much smaller bits of organic matter.

"If you follow that reasoning," explains Broten, "you'd expect fewer large molecules and a greater number of smaller ones. But, in fact, it really isn't that way, since the larger ones seem to be almost as abundant."

"The ion-molecule theory was already in difficulty when we made our previous HC_5N discovery," adds Kroto.

"Remember too," Broten stresses, "that space is a very hostile environment — exceedingly cold, and the gas extremely thin. Any ultraviolet radiation tends to knock the electrons off the atoms, causing molecules to dissociate."

If ion-molecule reactions aren't responsible for building up these large molecules, then what processes are? According to the Hoyle group, cosmic dust particles may hold the secret, helping to protect the developing organic molecules while radiation serves as a sort of ladle to keep the evolutionary soup stirring. Furthermore, they hold that the mechanics of an interstellar cloud might provide exactly the sort of bumping and jostling necessary to get biological activity going.

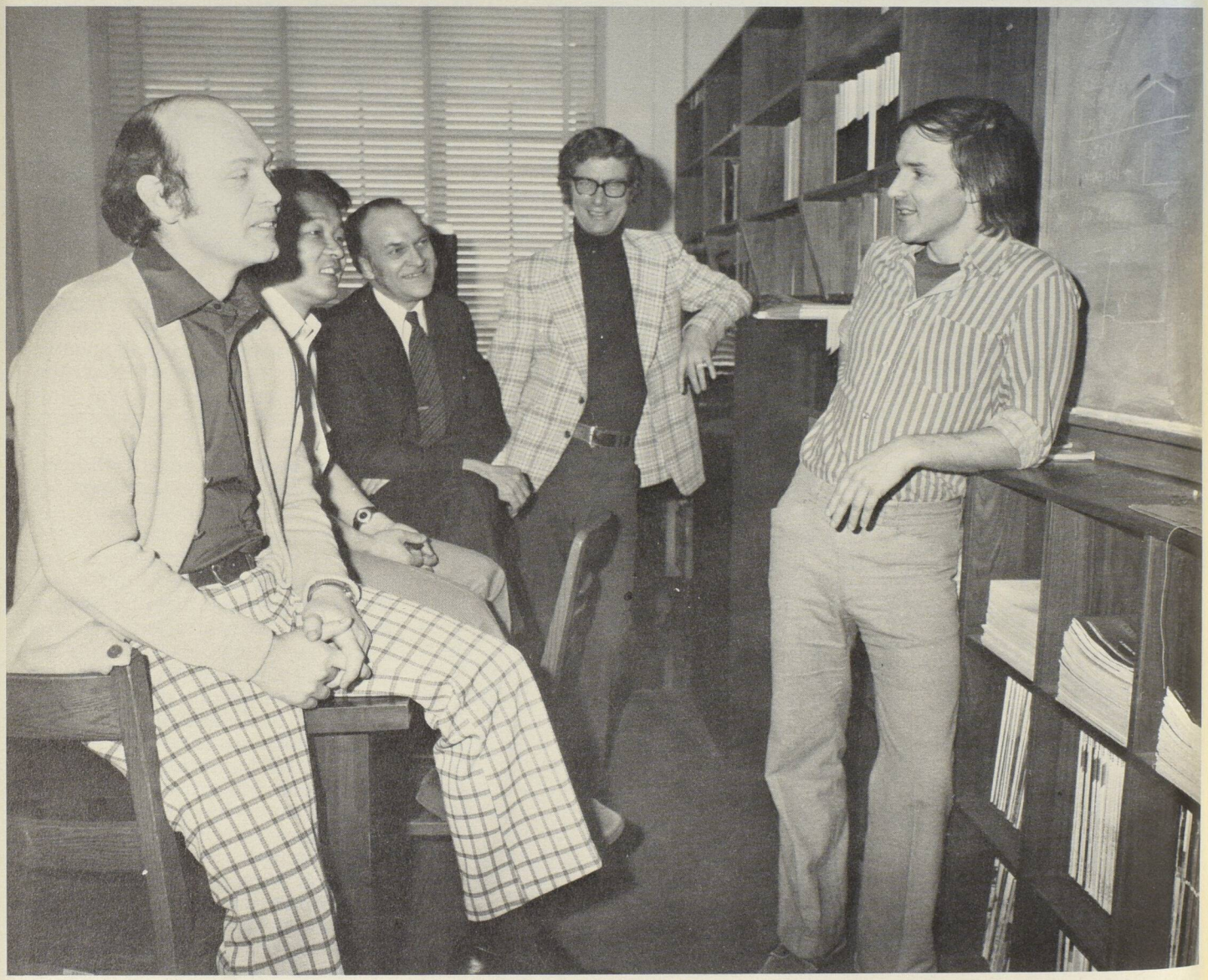
"The dust particles probably contribute in some way," says Kroto, "either as a protective screen, a kind of surface catalyst or in some manner we haven't yet discovered."

At this stage, although bent on solving the riddles of interstellar chemistry, Kroto hesitates to throw his hat in the mechanistic ring. "It's much too early," he reasons, "so far we've studied only the most intense and abundant species in these clouds. Without question there are many other molecules out there, less intense and as yet undetected. Before making any deductions, I feel we must discover more of them to have enough data to support any argument on mechanisms."

Since their initial discovery, the NRC astronomers have continued to comb the region of Cloud 2 for other transition frequencies in the HC_7N spectrum and have broadened the search to include other regions of space. As the hand is played out, they will also look for other perhaps heavier, molecules. Their next goal should be the most obvious — raising the ante by two carbons to HC_9N, molecular weight 123. Beyond that, it's anyone's guess, limited perhaps, only by the sensitivity of today's radio frequency receivers.

"Given some future improvements in equipment, I wouldn't be surprised at finding whole new generations of molecules," muses Kroto. "They may be just the pieces we need to solve the chemical puzzle of interstellar formation." □

Wally Cherwinski



Bruce Kane, NRC/CNRC

Molecular line sleuths (left to right) Lorne Avery, Takeshi Oka, Norman Broten, John MacLeod and Harry Kroto.

Lorne Avery, Takeshi Oka, Norman Broten, John MacLeod et Harry Kroto, les fins limiers qui ont découvert la raie moléculaire.