WOMEN IN ENGINEERING

Canadian Panel Calls for More

Suppose you were giving a party and you wanted to invite all the female engineering faculty at Canadian universities. How big a space would you need? A football stadium? A moderate-sized hotel? Try a large living room.

At the end of 1990 there were 54 females on Canadian engineering faculties, about 2% of the total of 2438, and the situation hasn't changed much since. (To give a sense of scale, in 1989, the most recent year for which National Science Foundation data are available, 2.7% of U.S. engineering faculty were female.) What explains the dismal Canadian figures? A new report by a blue-ribbon panel of educators, employers, and engineers has cited three principal causes that will sound all too familiar to U.S. engineers (and scientists) who have been struggling to address the problem for two decades: gender stereotyping by parents and teachers, the lack of role models for girls who want to become engineers, and systemic discrimination in universities and in the workplace.

"Systemic discrimination in the classroom and the workplace continue to make it difficult for women to succeed as engineering students and as engineers," said Monique Frize, holder of the Northern Telecom Women in Engineering chair at the University of New Brunswick. Frize was named chairwoman of the 18-member panel dubbed the Canadian Committee on Women in Engineering and appointed by Industry, Science and Technology Canada, a federal ministry. Helping to galvanize the ministry into action was the most horrific example of discrimination against women engineers in the history of any country: the murder of 13 female engineering students at the Ecole Polytechnique in Montreal in December 1989, after they were carefully separated from the male students by a psychopathic antifeminist who didn't think women should become engineers.

That episode was mind-boggling, but the panel's report, *More Than Just Numbers*, offers more persuasive, if less shocking, everyday examples of the antiwomen climate in Canadian engineering. Dozens of women engineers were quoted anonymously offering examples of slights they had endured.

Such discrimination has had its effects not only on the profession itself but also on the ranks of entering students. The panel contends that engineering is "lagging far behind" other professions in increasing the number of female students. Law and medicine, for example, have in recent years attracted equal numbers of males and females in Canada, says the report, while engineering has shown only modest increases. In 1981, 8% of engineering students were female; in 1990, the figure had risen—but only to 14%.

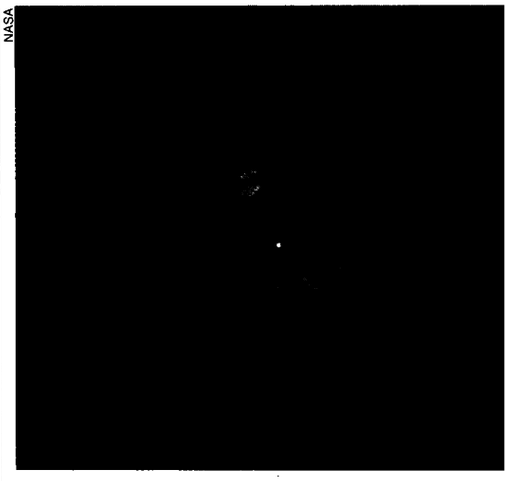
The panel would like to boost that figure significantly: to 25%-35% of all first-year engineering students by 1997. Reaching that goal, the report says, will require a number of steps, including regular visits to elementary and secondary schools by female engineers who can serve as role models, and compulsory programs on sexual harassment for all university students, faculty, and staff. The report also calls for written codes of behavior for engineering students and new editorial guidelines for the notoriously misogynistic engineering student newspapers.

In the absence of measures to change the climate in engineering schools and in the profession itself, some say there isn't much point in attracting more women. One woman, quoted anonymously, complained of discrimination in salary and job assignments and concluded, "All of these have been so disturbing to me that I asked myself whether I am indeed doing anyone a favor by encouraging women to join the profession."

–Doug Powell

Doug Powell is on the staff of the Information Technology Research Centre at the University of Waterloo in Ontario.

