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— Centrifugal Force

1. Sample suspended in a medium enters chamber.

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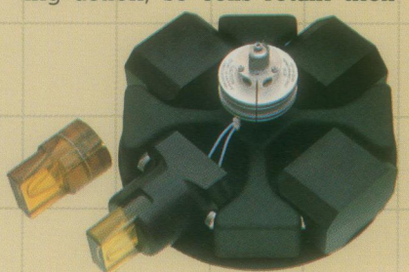

Cell concentration is high with the Beckman system. Typically 10^{10} to 10^{12} cells can be separated according to size, and synchronously dividing cells can be obtained for cancer research and drug inhibition studies.

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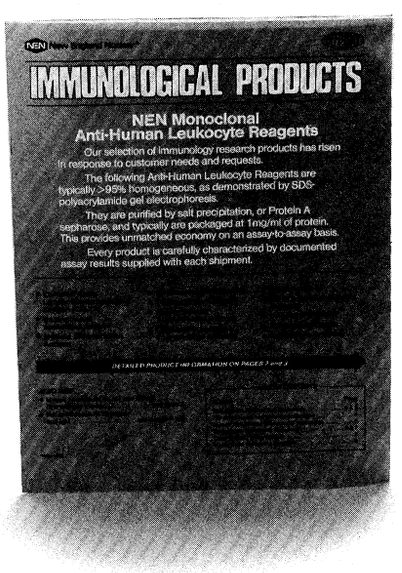

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COVER

Snowshoe hare (*Lepus americanus*) manipulating a winter-dormant twig. These herbivores reject resinous plant parts such as buds and catkins of alders, birches, and poplars by dropping them as the twig is eaten. The resinous parts are rejected because they are defended by secondary plant metabolites. See page 1023. [Gregory D. Wieland, College, Alaska 99708]

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Vice President
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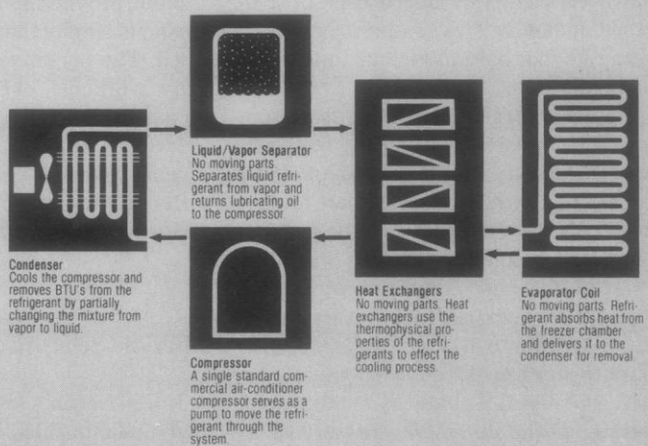

