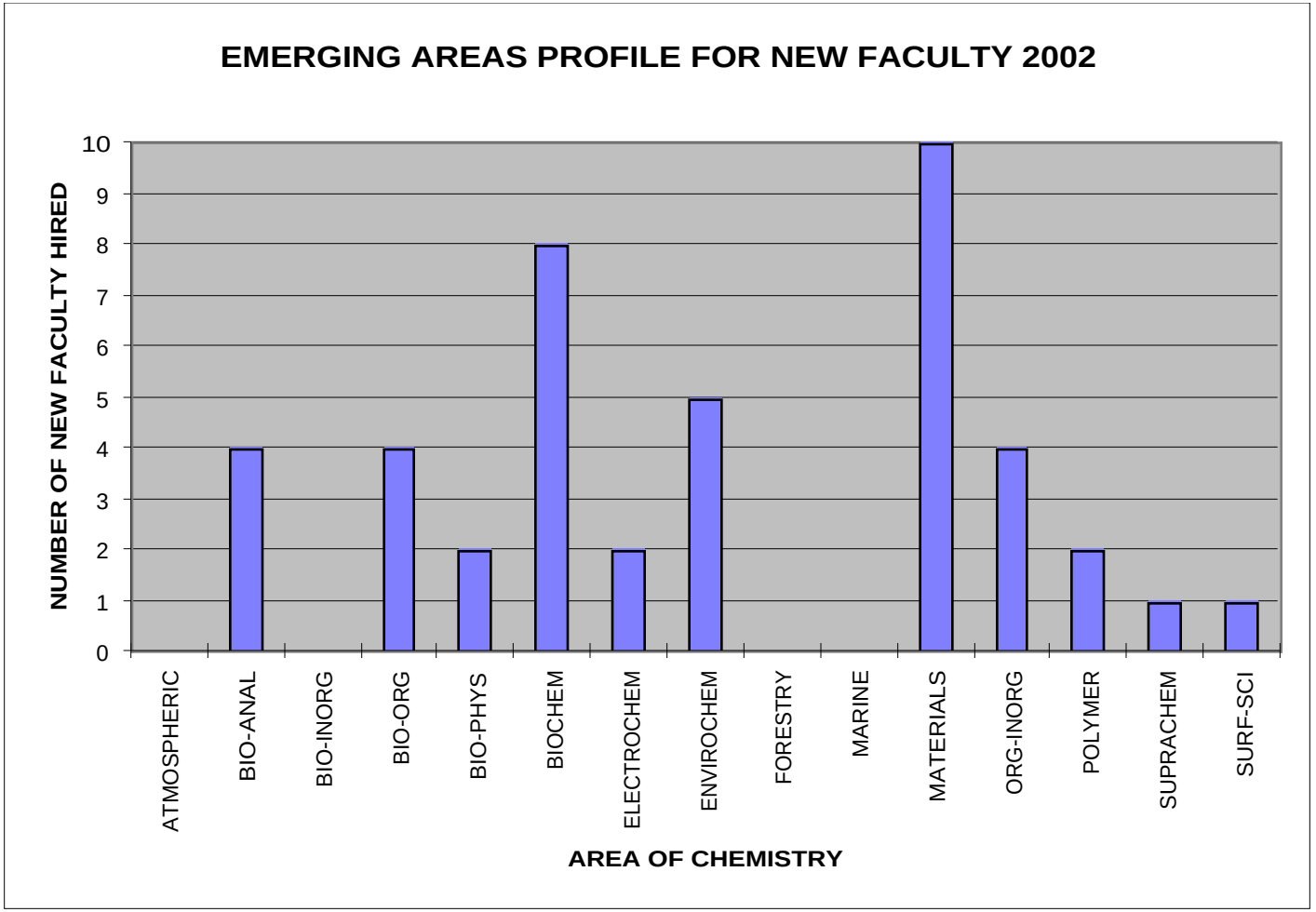
Overview of Academic Job Market & Recruitment Trends
2002 statistics of newest hires

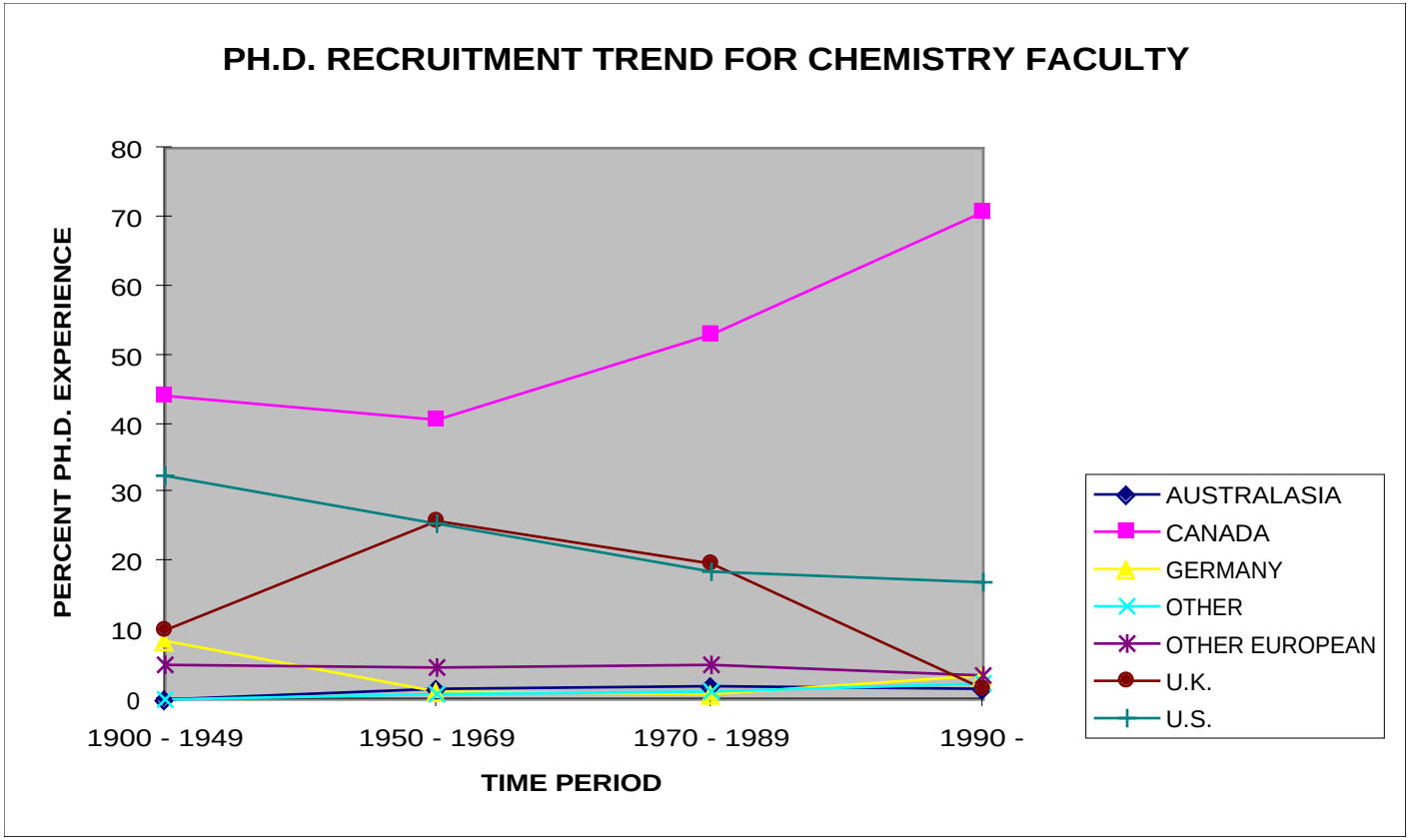
66 new hires: 81% male, 19% female; 92% at rank of Assistant Prof.
26 retirees; 12 professors moved to other departments; 5 professors left academia

