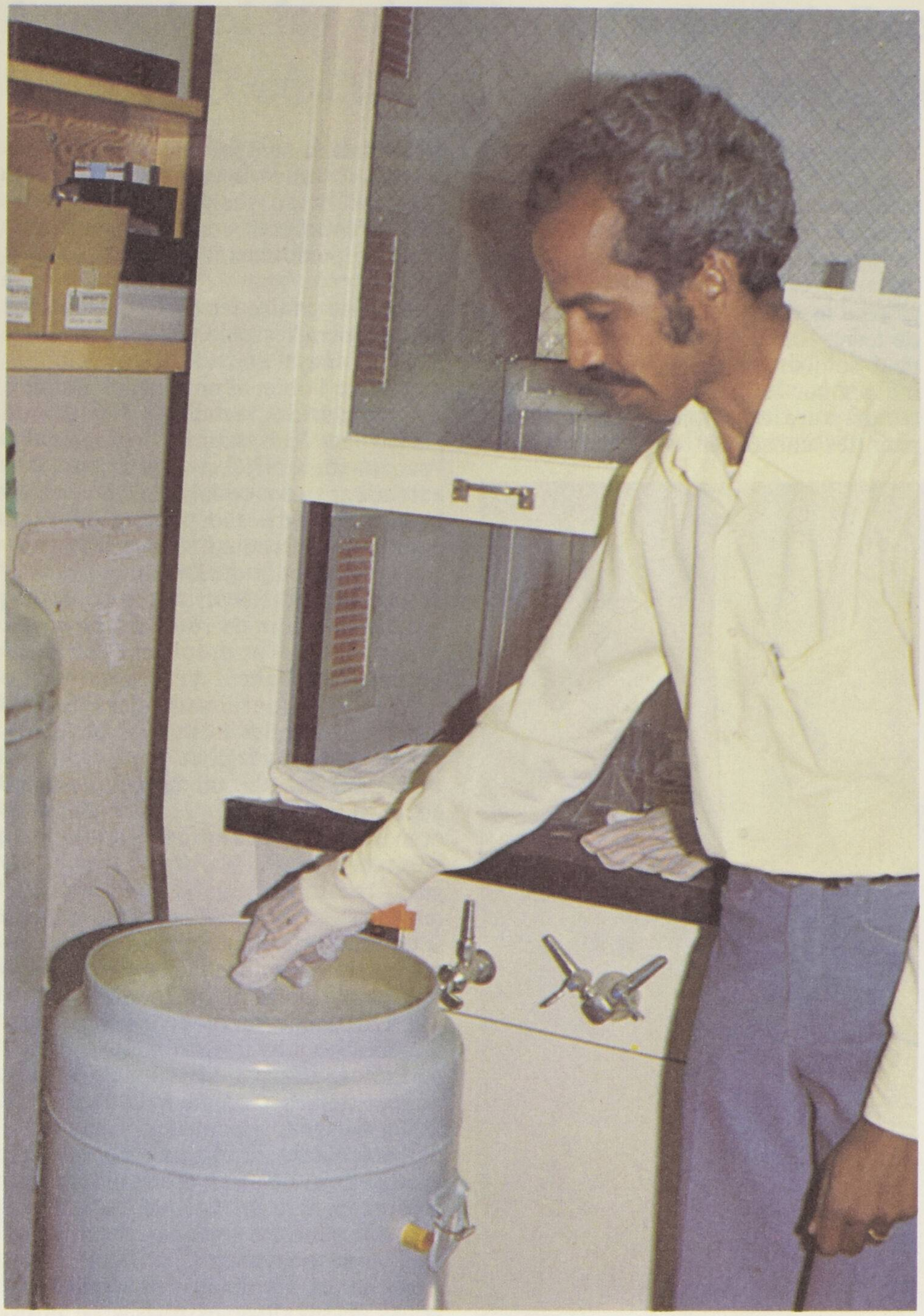

Michel Brochu, NRC/CNRC

Dr. Kutty Kartha withdraws an ampule of frozen plant material from a container of liquid nitrogen. His new plant preservation technique may prove very valuable to plant breeders.

Le Dr Kutty Kartha retire d'un récipient rempli d'azote liquide un échantillon de matériel cellulaire de plante. La nouvelle méthode de conservation des plantes qu'il a mise au point pourrait être d'une grande utilité pour les pépiniéristes.

was to grow them in the field, an expensive and risky business as a single outbreak of disease or a spell of bad weather could wipe them out, destroying irreplaceable strains.

According to Dr. Kartha, research at his Saskatoon laboratory promises to make the freeze preservation of living plants a practical proposition: "Working with field peas, we have developed through careful experimentation a method of freezing pea meristem cells sealed in tiny glass ampules. Protected against freeze damage by a solution of the chemical dimethylsulfoxide (DMSO), they are brought down from +4°C to −40° at a controlled rate. It is in this critical temperature range that the risk of damage from ice crystal formation in the cell is greatest."

If the cells can be kept alive during this phase, further cooling will not matter, and the temperature can be lowered to −196°C, the temperature of liquid nitrogen. At this point, almost all biological activity is at a standstill and the cells exist in a kind of "suspended animation", little affected by the passage of time. They could conceivably be kept there for several years without losing their vitality. In fact, the technique is similar to the cryogenic process in which animal sperm is preserved in special "sperm banks".

The thawing of the cells, the reverse process, is equally critical. Dr. Kartha found through extensive tests that the best way to do it was to bring the cells to 37°C for 90 seconds. They can then be cultured in special growth media to produce normal plants.

"So far," he says, "we have stored pea meristems in liquid nitrogen for seven months and successfully revived them for growth into normal plants. As a result, we are hopeful that the day will come when many important plant varieties can be kept for long periods in liquid nitrogen, possibly in internationally operated "banks" of genetic material.

"Of course, the precise method of protecting each plant species against freeze damage in cooling and thawing will have to be worked out, but the technique appears very promising, and we are now applying it to several important food crops such as cassava, the field pea and the chick pea."

One of the most interesting outcomes of Dr. Kartha's work may be in resolving the conflict between our need to exploit natural resources and the desirability of preserving wild plant species threatened with extinction because of the destruction of their habitat. For example, in the United States, the fate of the little-known Furbish lousewort (a small weed related to the snapdragon) has pitted environmentalists against dam builders in a protracted legal battle. Under the terms of the Endangered Species Act of 1973, the construction of a dam that would destroy the main known habitat of this plant has been challenged in court.

"Now, it might seem foolish to halt a multi-million dollar dam construction project because of a few dozen snapdragon plants," says Dr. Kartha. "However, who is to say that at some future time mankind will not have a pressing need for the genetic material of this apparently useless species, perhaps as a new source of food or drugs? Once a plant is extinct, it is lost forever. To ensure that future generations have access to the genetic material of threatened plants is therefore worthwhile, for both practical and aesthetic reasons." □

Michel Brochu