Women and Science in Europe: An Academic Pipeline in Need of Repair

Women are under-represented in science. Although the proportion of women science students has increased in recent decades, the percentage of women in top positions remains much too low. This imbalance is not only unjust but economically wasteful.

◆ In 1929, the biochemist Frederick Gowland Hopkins (1861 – 1947) was awarded the Nobel Prize for the discovery of growth-stimulating vitamins. He should also have been honoured for his commitment to encouraging women to enter science. Although at this time women had no access to formal degrees at Cambridge University, nevertheless women scientists occupied half of the posts in Hopkins' department. According to one of "Hoppy's ladies", it was his personal style that created such a woman-friendly atmosphere: Hopkins "provided valuable moral support" and gave them the "hormone of encouragement"[1]. But if it is so easy to attract women to science, why are there so few? A recent EU report, *Science Policies in the European Union: Promoting Excellence Through Mainstreaming Gender Equality*, tries to provide an answer by reviewing the position of women in science. Moreover, the report aims to improve their position – and thereby the quality of science – by steering science policy.

Women in Science Today

◆ "Half of the brainpower on Earth is in the heads of women", as OECD General Secretary Donald J. Johnson correctly remarked, and half of first-degree students are women, although there are still differences among the disciplines (Fig. 1). But the enormous potential of these highly educated women is not being fully exploited; only a few of them eventually rise to top positions. Since women students in universities are nothing new, their scarcity in high level positions cannot be explained by a lack of women undergraduates. The academic pipeline is leaking: many women leave science at the post-doctoral level; after that, their number declines still further. The proportion of women in Europe who obtain a full professorship ranges from 5% in the Netherlands to 18% in Finland. The current number of appointments hardly shows any change: in Germany, only 9.7% of the full professors (C4 level) and 17.3% of the associate professors (C3 level) appointed in 1998 were women. In 1996 in Poland, 21.9% of those given the title "professor" were women. Data for other European countries were not available, but the average rate at which the percentage of women professors increases in the EU is estimated to be 0.5 to 1.0% per year. Thus, merely waiting for a gender balance to be established is a very ineffective strategy.

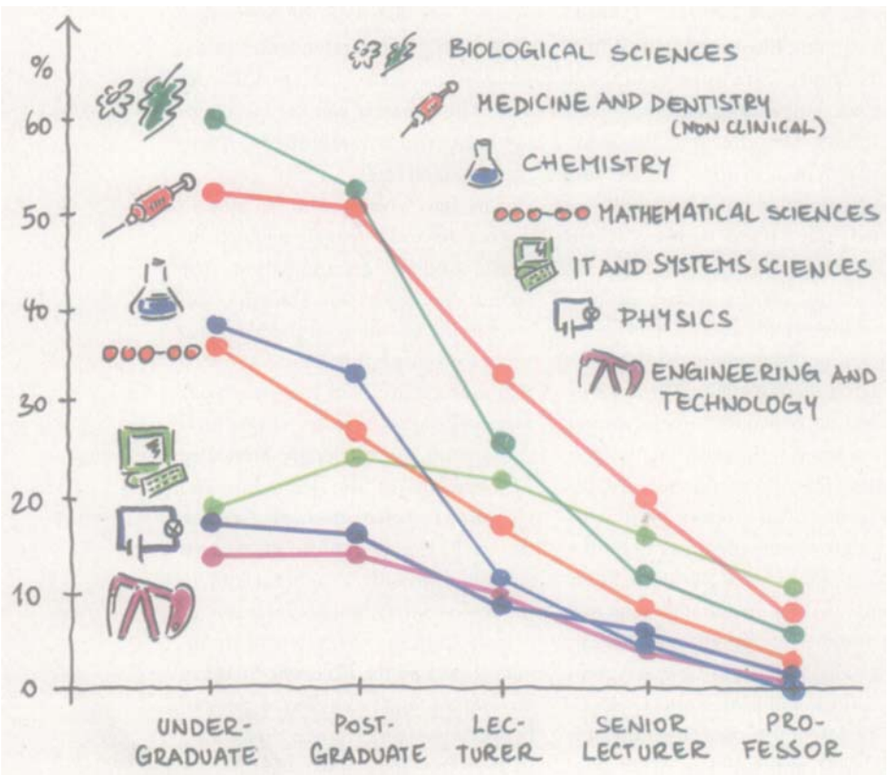
The few women who do stay in science have to struggle against different kinds of discrimination. The recent Bett report on academic salaries in the UK – one of the few studies in Europe on this topic – revealed that women are paid less than their male colleagues at every single level throughout the university hierarchy. In Germany, at the Hermann von Helmholtz Association of German Research Centres, 65% of women scientists but only 35% of men are in the lowest salary bracket for academic staff. Even in the US, where an *Annual Report on the Economic Status of the Profession* is published, a pay gap between men and women exists: e. g., in 1998 the salary of women full pro-