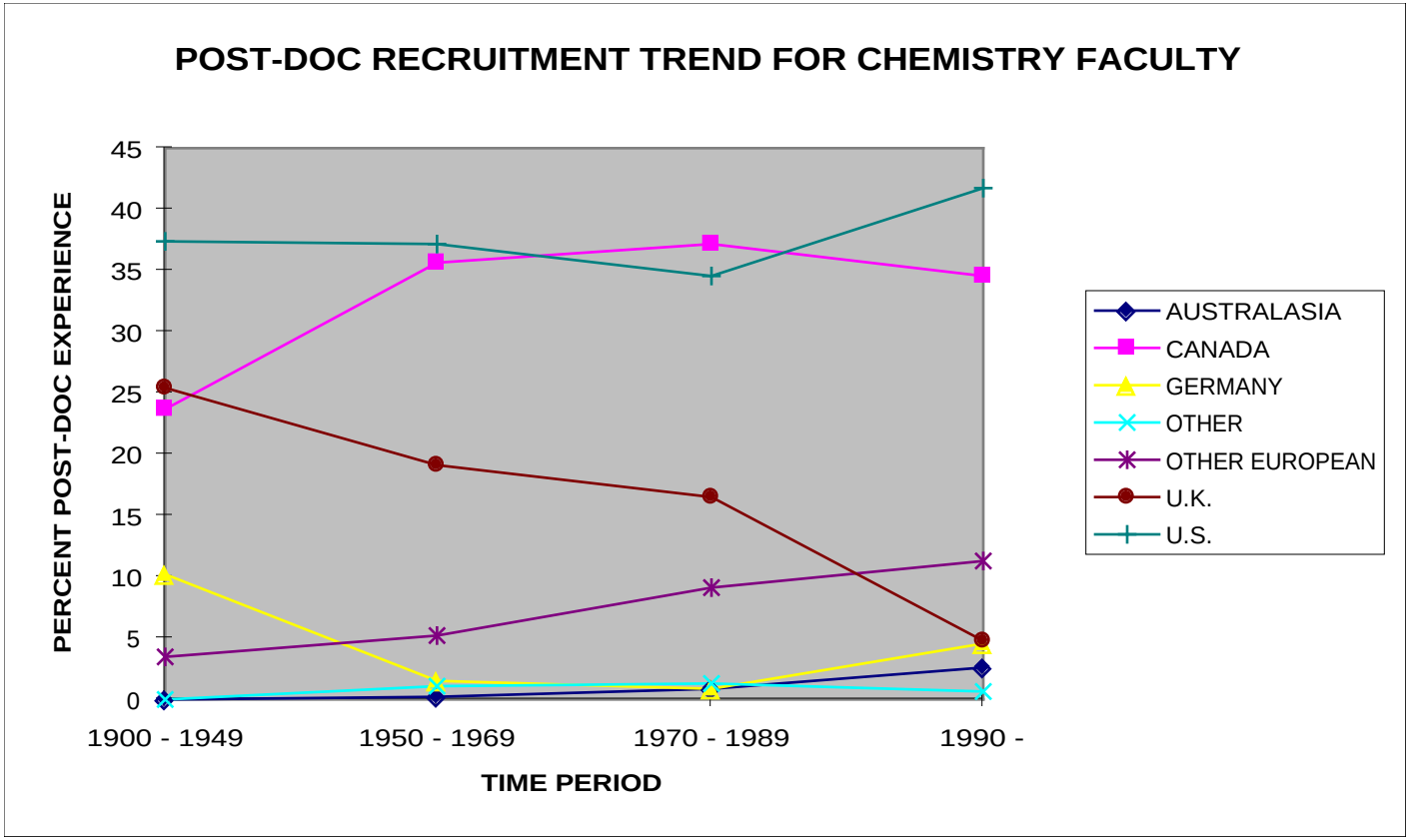





TRADITIONAL AREAS PROFILE FOR NEW FACULTY 2002
NUMBER OF NEW FACULTY HIRED
0
1
2
3
4
5
6
7
8
ANAL
ANAL-PHYS
CHEMED
INORG
NMR
NUCLEAR
ORG
PHOTOCHEM
PHYS
PHYS-INORG
PHYS-ORG
PULP & PAPER
THEOR
X-RAY
AREA OF CHEMISTRY

