



pharmaceuticals, energy, food production, chemicals, mining, waste management and much more. Following the Second World War, the dominant technology was nuclear and electronics; we then moved into the computer era; we are now moving from chips to bugs.

Biotechnology: the exploitation of the tiny living machines, thousands of times smaller than a grain of sand, which in recycling the molecules of the organic world, also happen to manufacture substances prized by man.

There are hundreds of thousands of species of microbes adapted to an impressive variety of habitats: some flourish at temperatures near the boiling point of water, others prefer a near-freezing temperature; some live in fresh water, others in the sea; some breathe air, others are poisoned by it. Microbes mutate readily, evolve rapidly, and can be genetically engineered for even greater diversity. Life for a microbe is short and intense. A

Drs. Ronald Neufeld and David Cooper at McGill University. Finding microbes that can soak up radioactive wastes, or others that can be used to squeeze extra oil out of dry wells, takes teamwork.

typical bacterium, given food and oxygen, can reproduce every 20 min or so. Doubling in numbers and size at this phenomenal rate, its progeny would equal the Earth in bulk at the end of a day — if their growth were not regulated by feedback mechanisms; if, for example, yeasts, which ferment grape sugars to wine, were not poisoned by the very alcohols they produce.

Biotechnology is not new, but what's happening at McGill is. Here, three professors in the department of Chemical Engineering, David Cooper, Ron Neufeld, and Bohumil Volesky, have joined forces to form an interdisciplinary team. With funding from the National Research Council under the Fermentation Technology Program, administered by NRC's Prairie Region-

Les Drs Ronald Neufeld et David Cooper, de l'Université McGill. La mise en évidence de microbes capables de digérer des déchets radioactifs ou pouvant extraire du pétrole de puits asséchés fait appel à un travail d'équipe.

al Laboratory, they are working on microbes that can soak up radioactive wastes, on the production of industrial solvents and liquid fuel by fermentation, on microbial surfactants (substances, for instance, which change the surface properties of oil and thus could make "dry" wells flow again), and a number of other projects. (They are not working on the most publicized facet of biotechnology — genetic engineering.)

Ron Neufeld, whose training exemplifies the mix of disciplines in biotechnology, studied microbiology, and after working in industry, took a Ph.D. in chemical/biochemical engineering.

After identifying the bread mold with a pronounced affinity for ura-