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Time-lapse confocal images of four cells migrating in living slices of cerebral cortex from newborn ferrets. The temporal sequences are depicted in false color with the final position shown in red. The diversity of migratory pathways may disperse young neurons widely from their sites of origin. These neurons migrated approximately 10 to 25 micrometers per hour. See page 299. For additional Reports, Perspectives, and News stories that focus on the neurosciences, see This Week in Science. [Image: M. Dailey]
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The Dimensions of the Brain

We are in the middle of what has been characterized as the Decade of the Brain. Perhaps there has been no era in history in which both the opportunities and importance of the brain needed more emphasis. The opportunities at the research level are vast. Never before has the array of tools been so impressive. Not only are new techniques available for probing the molecular biology and biochemistry at the cellular level, but computers and information processing are providing insight at the circuitry level, and various noninvasive or quasi-invasive probes can examine the whole brain in action. Research in classical areas of psychology is adding to the past foundations to become increasingly sophisticated about brain operation. There is real hope that complex processes, such as memory, information processing, perception, and so forth, will be understood on a level never appreciated before.

It could not have come at a better time because the problems of the world are truly challenging. The environment is threatened by a population growth that is proceeding largely unchecked. Increased crowding creates tensions and frictions on its own, and a struggle for diminishing resources brings out some of the worst features of any animal population, including mankind. An aging population with increased mental problems, and a population that does not properly care for the mentally ill, also creates new problems for the world. The complexity of modern civilization means that formal education, as distinct from learning by experience, must play a more central role.

In this aura of insecurity and competitiveness a better understanding of the brain and its functions is increasingly important. No single gene will be discovered for tolerance or compassion or altruism, but an understanding of the brain, its limitations, and its capabilities, can provide the background for education and therapy that can mitigate the stresses of the modern era and provide a happier life for its citizens. When Homo erectus evolved he and she had to cope with floods, pestilence, and predators, but not with cellular phones, a global economy, and bankruptcies.

The need for increased emphasis on brain research is not a sure cure for the ills of the world but it is a beginning. A better understanding of the brain can certainly help us solve such disorders as Alzheimer's, manic depression, schizophrenia, visual impairments, and hearing deficiencies. It may also lead us to the understanding of more vague and ill-defined responses such as aggressiveness, nationalism, bigotry, and sadism. Knowledge of how much of brain function is native and how much is learned becomes useful if education is to produce a more tolerant and peaceful world. A basic instinct that allowed prehistoric humans to distinguish prey from predator may turn into prejudice against foreigners in an urban world. If aggressiveness and identification with one's own group is inherited, they can still be modified by education, but it will require more work and an earlier start than if they are not innate.

The brain, however, occupies a particularly exalted and revered niche in the hierarchy of organs for study. As a result, many are repelled by a reductionist approach that has proved so successful in understanding other organs of our bodies. The unexpected and counterintuitive is amusing when it involves the curvature of light or weightlessness in space, but it is not greeted with detachment when it is uncovered in areas such as nationalism, aggressiveness, or competitiveness. Some are repelled by the idea that we can use education or medicines to overcome basic instincts. Others are unwilling to accept the idea that some instincts are anachronistic. Many are concerned that research in any brain area that is controversial is likely to be misused. So much misinformation abounds already that a little truth is unlikely to hurt.

Progress in neuroscience today is breathtaking. It needs more funding, more mutual sensitivity between scientists and laymen, and more speed in converting the frontiers of science to the applications of world anxieties. The new tools of neuroscience from molecular biology to the PET scan of the working brain are awesome. They can be used to enhance our lives as individuals and to improve society as a whole. The challenges are increasing, but fortunately, the technologies and the individuals needed to respond to the challenge are becoming available.

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Drugs from Third World Plants: The Future

I. S. Johnson (Letters, 14 Aug., p. 860) debunks persuasively the oversimplified, populist arguments why Eli Lilly & Co. owes millions in “royalties” to Madagascar for the exploitation of a common Vinca species in the development of the anticancer drugs vinblastine and vincristine. These naturally occurring alkaloids are historically instructive examples of medically important drugs, which, without further chemical transformation, continue to be obtained from plant sources. The future, however, of most new, medically useful drugs derived from the Third World or any other natural plant source is likely to be different.

Given present sophisticated isolation, separation, and especially structure elucidation techniques (for example, computer-aided mass spectrometry, nuclear magnetic resonance, and x-ray diffraction) as well as much more specific and material-saving screening procedures (for example, biological receptor technologies), the emphasis of most present medicinal research based on natural products is on the generation of molecular leads rather than final products. The synthetic chemist will either modify the original structure, thus coming up with a new drug, or else produce the natural product by synthesis. After a few hundred million dollars are spent to bring such a product to the regulatory approval stage, should royalties be paid to the Third World country where a few grams or even some kilograms of the original plant were collected? Or for a product originally derived from a marine organism collected within the frequently claimed (and disputed) 200-mile territorial limit of certain countries? Suppose the plant came from Switzerland? Should royalties be paid to a Swiss canton by a Lilly, Glaxo, or Ciba-Geigy? If we wish to contribute to the economic well-being of a Third World country—and I am all for it—let us do it on more logical grounds.