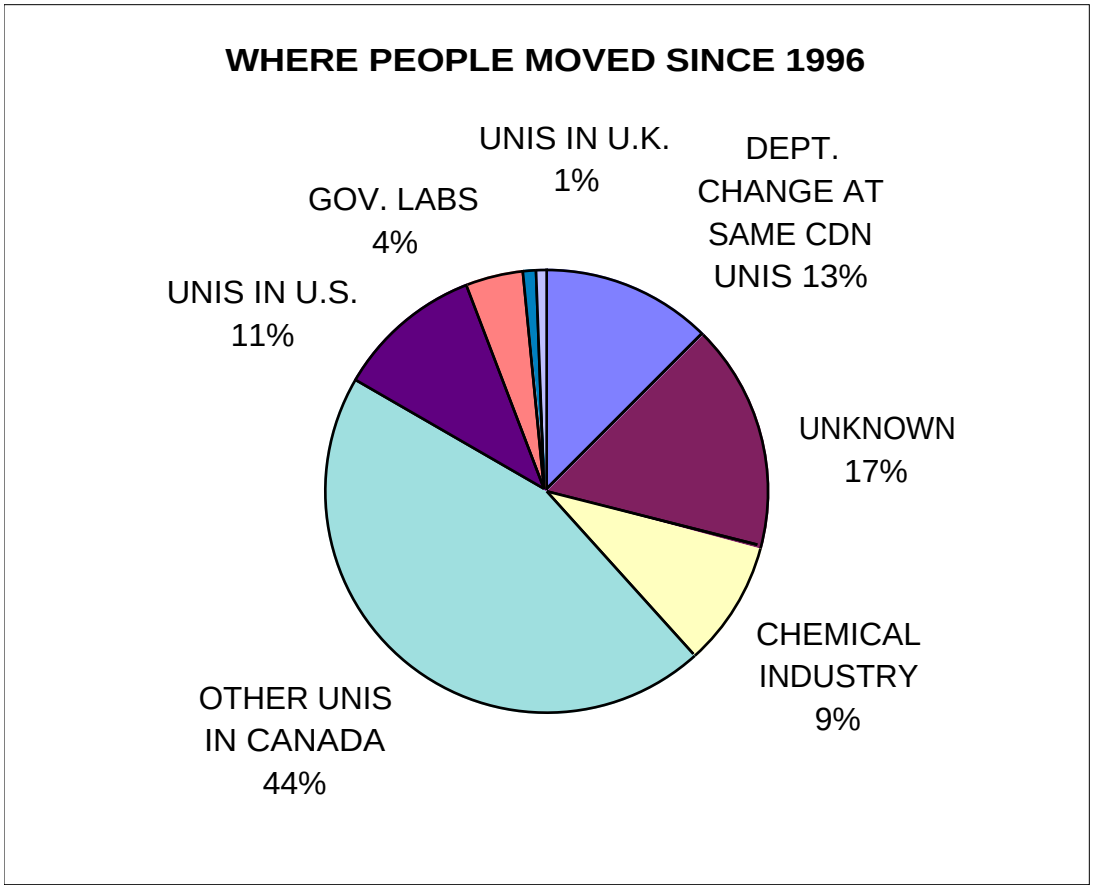

EMERGING AREAS PROFILE FOR NEW FACULTY 2002
NUMBER OF NEW FACULTY HIRED
0
1
2
3
4
5
6
7
8
9
10
ATMOSPHERIC
BIO-ANAL
BIO-INORG
BIO-ORG
BIO-PHYS
BIOCHEM
ELECTROCHEM
ENVIROCHEM
FORESTRY
MARINE
MATERIALS
ORG-INORG
POLYMER
SUPRACHEM
SURF-SCI
AREA OF CHEMISTRY


PH.D. RECRUITMENT TREND FOR CHEMISTRY FACULTY
PERCENT PH.D. EXPERIENCE
80
70
60
50
40
30
20
10
0
1900 - 1949
1950 - 1969
1970 - 1989
1990 -
TIME PERIOD
AUSTRALASIA
CANADA
GERMANY
OTHER
OTHER EUROPEAN
U.K.
U.S.

