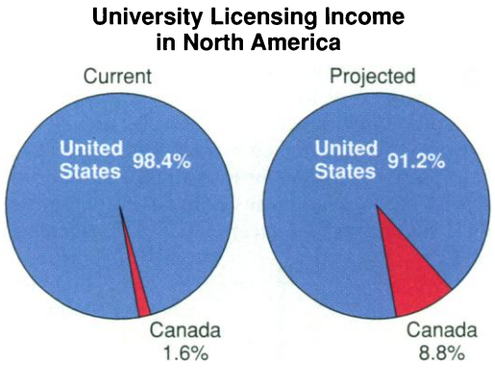
courses that direct contact with the professor is limited and student assessments have little meaning. "In practice, it will be very difficult applying that system without a global reorganization of our academic system," he says. **–CHIARA PALMERINI**

Chiara Palmerini is a writer in Milan.

CANADA

Schools Urged to Boost Technology Transfer

OTTAWA—Canada is losing valuable technology to other countries because of its policies on exploiting the fruits of university research, according to a new report by a high-level government panel. The answer, says the panel, is to give universities rather than individuals the right to commercialize publicly funded discoveries, as well as the money to do the job right. But some academics fear that such a policy, described in a draft report obtained by *Science*, would turn universities into toolboxes for industry and undermine basic science.



Bigger slice. Canadian officials want greater commercial return on academic R&D investment.

The report, "Public Investments in University Research: Reaping the Benefits," is the first product of the prime minister's Advisory Council on Science and Technology, created in 1997. Written by a nine-member subpanel of industry and university officials, it notes that only half of Canada's universities retain ownership of intellectual property (IP) generated by public funds or share it with the researchers; the others turn over full rights to the researchers. The result, says the panel, is that academe has become a "technology supply house for other countries," with faculty members "handsomely rewarded through consulting fees in return for assigning away IP rights" to companies from other countries, notably the United States.

Canadian universities collected a paltry $10 million last year from the marketing of university-based inventions, compared to $700 million in the United States, even though the government spends about one-tenth as much on academic R&D as its southern neighbor. Advisory Council member and expert panel chair Pierre Fortier says the only remedy is to "get some assurances from universities" that commercialization is part of their mission. "We cannot carry on with the laissez-faire approach which has prevailed until now," says Fortier, special adviser to Montreal-based Innovitech Inc. The panel's final report will be submitted 11 May to the full council, which will forward it to the Cabinet in early June. Observers predict it will receive a warm reception from a government eager to promote high-tech industry.

The draft report says that researchers should be obligated to make full disclosure of all IP created from federally funded research. The university, with few exceptions, should own the rights to its commercialization, while the creator should get a "share" in the form of equity or license income. The report proposes legislation similar to the U.S. Bayh-Dole Act of 1980, which gave universities the right to obtain title to inventions developed with federal funds and to grant exclusive licenses to patents based on those discoveries. Such a law would serve to harmonize what is now a hodgepodge of policies and practices.

As an alternative to legislation, the report also proposes that the granting councils adopt a new IP code and prohibit awards to universities that don't follow its guidelines for promoting commercial activity. Fortier says that consultations with 150 academic administrators have recently led the panel to conclude that's a preferable approach. "It's easier to administer," he says. "Legislation could take 2 to 3 years." The panel also recommends that Ottawa spend $30 million a year to hire and train commercialization staff in universities, noting that only 62% of the country's universities have any form of office to foster technology transfer.

While agreeing that universities need to become more attuned to the market, some academics question whether new spending on commercialization is the best solution to the problem of reaping more from Canada's investment in academic research. "Before you can imagine getting a lot of money from industrial applications, you must first invest more in basic research," argues Yves Gingras, professor of the history of science and sociology at the University of Quebec in Montreal.

Others, like Canadian Association of University Teachers executive director Jim Turk, worry that the recommended measures will transform universities from institutions of "open scholarship" to ones in which "commercial benefit" serves as the primary rationale for research. Turk takes issue with virtually every aspect of the report and is particularly incensed by its casting of faculty who assign IP abroad as somehow "treasonous" at a time when the government is allowing Canadian high-tech firms to be bought up by foreign interests. He also faults the panel's emphasis on commercialization rather than on the need to create new knowledge that might have applications, a view he sees as a "bizarre, Orwellian redefinition of innovation." **–WAYNE KONDRO**

Wayne Kondro writes from Ottawa.

JAPAN

Mixed Grades for 5-Year Science Plan

TOKYO—A 1995 law that led to Japan's first-ever 5-year plan for science and technology has helped boost spending and the number of scientists being trained, but it has been less successful in ensuring that the increased funding is well spent. That's the preliminary verdict of a committee of the country's top science policy-makers, in an interim report released last week. "There has been a fairly big effect ... on bringing up the overall level of research activity," says Mitsugu Ishizuka, a former official of the Science and Technology Agency (STA) and a member of the committee that drafted the report. "But there are aspects [of the plan] that haven't progressed as hoped."

A REPORT CARD ON JAPAN'S 5-YEAR PLAN

C or better

- Spending has risen dramatically
- 10,000 postdoc positions created
- Graduate school enrollment up sharply

Just passing

- Spending on facilities spread too thin

Not acceptable

- Negligible increase in lab assistants
- Ineffective evaluation of research programs and results

SOURCES (LEFT TO RIGHT): PRIME MINISTER'S ADVISORY COUNCIL ON SCIENCE AND TECHNOLOGY; COUNCIL FOR SCIENCE AND TECHNOLOGY REPORT

The review is likely to be influential, given its source: the Committee on Policy Matters of the Council for Science and Technology, which is chaired by the prime minister and serves as the nation's highest science advisory body. The panel examined such quantitative measures as the level of funding and the number of lab assistants and interviewed national laboratory heads, researchers, and business leaders.