HOW ABOUT all that information "right on the tip of your tongue"? How about all those names you "know as well as your own"? Isn't there some way you can jog your memory into being more cooperative?

There just may be. Scientific research on the subject is far advanced—and a memory pill appears to be in the offing!

At centers as far apart as McGill University in Canada, Stanford University in California, and the University of Michigan, scientists are studying the mystery of how we remember. And laboratories now are translating their findings into chemical compounds that will help us remember better.

At McGill, Dr. D. Ewen Cameron markedly has improved the flagging memories of elderly people with yeast RNA (ribonucleic acid) injections. He gave the medication to 20 senile patients—and in every case he was able to report substantial improvement.

Dr. Cameron also got results by giving patients RNA tablets, although the pills took longer to work than the injections. But pharmaceutical chemists now are working on a fast-acting pill. They hope to eliminate injections entirely and make it possible for not just the elderly but *everyone* to sharpen his memory overnight.

With RNA pills, it will be possible to learn foreign languages in a short time. Readying a speech for the PTA will be a breeze. And politicians will be able to remember with ease both voters' names and, hopefully, campaign promises.

How did pioneering Dr. Cameron hit upon RNA as a memory-boosting drug?

His research was the logical outgrowth of an earlier discovery that our genes "remember" personal characteristics and transmit them from generation to generation by means of a complex molecule of the nucleic acid DNA (deoxyribonucleic acid).

How Is Information Stored?

Somehow, this molecule stores up the infinity of subtle traits passed on through heredity. So why couldn't a related molecule contain the secret of how the mind stores information?

Dr. Cameron and his associates at McGill were wondering about that—and so, as it happens, were U.S. scientists.

At the University of Michigan, a brilliant psychologist, Dr. James McConnell, had been "educating" flatworms. That is, he had been training their primitive nervous systems to respond to light flashes by shocking them with a mild current until they reacted. Then he would cut the "educated" worms in half!

The flatworm is a wondrous creature which, if cut in two, can grow a new tail from its head part and a new head from its tail part. Dr. McConnell discovered that, when his light-conditioned flatworms grew new heads and tails, they had the same built-in response to light flashes that the "parent" flatworms had had.

Fine. But why is it so? Two scientists at the University of Rochester, Dr. William Corning and Dr. Roy John, popped halves of flatworms which they similarly had light-conditioned into a solution containing RNAase, an enzyme which destroys RNA. While the *head* halves retained what they had learned, the *tail* halves grew new heads which had forgotten completely!

The secret was out: RNA was destroyed by the effects of RNAase on the tails before they had a chance to share their light-flash "memory" more lastingly with the new heads. It (or some part of its complex molecule) was the mysterious chemical link the mind depends on to store information—that is, to remember.

Back at the University of Michigan, Dr. McConnell pushed the RNA experiment one step further by taking light-conditioned flatworms, chopping them up fine, and feeding them to "uneducated" fellow flatworms. Amazingly, the inch-long cannibals thereupon took only half as long to become light-conditioned.

What It All Means

The explanation: RNA from the cannibals' chopped-up, "educated" brothers entered their nervous systems to communicate, chemically, a "memory" of what any good flatworm is supposed to do when a light flashes; that is, cringe.

And the significance of all this for human beings? Apart from the dramatic results already obtained with RNA among the aged—and the still more dramatic prospect of a heightened "recall capability" for anyone who wants it—RNA research is helping pull together the intriguing but isolated data which man has been assembling about the puzzle of how his mind remembers.

One recent project found that when we remember we cause the brain to channel random electric currents into specific circuits. Up to a point, this process strengthens those circuits—that is, it makes the memories permanent.

Once we have the information pretty clear, however, we can get a better grip on it for the long pull *by putting aside the subject entirely for hours or even days.* Cramming is not recommended. It not only causes fatigue, the source of misinformation storage, but it also impairs the quality of information the mind already has stored correctly.

Benton J. Underwood, an experimental psychologist at Northwestern University, reports that his studies show no difference in the ability of a slow learner to *retain* what his mind stores up; it just takes him longer. He may have to spend three hours to get what a faster learner can pack away in one hour, but he can end up doing just as well on a test.

Furthermore, slow learners do not forget faster than rapid learners. Their lagging supply of RNA or its sluggish performance burdens them with the need to spend more time in learning—especially on difficult material. But they have the same constant rate of forgetting (about 20 per cent in 24 hours) as people with the keenest memories.

Giving a Lift to Memory

While much of how the human brain stores memories never may be fully explained, doctors do know that concentrations of RNA rise during activity and probably also during learning. A means of assisting this rise with an RNA pill, whenever the need to do so occurs, will be a real step forward.

In examining blood from normal individuals and comparing it with samples from those with defective memories, Dr. Cameron's researchers at McGill also have found that the forgetful individuals have larger amounts of RNAase (the RNA distroyer). Some means of reducing RNAase seems to be the solution.

Memory studies depend heavily on data from amnesia research. Why does memory always return from the past toward the present by gradual stages when a person receives a blow on the head? Why does it unfailingly stop short and never permit him to recall the interval just before the blow? Why does a child who bangs his head violently lose half his vocabulary sometimes, and always the half he learned more recently? What else besides a more or less prolonged short circuit of RNA-protein metabolism underlies the time it takes the brain, when it suffers a concussion, to reactivate its memory systems?

For years, Department of Defense scientists have known that one of the main concerns of Soviet medicine is intensive memory research. It is quite conceivable that some of the still unpublished results of that research may account for Russian successes in space flights, oceanography, and other scientific developments.

Who knows? In the process of developing a memory pill, scientists also may discover what causes the mind to forget what peace is like and what makes men go to war.