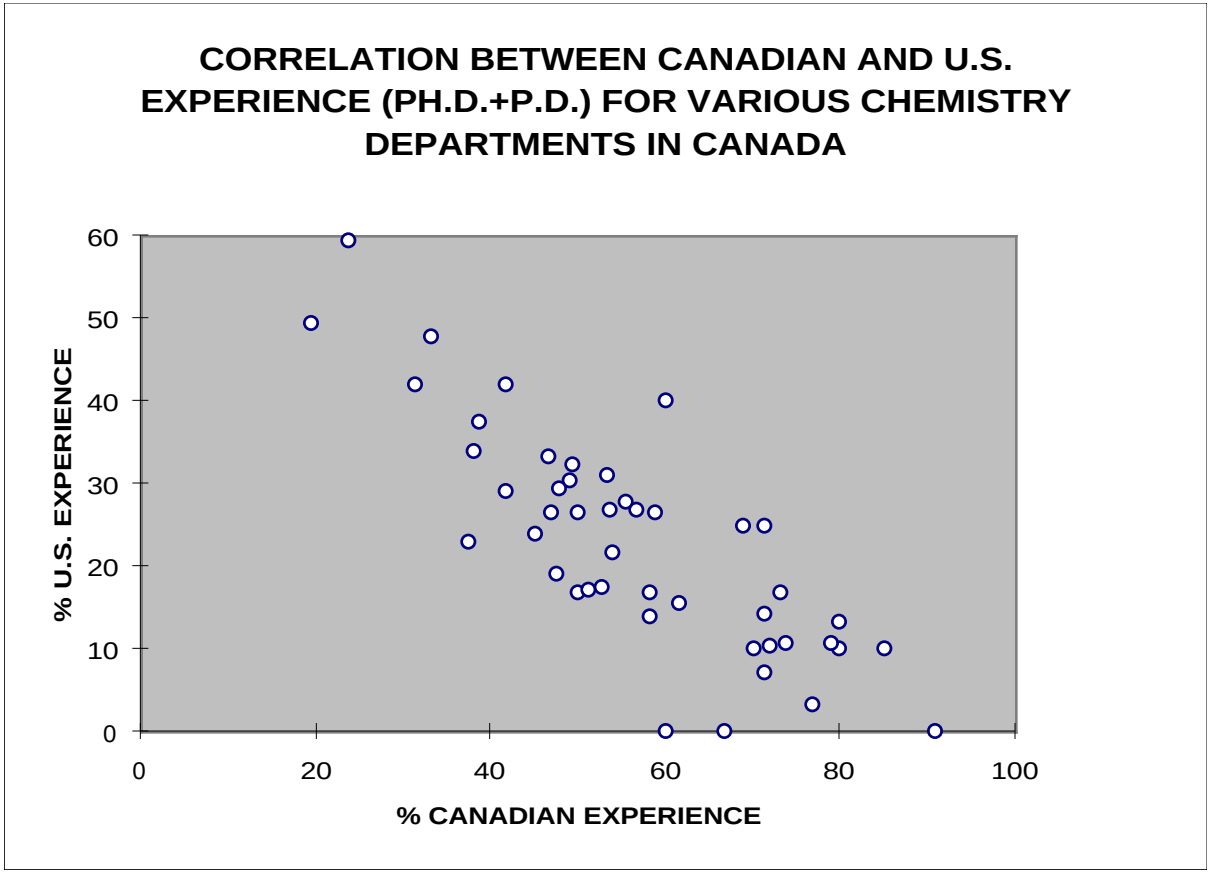

POST-DOC RECRUITMENT TREND FOR CHEMISTRY FACULTY
PERCENT POST-DOC EXPERIENCE
45
40
35
30
25
20
15
10
5
0
1900 - 1949
1950 - 1969
1970 - 1989
1990 -
TIME PERIOD
AUSTRALASIA
CANADA
GERMANY
OTHER
OTHER EUROPEAN
U.K.
U.S.

The Competition

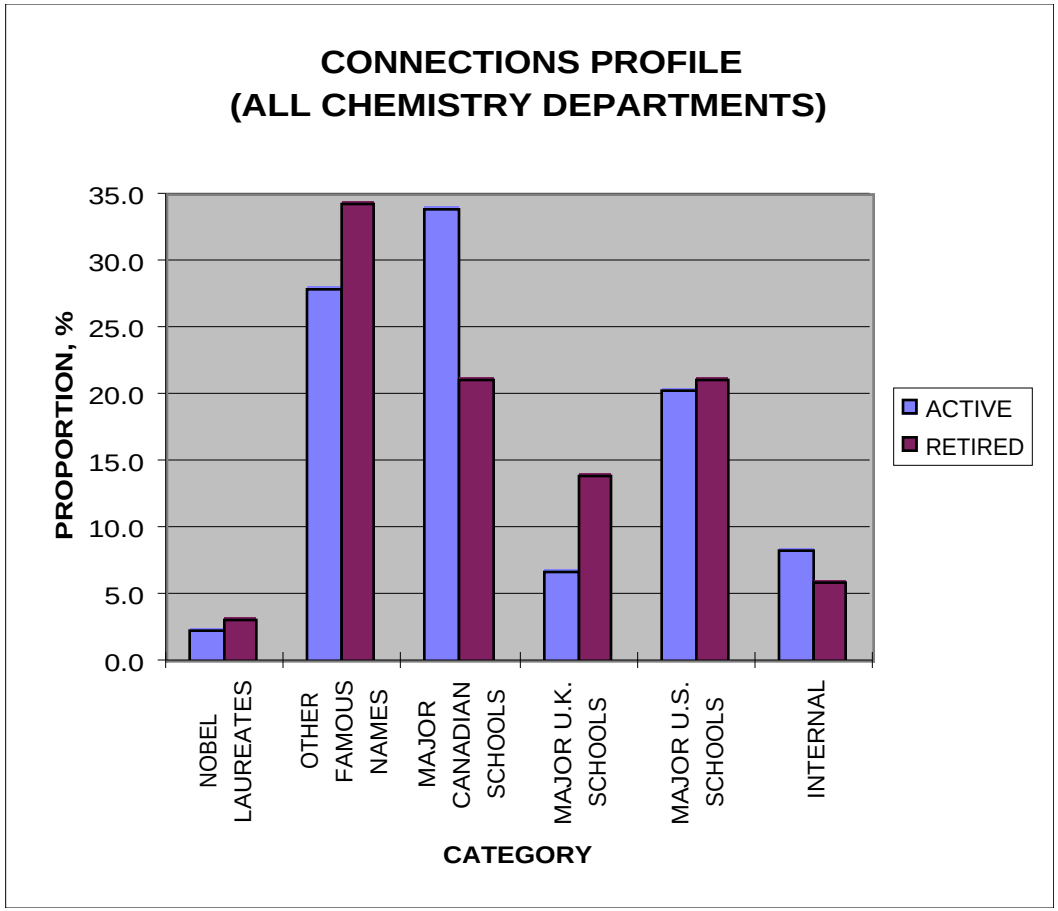
- **People who are already faculty members but have decided to move from one university to another**
- **Recent Ph.D.'s and post-docs who have degrees from biology, biochemistry, engineering, or physics departments**
- **Recent Ph.D.'s and post-docs from "big name" groups in Canada and abroad (mainly U.S.)**
- **Recent trend to hire Ph.D.'s and post-docs from the United States (U.S. citizens)**
- **Recent Ph.D.'s and post-docs from influential supervisors in Canada (chairpersons, society presidents, journal editors)**