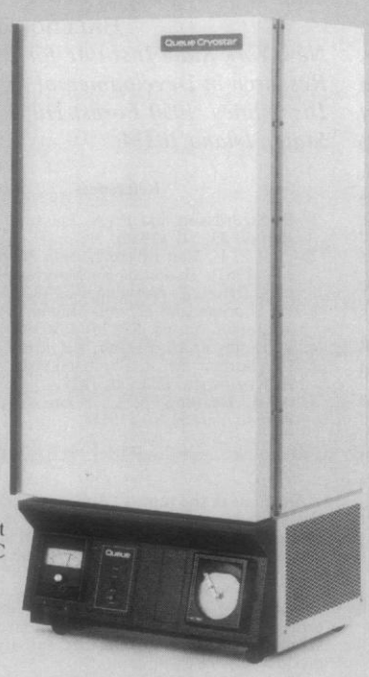

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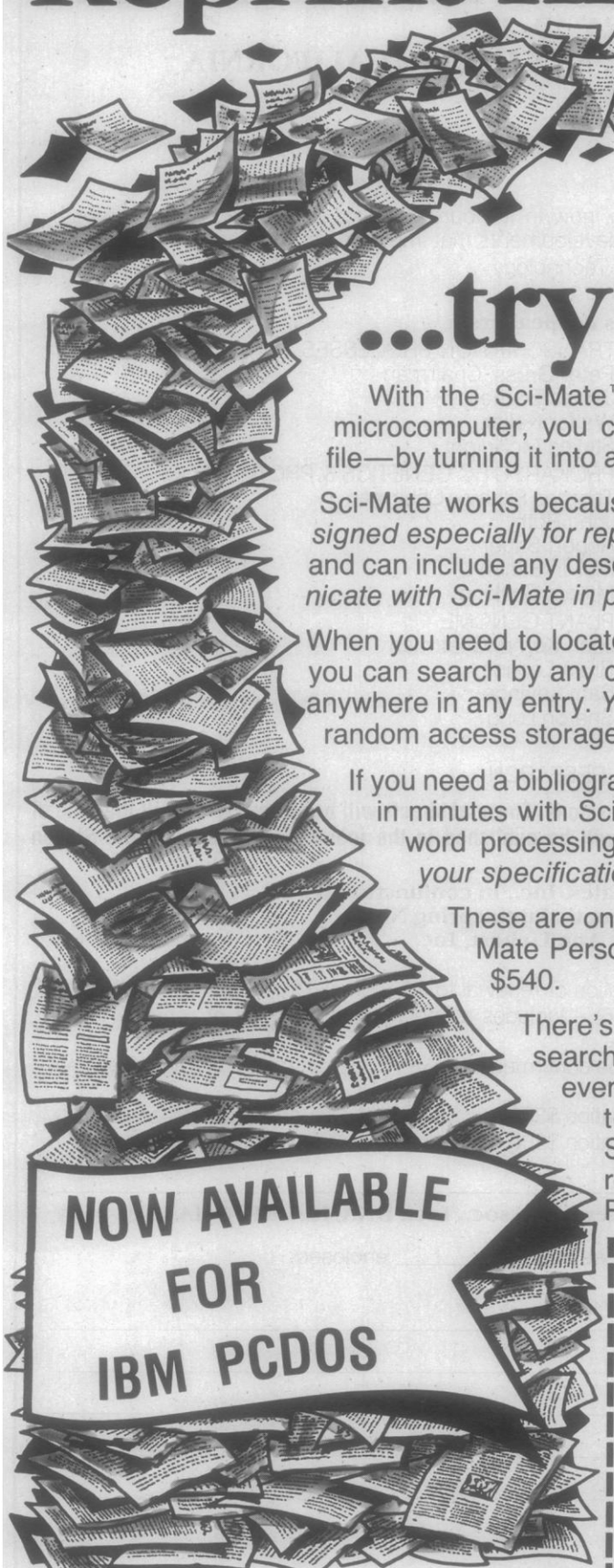

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2 December 1983, Volume 222, Number 4627 **SCIENCE**

Frontiers of Research in Neurobiology

This issue of *Science* contains an article by Dorothy T. Krieger on brain peptides, a large number of which have been discovered in the vertebrate central nervous system within the past decade. Study of these peptides and of their possible functional roles is one of the most active areas of scientific research and is at the frontier of work in neurobiology. The complexity of the brain is yielding to scientific analysis and new pathways are being opened to the study of behavior.

These recent discoveries grew out of investigations into the brain's control of the endocrine system and the hypothalamic hormones (peptides) that mediate this control. It was discovered that such peptides not only are present in the hypothalamus and pituitary but are widely synthesized and distributed throughout the brain; that they have neurotransmitter or neuromodulatory functions; that they are involved in the regulation of homeostatic systems in many ways; and that they mediate such crucial behavioral systems as those involved in pain and pleasure, learning and memory, and stress and coping. Because some of these peptides were previously discovered in nonneural tissues and in invertebrate species, fascinating questions are raised concerning their evolutionary origins and role in intercellular communication at a fundamental level.

Current research in the life sciences is highly dynamic, including effective inquiry at every level of biological organization, from molecules and cells to organisms and populations. The neuropeptide work is likely to be illuminating at each of these levels of organization. Moreover, the basic research is pregnant with implications for clinical investigators and reminds us of what a powerful stimulus clinical observations can provide for fundamental inquiry. It was Avery, MacLeod, and McCarty's curiosity about pneumonia that led them to the pneumococcus transformation experiments and hence to the discovery that DNA is the genetic material. So, too, curiosity about stress-related disorders has led to fundamental progress on neuropeptides and other neuroregulators.

Another clinical stimulus to basic research has been the growing realization that much of the world's burden of illness is behavior-related. The Centers for Disease Control have estimated that about half the mortality from the ten leading causes of death in the United States is strongly linked to long-term patterns of behavior (life-style). Such known behavioral risk factors as cigarette smoking, excessive consumption of alcoholic beverages, use of illicit drugs, certain dietary habits, insufficient exercise, reckless driving, noncompliance with medication regimens, and maladaptive responses to stress are involved in the pathogenesis of cardiovascular diseases and cancers as well as accidental disabilities and other disorders.

Major institutions concerned with the science base for health have increasingly addressed the relation of behavior to health. A series of reports from the Institute of Medicine, National Academy of Sciences, has had a stimulating effect on the Public Health Service. A joint initiative has been proposed by the National Institutes of Health and the Alcohol, Drug Abuse and Mental Health Administration. There is strong support for such an initiative not only in the Department of Health and Human Services but in the Congress. Moreover, the World Health Organization is actively planning a new program of research on health and behavior in developing countries.

