MacDonald Dettwiler

Digital image of the Vancouver area, generated from Landsat V and Spot satellite data. The image was processed on MacDonald Dettwiler's MERIDIAN Image Analysis and Mapping System, and plotted on its FIRE 240 film image recorder. Landsat source data courtesy of the Canada Centre for Remote Sensing. SPOT source data supplied by Spot Image, copyright CNES 1987.

In Higher Education

At the base of Canada's wide-ranging capability and performance in science and technology lies one of the most developed systems of publicly funded postsecondary education in the world. There are a total of 266 colleges and universities to serve its population of 26 million. Canadian per capita expenditures on higher education are also among the world's highest.

The free flow of ideas and highly qualified personnel between the two countries has been a cornerstone of university life in Canada and the U.S. Many Canadian and American scientists and engineers have received training in each other's country.

At the heart of Canada's university research capability is the Natural Sciences and Engineering Research Council of Canada (NSERC), Canada's counterpart to the U.S. National Science Foundation (NSF). As Canada's largest single agency in support of university research, NSERC plays a key role in the development of a strong research base and in forging closer links among all players in the Canadian research arena.

Canadian university researchers cooperate with their American colleagues across many fields. In fact, when it comes to research papers which are internationally co-authored, they work with American scientists almost as much as with all the rest of the world's scientists put together.

Such partnerships are paying off handsomely. In 1989 a team of University of Toronto scientists working at Toronto's Hospital for Sick Children, together with colleagues at the University of Michigan, pinpointed the genetic defect which causes cystic fibrosis. The discovery of the gene means it will soon be possible to identify carriers and ultimately provide counselling to couples at risk.

The Canada-France-Hawaii Telescope (CFHT) is a shining example of cooperation. Situated atop the mountain of Mauna Kea in Hawaii, CFHT is a joint project of Canada, France and the University of Hawaii. The University donated the telescope's site and support facilities, while Canada and France shared the costs of construction. University astronomers from the three countries share time on this important instrument.

Canadian universities already perform one-quarter of all research and development in Canada, and interest in university-industry collaboration is growing.

Partnerships with industry will highlight the Canadian university research scene in the 1990s. Many Canadian universities have added a new role — the transfer of technology — to their traditional teaching and research function.

Canadian university researchers have been responsible for many important industrial technologies, from photo-degradable plastics which begin to decompose when exposed to sunlight, to the laser plasma mass spectrometer, which is used to detect ultra-trace impurities in materials.

With the support of Canadian industry and provincial and federal governments, an innovative system of centres and networks of research excellence is being put into place. These new research alliances cover such diverse disciplines as protein engineering, ocean production enhancement and neural regeneration. The Canadian operations of U.S. firms are free to participate as equal partners in these centres and networks, subject to the centres' policies on intellectual property.

The Tradition Continues

The trust and partnerships which have grown up between Canadian and U.S. scientists over the years promise exciting new opportunities for the future in areas as diverse as fundamental research and space technology.

HIGH-ENERGY PHYSICS

Canada and the United States are studying their possible collaboration in two exciting science projects for the next century. The Super-conducting Supercollider (SSC) is an American project in which Canada has been invited to participate. Similarly, Canada would invite American researchers to join in the Kaon Factory which has been proposed by the TRIUMF consortium headquartered in British Columbia, should the project proceed.

This year Canada and the United States agreed to become partners in the Sudbury Neutrino Observatory (SNO). Housed deep in a nickel mine in Sudbury, Ontario, SNO will permit Canadian and American scientists to measure the flow of neutrinos — a class of elusive, high-velocity sub-atomic particles — from the sun.

Reuters/Bettmann Newsphotos

The three doctors who found the defective gene that causes cystic fibrosis, left to right, Lap-Chee Tsui of Toronto, Francis Collins of the University of Michigan and Jack Riordan of Toronto, with Ashley Dryer, who has cystic fibrosis.

SPACE STATION *FREEDOM*

Canada's contribution to the international space station will be the all-important Mobile Servicing System (MSS). MSS will be one of the first elements launched on the Shuttle. A mobile "space crane," MSS will use highly sophisticated robotics and artificial intelligence to help astronauts construct and service the station. MSS is valued at over US $1 billion. It will build on the expertise in Canadian industry, university and government laboratories.

RADARSAT

Canada's Radarsat remote sensing satellite will be the world's first operational satellite to use synthetic aperture radar technology. Capable of penetrating clouds, Radarsat will provide 24-hour-a-day coverage of the earth's surface for polar navigation and resource management. The U.S. contribution will be a rocket launch to place Radarsat in a polar orbit. In return, Canada will guarantee exclusive data rights to a U.S. company for the American market.

In industry, government and higher education, Canada's science and technology capabilities form the basis for stronger partnerships with the United States in the future.