fessors was only about 90% of that of their male counterparts.

Women scientists are in the minority when it comes to prizes and awards. Since the Nobel Prize was established in 1901, only 11 out of the 457 winners in science were women. For other major prizes, the statistics are even worse. Some, such as the Crafoord Prize or the Jung Prize for Medicine, have never gone to a woman scientist. Yet many women work on the front line of research, contributing to the reputations of their bosses, most of whom are less scrupulous than Pierre Curie (who accepted the Nobel prize for physics only on the condition that Marie Curie share it). Investigation should be made into whether the awarding committees judge objectively or if applicant gender plays a role.

Christine Wennerås and Agnes Wold examined the peer review process in regard to gender bias, basing their study on the Swedish Medical Research Council's evaluation process. They found, shockingly, that a woman scientist had to be 2.6 times more productive than the average male applicant to be perceived as equally competent[2].

Percentage of women in science, engineering and technology in UK universities by field and level (1996-97)
Illustration: M.Homma.



Fairness in Science

◆ "As a minister, I had the opportunity to read proposals for appointments to professorships. You would not believe with what kind of criminal energy women are kept outside such proposals. With all kinds of tricks, for instance, women scientists who would stand their ground in competing with men are not even invited for interview so as not to put a list of nothing but males at risk... First women were prevented from qualifying and now, when women are qualified, new methods are being used to avert competition", claims Helga Schuchardt, former science minister of the state of Lower Saxony, Germany.

Discrimination today is indirect. Many women leave science because they have no chance due to:

- "old-boy networks": This archaic structure influences recruitment procedures in some universities and in industry. "It is still very difficult for women to reach top positions in industry as they are competing with men who have had a chance to build their networks. In contrast to this situation, women are reaching 50% in professions where it is possible to work independently, e.g. as a pharmacist or medical doctor", comments Helga Rübsamen-Waigmann from Bayer AG.
- the "long hours culture": Total dedication to work is impossible for the many women (and a few men) who are responsible for housekeeping and caring for children or old people. Moreover, this sort of dedication is not essential to the proper functioning of scientific institutions. On the contrary, research benefits from family life, as a Swedish post-doc remarked in the *Nature* Internet Debate on Women in Science: "If I look back at my time as a graduate student before and after my first child, I see a great difference. Before, my whole life was about work and I spent a lot of time at the lab. After, I was there less but actually produced more data because I was more effective."
- career interruptions: Women scientists who have taken time out for pregnancy or family responsibilities often publish less and are older than their male colleagues at the same stage. Their career progress suffers as a result.

◆ Internet Links

Information about the Fifth Framework Programme and preliminary statistics about women's participation are available at *www.cordis.lu/improving/src/hp_women.htm*. At this site, women can also apply for candidacy for evaluation and monitoring panels.
More information on women in science and links to many other websites can be found at *www.awise.org*, the website of the Association for Women in Science and Engineering.
A debate on women in science is published at *helix.nature.com/debates/women*.