NASA



Hot One From Hubble

The space telescope unveils one of the hottest stars on record: the white dwarf in the nebula NGC 2440. The nebula—thrown off during the star's earlier life as a red giant—is set ablaze by extreme ultraviolet radiation from the star. "We use the nebula as a photon counter" for the high-energy radiation, says astrophysicist Sally Heap of the NASA Goddard Space Flight Center in Greenbelt, Maryland. By comparing the result with the star's visible brightness, she and her colleagues took its temperature: 200,000 degrees Celsius or more.

–T.A.

INTELLECTUAL PROPERTY

A New Wrinkle in Retin-A Dispute

Two years ago, the University of Pennsylvania sued an emeritus professor on its medical faculty, Albert Kligman, accusing him of conflict of interest and appropriating the university's rights to Retin-A, a much-ballyhooed antiwrinkle cream Kligman invented. Now, the university is showering Kligman with praise. A recent Penn press release honored him as a "major contributor in his field" of dermatology, "a well-regarded and admired instructor among students," and a "leader among his peers" whose inventions "have long and outstanding implications for medical research and treatment." What made Penn change its tune?

NYT PICTURES

Back in Penn's favor. Albert Kligman.

The short answer is that Kligman and his commercial partner, a Johnson & Johnson subsidiary called Ortho Pharmaceuticals, have agreed to cut the university in on new proceeds from Retin-A. Though neither side will reveal the precise terms of the deal, it could potentially channel millions of dollars to the university's medical school. Just how much will depend on whether the Food and Drug Administration (FDA) approves the drug; its verdict is expected later this year. But the long answer is that what began as a marriage of convenience—Penn supplied Kligman with resources and he provided the university with a link to the world of applied science and some extra income for its medical school—foundered over different interpretation of who should retain control of Kligman's inventions. Without revealing the details, both sides have now made up once again—not agreeing in principle on who should control Kligman's patents, but agreeing in practice that the university will get more of the revenues than either Kligman or Johnson & Johnson originally intended.

So, does the university's renewed love affair with Kligman suggest that it has sold its principles for a small pot of gold? Not precisely, because nobody has ever disputed that Kligman is the intellectual father of Retin-A. In the 1960s, he discovered

that the compound is effective in treating severe acne, and he and Penn both benefit from the patent for that application. What drove the marriage onto the rocks was the fact that when Kligman later filed for a patent on the use of Retin-A for treating "photoaged skin," he didn't include the university as a co-owner and assigned exclusive rights to the invention to Johnson & Johnson.

Penn filed suit, charging that Kligman had used junior faculty members and hospital facilities to conduct the studies that established the drug's value. Kligman and Johnson & Johnson disputed these charges, claiming that Kligman did the work in his own time (*Science*, 2 March 1990, p. 1028). The dispute never went to trial. Instead, after 26 months of wrangling, the university dropped its suit in March, permitting Kligman to retain the patent in return for a share of the antiwrinkle cream profits.

JOHNSON & JOHNSON

Billion-dollar drug? An FDA panel has voted to approve Retin-A to fight wrinkles.

The truce has come at a good time for everyone involved. Just weeks after the settlement, Retin-A cleared a key hurdle at FDA. An independent panel of experts gave the product a favorable review in a meeting at FDA on 9-10 April—even though the panel was apparently not persuaded that the compound actually heals damaged skin. According to panel chairman Arnold Schroeter, a dermatologist at the Wright State University School of Medicine, Johnson & Johnson "only had data to support the claim that there was improvement in the appearance of mottled pigmentation, roughness of the skin, and fine wrinkling"—not healing. Rather than reject the application entirely, Schroeter says, the advisory committee decided that FDA should simply change the label to emphasize that the cream has cosmetic benefits only.

If this leads to FDA approval the product could become extremely lucrative. One attorney involved in the litigation between Penn and Kligman says marketing experts believe it could earn $600 million to $1 billion a year. Schroeter agrees that it's no exaggeration to speak of potential annual revenues of $1 billion or more.

Penn's press release says the university is "particularly grateful for the opportunity to repair its relationship with Dr. Kligman." No wonder.