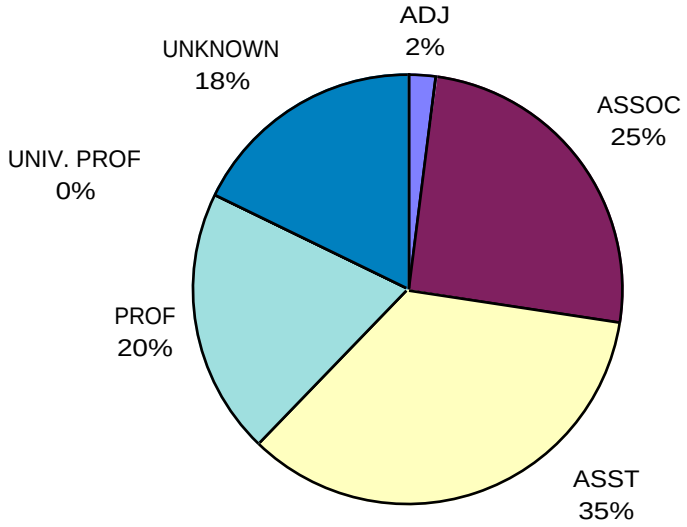
Research vs. Teaching Institutions



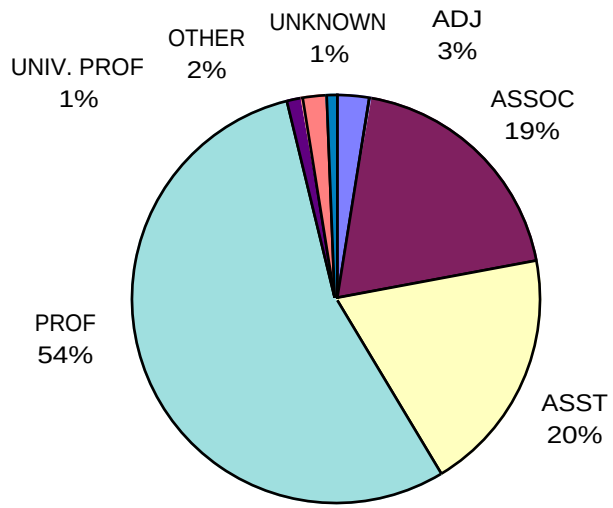
Department Cultures

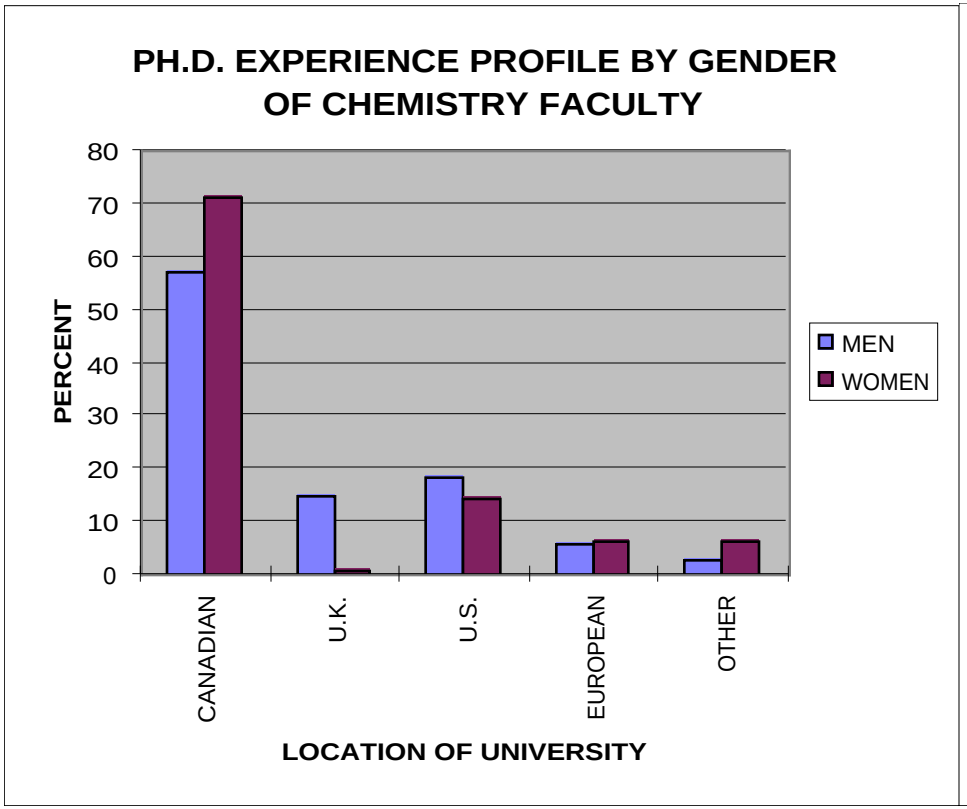


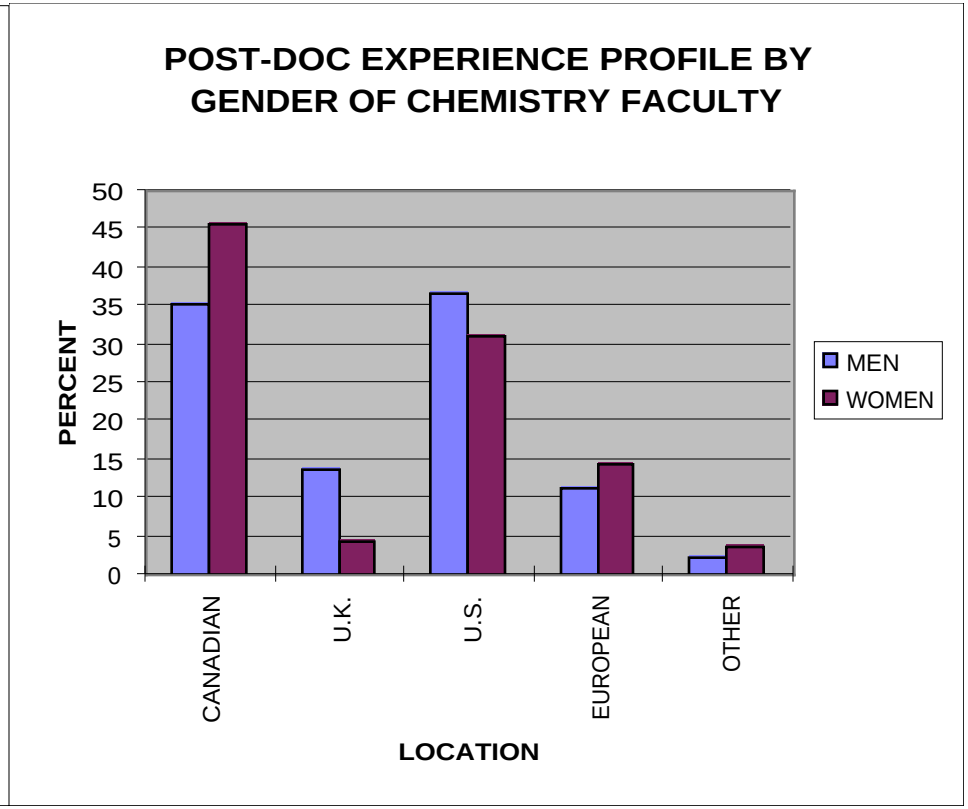
RANK PROFILE FOR WOMEN FACULTY IN CHEMISTRY DEPTS. (TOTAL = 95) 2001 FIGURES



RANK PROFILE FOR MEN FACULTY IN CHEMISTRY DEPTS. (TOTAL = 751) 2001 FIGURES




PH.D. EXPERIENCE PROFILE BY GENDER OF CHEMISTRY FACULTY
PERCENT
80
70
60
50
40
30
20
10
0
CANADIAN
U.K.
U.S.
EUROPEAN
OTHER
MEN
WOMEN
LOCATION OF UNIVERSITY