Obviously, treating women the same as men is no guarantee of gender balance. The two genders are not the same, and, in some cases, gender distinction is the better way.

Science Policy at the EU Level

◆ The EU supports a great number of research projects and thus influences research subjects and the position of women in science. About 30% of the members of the European Parliament are women. Thus women are – compared with member-state parliaments – relatively well represented. But is there a gender balance at the top of key EU scientific committees? In 1999, 19 out of 60 members of the Committee for Industry, External Trade, Research and Energy were women. In the Research Directorate General only 9.5% of the A-grade posts (professionals) went to women. Thus women are not only in the minority among career scientists, but also among those who shape scientific policy. Men over the age of 50 dominate the European scientific committees that award research funds, grants and prizes. This narrow base hardly suggests that the gender dimension is being taken into account.

But there is a change in the offing. At the EU level, framework programmes specify science policy and research areas. In the Fifth Framework Programme (1998–2002), measures are being undertaken to correct the gender imbalance. The recent EU report and the launch of gender impact studies are part of this action plan. In recognition that gender monitoring is a key element, data on women's participation in the Fifth Framework Programme are being collected. The Commission has set itself a target of 40% women, particularly on evaluation and monitoring panels. Nicole Dewandre from the European Commission points out that women need to "take part in the Fifth Framework Programme in the broadest sense" and "make their voice heard in the policy process at all levels".

Making Change Happen

◆ Long-term strategies are required to change the stereotypical image of science as a male domain. They have to start in school with new approaches to teaching and more women in science departments.

A key issue in order to achieve a gender balance in science – and also in other areas – is to improve the balance between family and work, with a good child-care system as a basis. To cite the Swedish post-doc once more: "If you don't feel your kids are fine, you can't work."

The scientific community should encourage women to return to science after taking time out. Retraining measures and programmes such as the Daphne Jackson Programme in the UK (*www.sst.ph.ic.ac.uk/trust*) are models. Age ceilings in fellowship programmes should be based on years of academic service rather than chronological age. That would also help all those who interrupt their careers for time with their family. More transparency is needed in employment and peer review processes in order to ensure objectivity and fairness. Scientists should be judged by quality, not by quantity: not the number of publications but the content, not the number of working hours but the results should be the criteria.

Then it may hoped that more women will follow in Petra Mischnick's footsteps. A professor of food chemistry and mother of three children, she said, when asked why she did not give up: "The encouragement I received from others was important because it strengthened my resolve to realise my own potential." Once more, Hopkins' encouragement hormone. But women must learn to produce it on their own: there are entirely too few "Hoppies".

Uta Neubauer, Frankfurt a. M.

1) *M. Rayner-Canham, G. Rayner-Canham,* Chem. Br. *1999, 35(1), 47-49.*
2) *C. Wennerås, A. Wold,* Nature *1997,* 387, *341-343.*

This article is based mainly on *Science Policies in the European Union: Promoting Excellence Through Mainstreaming Gender Equality,* a report by the European Technology Assessment Network (ETAN) expert working group on women and science. The report is available from Bundesanzeiger Verlag GmbH, Tel.: +49 (0)221 976680; e-mail: vertrieb@bundesanzeiger.de.

◆ Taskforce for Equal Opportunities in Chemistry

In March 2000, the *Arbeitskreis Chancengleichheit in der Chemie* (AKCC) was established by the GDCh. Activities are concentrated in three areas:

- public affairs
- women in the profession
- schools and universities

The AKCC is organising a women's forum for the annual GDCh conference, *Chemie 2001,* in Würzburg from September 23 to 29. More information about the AKCC can be found at *www.gdch.de/akcc.* Those wishing to be added to the mailing list may contact Dr. Hoer, Public Affairs Office of the GDCh, Tel. +49 (0)69 791 7493; e-mail: renate.hoer@gdch.de.