Eventually, advances in disease prevention and health promotion may result from fundamental research on the effects of brain peptides on behavioral systems. The development of therapeutic approaches will probably be facilitated if the origins, mechanisms of action, and functional roles of these peptides are more clearly delineated and more physiological and pharmacological studies completed. Concomitantly, this line of inquiry provides a powerful stimulus for research in a broad range of biobehavioral sciences.—DAVID A. HAMBURG, *President-Elect, AAAS, and President, Carnegie Corporation, New York 10022*

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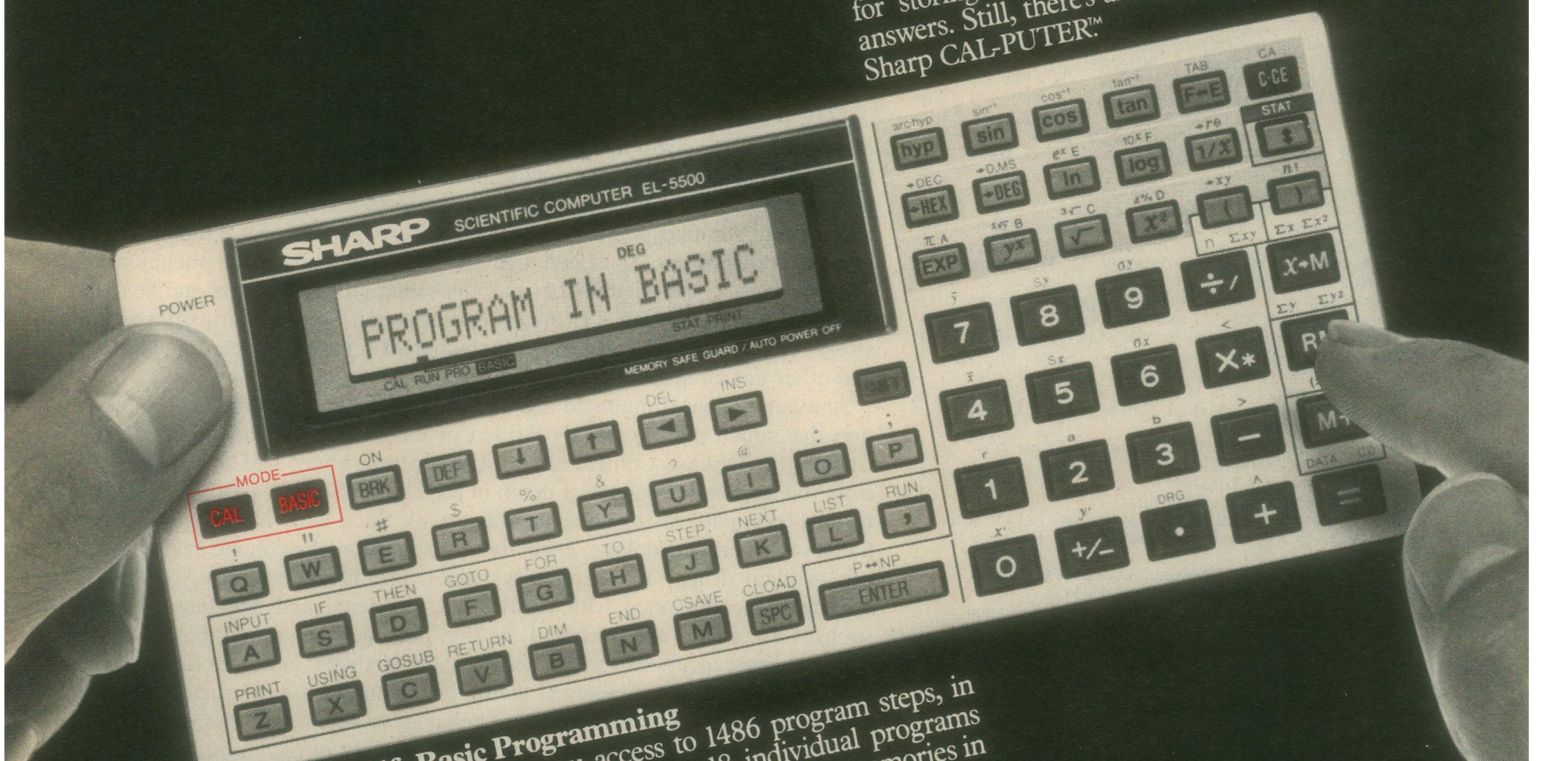

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