POST-DOC EXPERIENCE PROFILE BY GENDER OF CHEMISTRY FACULTY
PERCENT
50
45
40
35
30
25
20
15
10
5
0
CANADIAN
U.K.
U.S.
EUROPEAN
OTHER
MEN
WOMEN
LOCATION

Things to Do Before Applying

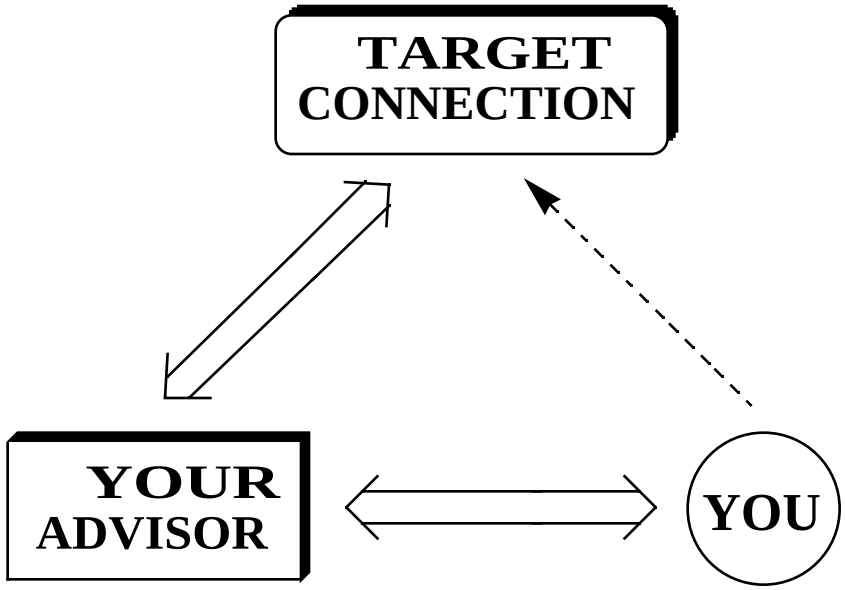
- **Learn by example from your advisors**
- **Emulate advisor's strategy in coming up with ideas, asking the "right" questions", obtaining grants, peer review process**
- **Take charge and actively participate in the whole research/teaching process: writing proposals, writing a scientific paper, lecturing undergraduate courses, giving talks at conferences**
- **Seek people of influence who promote your scientific efforts and ideas**
- **Seek people who can steer you in the path of other "good connections"**
- **Seek professional allies from within and outside your area of science as early as possible (peers and higher ranking people); be aware of professional rivals**
- **Determine professional connections between people of influence in your area of science => scientific pedigrees**
- **Attend department colloquia to identify potential "good" connections; pay careful attention to introductions**
- **Be proficient in using the scientific literature: clarify scientific ideas => find out what has been done, find out what has not been done, determine what is important to pursue, be aware of scientific controversies maintain focus on ideas, pursue ideas tenaciously**
- **Bounce your ideas off of peers and people of influence**
- **Develop strong personal and professional connections with fellow graduate students and post-docs**
- **Find out who else in your research group is applying for academic positions => caveats: competing for same position**

Culture of academia and the Job of Professor

Professional goals of academics:
(1) To be recognized for their contributions to a field of study
(2) To propagate and perpetuate those contributions through their students

Triangulation Principle and Rank-to-Rank Flow:

Selling yourself vs. someone else selling you



Personal Characteristics for Academic Job

- **command of the scientific literature and your subject**
- **ability to decide what is an important question to ask**
- **ability to be creative**
- **ability to pick up and recognize useful ideas from outside your area**
- **ability to maintain focus on ideas**
- **ability to know limitations of their scientific work**
- **ability to work hard and have the stamina to pursue scientific inquiries as far as possible**
- **ability to know own personal limitations**
- **ability to know own personal strengths**
- **develop and maintain strong personal connections with peers**
- **actively engage in peer review, administrative roles**
- **develop confidence in themselves and in their students**
- **ability to take risks and take responsibility for those risks**
- **willingness to have others criticize their work, particularly those outside your field**
- **admitting that you may sometimes be wrong in your work or your judgement**

The Application Package

- **Job Ad**
- **Covering Letter**
- **CV**
- **Recommendation Letters**
- **Proposal**
- **Statement of Teaching Philosophy**

Typical Job Ads for Academic Positions

THE UNIVERSITY OF MANITOBA

Department of Chemistry

Assistant Professor in Organic Chemistry - Tenure-track Position

The Department of Chemistry at the University of Manitoba invites applications for a tenure-track position in Organic Chemistry at the rank of Assistant Professor. This position, which is subject to final budget approval, will be available on or after July 1, 2001. Applicants must have a Ph.D. or equivalent doctoral degree, with post-doctoral experience, in one of the branches of organic chemistry. The successful applicant will be expected to establish a vigorous research program, and teach general and organic chemistry at the undergraduate level and advanced organic chemistry at the graduate level.

The Department currently has 19 tenured or tenure-track staff, 5 other full-time academic staff, 12 support staff, and about 40 graduate students, post-doctoral fellows, and research associates. We are well equipped for research in most branches of Chemistry, including service laboratories for NMR (500 and 300 MHz instruments) and mass spectrometry, and a full-time glassblower. For further information about the Department please see our web page at: http://www.umanitoba.ca/chemistry/.

Winnipeg is a mature, highly civilized city with rich cultural and recreational opportunities. It combines the amenities of urban life with easy access to the countryside and to northern lakes and forests. Housing prices are very attractive by North American standards.