–Eliot Marshall

BIOTECHNOLOGY

Swiss Drug Giants Seek Antidote to Activists

BASEL—Kaspar von Meyenburg, head of pharmaceutical biotechnology research at Ciba-Geigy in Basel, has only to glance out of his office window to be reminded of what might have been. Fifty yards from his desk is the site once earmarked for Ciba-Geigy's Biotechnikum—a state-of-the-art pilot production plant that would have brought 120 new jobs to the city and high-tech drugs to the rest of the world. Last December, though, company managers abruptly abandoned their plans to build the $125 million facility in Basel. It will now be constructed in Huningue, less than half a mile away but on the other side of the border with France. The reason? Activists opposed to genetic engineering had promised to fight the building permit all the way to the Swiss federal court—a process that could have taken more than 2 years. France, it seems, provides a more secure home for biotechnology than Switzerland these days.

Threatened from one side by a vocal minority of environmentalists who oppose genetic engineering, and on the other by the Swiss public's ambivalence toward animal experimentation, the nation's world-renowned pharmaceutical giants are getting increasingly nervous about investing at home. And it's not merely production facilities that are at risk; research and development facilities are just as controversial. Executives at Hoffmann-La Roche, for example, are battling critics over the company's plan to build new research laboratories in Basel, and Sandoz officials are keeping an anxious eye on the local administration in Bern, which is expected to draft a law this year governing animal experiments. And while they are fending off such local threats, the drug companies are bracing for a campaign by foes of genetic engineering to impose strict national regulations on the technology.

As bad as it sounds, company officials haven't sounded maximum alert yet. They are encouraged that Ciba-Geigy's move into France in the midst of an unprecedented (for Switzerland) recession has provoked something of a backlash against the anti-genetic engineering activists. Nevertheless, they are warning that if the climate for biotechnology sours in Switzerland, the Swiss drug industry will be forced to shift its benchwork to newer laboratories abroad, such as those already established in the United States and Japan.

Were some or all of the behemoths to be hounded out of Switzerland, the impact on Basel would be catastrophic. The city's population is only 200,000, and its economy is dominated by Ciba, Roche, and Sandoz—each on the list of the world's top dozen pharmaceutical firms (see table). The trio have helped Basel become one of Europe's leading centers for biological research, and not solely because of their own labs—the city's academic research centers have become world famous, in part because of proximity to the giants. Take the Basel Institute for Immunology and the Friederich Miescher Institute. Both are supported directly by industry (by Roche and Ciba, respectively), and although the University of Basel Biozentrum has no direct financial links with industry, Biozentrum director Thomas Bickle says: "You shouldn't underestimate the intellectual contact." Swiss academic laboratories also face a direct threat from the opposition to genetic engineering and animal research. University of Zurich molecular biologist Charles Weissmann fears that if the climate gets any worse, "the best people will go to the United States and not come back."

Given that Switzerland's opponents to genetic engineering are no more numerous than those in the United States, why should the drug industry feel so threatened? For a start, say industry sources, Switzerland's affluence has bred complacency among those who don't oppose genetic engineering. "People forget where the money comes from," says E. Karl Weibel, who runs Roche's Basel biotech plant. Then there is Switzerland's constitution, which not only gives a strong measure of control over environmental and safety regulations to the cantonal, or regional, governments, but also allows minority groups to challenge the cantons' decisions through the courts. Moreover, under Switzerland's unique system of direct democracy, only 100,000 signatures are required to force a national referendum on any issue, and initiatives that pass must be implemented by the federal government.

The Top Twelve

	1991 sales* ($ billion)
Merck and Co. (US)	6.60
Glaxo (UK)	5.68
Bristol-Myers Squibb (US)	5.36
Ciba-Geigy (Switzerland)	4.49
SmithKline Beecham (UK/US)	4.21
Hoechst (Germany)	4.18
American Home (US)	3.67
Lilly (US)	3.66
Hoffmann-La Roche (Switzerland)	3.63
Johnson & Johnson (US)	3.60
Pfizer (US)	3.47
Sandoz (Switzerland)	3.33

*Sales of prescription drugs, year ending September 1991.

SOURCE: GLAXO