The deadline for applications is February 28 2001. Applicants should submit a curriculum vitae, a short description of research interests; a research proposal appropriate for funding by NSERC Canada; a statement of teaching experience; and the names, mailing addresses, telephone numbers and e-mail addresses of three referees, to:

Dr. Harry W. Duckworth,
Chair of the Search Committee
Department of Chemistry
University of Manitoba
Winnipeg, MB, Canada R3T 2N2
E-mail: hdckwth@cc.umanitoba.ca
Telephone: (204) 474-9265
FAX: (204) 474-7608

The University of Manitoba encourages applications from qualified women and men, including members of visible minorities, Aboriginal Peoples, and persons with disabilities. In accordance with Canadian immigration requirements, this advertisement is directed to Canadian citizens and permanent residents.

Appointment in Biological Chemistry

The Department of Chemistry and Biochemistry invites applications for a tenure track position in the area of Biological Chemistry. The department is particularly interested in candidates with expertise at the interface between Chemistry and Biology with preference given to outstanding candidates in either bioanalytical, bioinorganic, bioorganic or biophysical chemistry. Candidates will have a PhD, postdoctoral experience and a record of accomplishment in research. This appointment will be at the rank of Assistant Professor to begin January 1, 2003 or as soon as a suitable candidate can be found. The successful candidate is expected to teach courses in the Chemistry and Biochemistry programs at the undergraduate and graduate levels in both French and English and to develop a solid research program.

Laurentian University is located in Sudbury, a vibrant multicultural city, which is rapidly diversifying its economic base into the sectors of Education and Health Sciences. The university is in the midst of adding the new Northern Medical School, which will be providing unique opportunities for collaboration in the domain of health studies. Finally, the successful candidate will be able to join the planned multidisciplinary Ph.D. program in Biomolecular Sciences as a core faculty member.

The university is committed to equity employment and encourages applications from all qualified applicants. In accordance with Canadian immigration requirements, this advertisement is directed in first instance to Canadian citizens and permanent residents.

Applicants should provide a curriculum vitae, a list of publications, a summary of research interests, a research proposal indicating equipment needs and three letters of reference addressed to:

Chair of the Search Committee
Biological Chemist
Department of Chemistry & Biochemistry
Laurentian University
Sudbury, ON P3E 2C6
http://www.laurentian.ca/chem/index.htm

Review of applications will begin September 1, 2002.

Carleton University

Carleton University invites applications to the Department of Chemistry from potential nominees for a 2003 NSERC University Faculty Award (UFA). The UFA program is limited to women and aboriginals who have not previously held a tenure-track appointment at a Canadian university. All areas of chemistry will be considered. Complete applications must reach NSERC by Nov 1, 2002 and thus are required at Carleton as soon as possible and no later than September 1,2002. The successful applicant will be appointed at the Assistant Professor level (tenure track). Candidates must possess a Ph.D., and postdoctoral experience would be an asset. This advertisement is directed only to women and aboriginals who are (or will be by November 1,2002) Canadian citizens or permanent residents of Canada. Further information on the NSERC UFA program is available from NSERC at www.nserc.ca/programs/sf/UFA_e.htm

Completed applications will consist of a full curriculum vitae, a research proposal and a statement of teaching specialization. A completed NSERC Personal Data form (form 100) and an Application for a Grant form (form 101) must also be included. Three confidential letters of reference should also be sent under separate cover. All material should be sent to: Professor G.W. Buchanan, Chair, Department of Chemistry , Carleton University, 1125 Colonel By Drive, Ottawa, Ontario, CANADA, K1S 5B6

For more information on the Department of Chemistry at Carleton University please see the Department Web Page at www.carleton.ca/chemistry.

Although all areas of chemistry will be considered, special attention will be given to candidates in the areas of materials science, inorganic chemistry, and computational chemistry/biochemistry.

Covering Letter

- **address to actual person in charge of hiring, (not "Dear Chair", "Dear Head", etc.)**
- **don't want reader to suspect that letter is a "form" letter sent to multiple institutions (e.g., not mentioning name of institution you are applying to in body of letter)**
- **mention where you saw advertisement**
- **state complete job title you are applying for and name of institution**
- **state your strong qualifications for position (what you can offer)**
- **state your genuine enthusiasm and interest in position (why you want the job)**
- **mention names of referees for contact: best scenario is that addressee and one or more of your referees have a personal connection**

Curriculum Vitae (CV)

General Points

- **pagination (1 of 2, etc.), name on each page as a header**
- **keep it clean and uncluttered**
- **follow the W5 principle: Who, Where, When, What, Why**

Order of Sections

- **Full name and complete contact information**
- **Citizenship (Canadian, UK, US, Australian, EU)**
- **Education**
- **Awards, Prizes, Medals, Fellowships, Grants received**
- **Membership to Professional Societies**
- **Employment History (relevant to job): Research & teaching experience**
  => for each give job title, advisor name, duration
  => state and quantify key accomplishments
- **List of Publications in Refereed Journals**
- **List of Patents**
- **List of Invited Addresses**
- **List of Conference Contributions**

What readers look for in CV:

- **NAMES OF PEOPLE THEY KNOW**
- **CONSISTENCY**
- **PROSPECT OF "RISING STAR"**
- **BALANCE BETWEEN SCIENTIFIC OUTPUT AND RECOGNITION OF MERIT**

Who

names of people they know personally or through literature

=> past Ph.D. and post-doctoral advisors, mentors, former students and colleagues

=> a good scientific pedigree counts!

Where

Top doctoral and post-doctoral institutions

=> progression from small to large is appealing

=> favoured research institutions in Canada: Alberta, McGill, McMaster, Toronto, UBC

Beware of regionalism factor: West/Ontario/Quebec/East

=> favoured research institutions in US: Harvard, MIT, Yale, UC Berkeley, UCLA, Scripps, top institutions in Massachusetts, California, Illinois, New York, Pennsylvannia, Wisconsin

=> favoured research institutions in UK: Cambridge, Oxford

When

years to complete Ph.D.

years of post-doctoral work

=> "rising stars" are sought after

=> window of opportunity: $\leq$ 5 years after Ph.D. (only exception is significant number of years in industry at top level positions which are deemed relevant to academic job applied for)

What

Your awards list:

=> prestigious prizes and medals

=> grants are particularly looked at: $$$ talks!

Your scientific achievements:
=> Is your work pioneering? Was your contribution significant?
=> Has your work been advertised at conferences by your mentors through their own conference presentations, or through private conversation with reader?
=> Are they reinforced by your referees?

Your teaching achievements:
=> Have you been recognized with teaching awards?
=> Are they reinforced by your referees?

Your area of chemistry:
Is it "in"? Does it fit job ad description?

Your publications:
=> prestigious and high impact journals, number of publications
=> list from recent to past; include titles of papers
=> Have you written any scientific works in which you are the author of correspondence?
=> Does your publication track record show that you are "growing up" in your science?

Your conference contributions:
=> established national and international meetings
=> Has reader heard any of your talks at a conference they attended?

Why

=> evidence as to why you should be considered for position
=> evidence as to why you want the job

What readers look for in recommendation letters:

- **CONSISTENCY**
- **PROSPECT OF "RISING STAR"**
- **BALANCE BETWEEN SCIENTIFIC OUTPUT AND RECOGNITION OF MERIT**

- **personal connection between author of letter and reader**
- **how long referee knows candidate**
- **rank of candidate among others referee has mentored**
- **do accomplishments stated in recommendation letter mirror those in candidate's CV?**
  => Is there consistency between what you say and what others say about you?
  => "enantiomer" principle: Make sure your referees have recent copy of your CV!!!
- **why referee believes candidate should be a professor (both personal and professional characteristics); candidates potential for research, for teaching**
- **are statements general or specific and quantifiable?**

Make sure you have discussed your academic career interests thoroughly with your mentors before sending out applications.

A game plan between you and your referees needs to be worked out beforehand! This is NOT a one person effort!

Proposal

First...

- **access past NSERC or other proposals from your advisor to see format**
- **find out which ones were successful and which ones failed; find out why**
- **do thorough literature search of what has been done and what hasn't in your area**
- **choose areas in which you are qualified to carry out research (based on your doctoral and post-doctoral experience)**
- **choose areas that interest you but be aware that science is now a commercial commodity subject to economic pressures; know which areas are fashionable and saleable**
- **decide which questions are worth pursuing -- do a risk assessment**
- **bounce your ideas off others for feedback and criticism**

Document...

Purpose is to inform and to convince

- **begin with broad questions; do a road map; put things in perspective**
- **address why are questions important; how do they fit in with what is already known**
- **develop in detail at least 3 specific projects to address major questions**
- **define short and long term goals; timelines**
- **supply key literature references**
- **prepare a budget for specific projects (2/3 of costs goes toward salaries and conference expenses)**

=> major equipment
=> ancillary equipment
=> department equipment
=> maintenance costs
=> personnel costs

What readers look for in proposal:

- **Is your scientific background credible to take on the risks of the proposed project?**
- **How original are ideas with respect to past advisors' work?**
- **Do you have a strong publication track record in the areas discussed?**
- **Proposal should show scope for a career to be developed if hired for position**
- **Well thought out and reasonable budget (Has proposer done their homework?)**
- **Good, clear, concise language**
- **Have pitfalls been identified and accounted for? How will proposer handle them should they arise?**
- **Ability to inform and convince reader**
- **Sufficient documentation of literature (Has proposer done their homework?)**

Statement of Teaching Philosophy

What readers look for:

- **genuine enthusiasm in writing**
- **stated concrete goals in authors teaching**
- **past teaching awards that make author's statements credible**

The Interview

Format (usually one day, maximum of 2 days)

- **meeting at airport/hotel**
- **meeting with secretary**
- **meeting with Chair of Department**
- **half hour sessions with faculty members according to prescribed schedule**

  Note: identities of faculty members may or may not be known to candidate before interview
- **meeting with students (optional)**
- **department and laboratory tour**
- **department seminar**
- **lunch with group of faculty at a restaurant**
- **pre-assigned question period on proposal, your views on research and teaching**
- **more half hours sessions with faculty members**
- **meeting with Dean (optional) -- money matters (grants, funding, salary)**
- **dinner with one or more faculty members at a restaurant**

Doing Your Homework

- **scientific pedigree of department members you will be meeting:**

=> look for their past advisors and past institutions

=> look for common links with your own scientific pedigree

=> identify personal interrelationships between faculty members

- **familiarize yourself with scientific work of department members you will be meeting**
- **latest awards of recognition of faculty members**
- **identify movers and shakers of department**
- **familiarize yourself with latest big projects taking place in department**
- **familiarize yourself with equipment and grants department has acquired**
- **rehearse your department seminar in front of present research group with advisor present; identify weaknesses and address them**
- **consult webpage thoroughly**
- **keep track of media literature about department**
- **keep track of scientific papers from department appearing in journals**

What faculty members look for:

Half hour sessions

Assessment of interpersonal skills: Can I live with this person for the next 30 years?
Enthusiasm in candidate for position
Has candidate done their homework on department? on interviewer?

Informal meetings (lunch/dinner)

Assessment of interpersonal skills: Can I live with this person for the next 30 years?
Does candidate show that he/she could take on administrative roles?
Does candidate show that he/she understands what academic life is about?

Departmental seminar

Lecturing ability: engaging style, show pedagogy, clear delivery and optics
Ability to field questions
Enthusiasm in candidate for position
Does candidate mention how his/her work will fit in with the department?
Is candidate's past scientific work and proposed work asking credible academic questions?
Does candidate show confidence in their ability to carry out research?
Has candidate addressed limitations of their work?
What is candidate's extent of possible collaborations?
Is candidate's research work worth funding?

Caveats to bear in mind:

- **front-runner candidates with strong scientific pedigrees are usually favoured prior to interview**
- **entry level job ads are open to all ranks, not restricted to assistant professor**
- **greatest competition from assistant professors who move from one university to another**
- **insist on seeing physical space for future lab; beware of "tricks" regarding costs of equipment**
- **overzealous demonstration of how research may be "applied"**
- **overzealous demonstration of research collaborations**
- **balance confidence and humility; show humility by discussing limitations of your research ideas**
- **"non-diplomatic" answers to questions => "tact"**
- **not showing that you want THAT job at THAT institution**
- **discussions over meals**
- **bias toward women candidates; bias against "single" candidates**
- **departments communicate with each other regarding candidates they interview or seek to interview**
- **protect your proposal ideas**

Good Luck! :)