There is one instance where a real argument existed for financial reimbursement to a country for the exploitation of a widely growing local plant—the isolation of diosgenin from Mexican Dioscorea species, which, starting in the late 1940s, led to a booming steroid industry in that country (1). By that time, the Mexican government had imposed prohibitively high export duties on the Dioscorea plant as well as on diosgenin, in order to stimulate the establishment of a local advanced steroid manufacturing industry performing the much more complex chemical steps whereby diosgenin was converted into higher value finished hormones, such as progesterone and testosterone, that were then exported. This enlightened step led to the training of a new generation of Mexican chemists; to the eventual establishment of Mexican industrial research laboratories [for example, Syntex, which Fortune (2) in 1951 termed “the biggest technological boom ever heard south of the border”]; and to a budding graduate chemistry program at the National University (UNAM)—a process that within 10 years made Mexico the world’s center in steroid hormone production, research, and patents. According to Harvard University’s L. F. Fieser at a Gordon Research conference (3), more papers originating from Syntex in Mexico City were cited in his famous monograph (4) than from any other pharmaceutical company in the world.

One of the key factors in the collapse of these uniquely promising developments was precisely the type of naive populist thinking reflected in recent pronouncements about “drugs from Third World plants.” In the late 1960s, a different Mexican government decided to nationalize the plant collection and production of the cheap basic raw material, diosgenin, the base of the entire inverted pyramid of Mexican-produced hormones and synthetic steroids (oral contraceptives, topical corticosteroids, anabolics, and so forth), and to raise the price of diosgenin by several hundred percent. The ostensible argument was to bring more wealth to the poor peasants collecting the wild-growing yams, rather than continue supporting the flourishing export business of advanced intermediates and final products by the affluent steroid manufacturers. This was chemical OPEC (Organization of Petroleum Exporting Countries) thinking with one fatal flaw (5): While it may take decades to come up with economically attractive alternatives to petroleum as an energy source, it took the international pharmaceutical companies only a few years to come up with other alternatives (total synthesis, use of other competitive steroid raw materials, and more extensive use of microbiological fermentation techniques) that transformed the Mexican di-
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osogenin-based steroid industry into a minor player on the world stage—a transformation from which Mexico has never recovered.

As is so common in gray area problems of great complexity, where economic, political, and scientific factors as well as feedback mechanisms operate, oversimplified black and white solutions tend to prove counterproductive. The Mexican example shows that they can even lead to economic hara-kiri. Most of us want better new drugs, a more equitable distribution of the world’s wealth, less dependence by three-quarters of the world on the technological prowess of the other quarter, and so forth. But naive proposals and a refusal to learn from history will not accomplish those meritorious aims. Caveat lector!

Carl Djerassi
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Stanford, CA 94305

REFERENCES AND NOTES
1. For a recent personal view, see C. Djerassi, The Pill, Pygmy Chimps, and Degas’ Horse (Basic Books, New York, 1992), chapters 4 and 5.

Space Station Freedom

Ivan Amato’s article “Microgravity materials science strives to stay in orbit” (Research News, 14 Aug., p. 882) leaves a somewhat misleading impression regarding the ability of Space Station Freedom to support basic scientific research. Both of the reports cited by Amato (1) emphasize the need for a coordinated program of basic and applied research as well as the need for both manned space facilities (such as Space Station Freedom) and complementary unmanned facilities.

Space Station Freedom has been designed with the flexibility to be refitted in space over a 30-year period so as to accommodate a changing mix of research. This flexibility will allow both basic and applied research in a variety of disciplines to be done simultaneously. The foundation built by good basic research will progress to innovative commercial applications. Applied research is a follower, not a leader.

Amato cites the lack of access to space flight opportunities as hindering our understanding of basic phenomena. This is
true, but the picture will begin to change as a series of Spacelab missions fly in the 1990s. However, there is a limit to the kinds of experiments that can be conducted during short missions. Space Station Freedom will provide a substantial boost in research capability that will build on the results obtained from these precursor Spacelab missions. Another goal of the Space Station Freedom program is to ensure that investigators can rapidly pass through the system. There is no question that the current time from concept to flight is too long.

Two of the prime design drivers for Space Station Freedom are prolonged exposure to microgravity and a continuous human presence—capabilities that are needed to expand microgravity and life science research; capabilities which can only be provided aboard a permanent space-based research facility.

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Space Station Freedom,
Office of Space Systems Development,
National Aeronautics and Space Administration,
Washington, DC 20546

REFERENCES

Landsats Old and New

The 14 August ScienceScope item “Landsat to get a new home” (p. 867) paints a rosy picture of the Landsat program and its “new home.” What is not mentioned is that the Landsats so far defined to continue the program are nothing but clones of previous Landsats and represent 25-year-old technology. In the meantime, other countries, particularly France and Japan, have built or are building Earth-sensing satellites with performances that greatly exceed those of current (and planned) Landsats. It is hoped that Congress and the Administration will see the wisdom of bringing our Earth-sensing program into the 1990s before we find ourselves completely out-of-date.

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*Past President, American Society for Photogrammetry and Remote Sensing

Corrections and Clarifications

Figure 3 on page 253 of the report “Block of Ca2+ wave and Ca2+ oscillation by antibody to the inositol 1,4,5-trisphosphate receptor in fertilized hamster eggs” by Si. Miyazaki et al. (10 July, p. 251) was printed so that the sperm drawn on the computer display were not visible. Also, the scale bar for (F), which was 50 μm, was not clear. The correct figure is reproduced below.

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University of Southern California
Health Sciences Campus, Los Angeles

PROGRAM

LARRY H. KEDES, M.D.
University of Southern California
Introduction

W. FRENCH ANDERSON, M.D.
University of Southern California
"Gene Therapy for AML Deficiency"

DONALD KOHN, M.D.
Children's Hospital of Los Angeles
"Retroviral-Mediated Gene Transfer into Bone Marrow"

RICHARD MORGAN, Ph.D.
National Heart, Lung and Blood Institute, NIH
"Current Status of NIH AIDS Gene Therapy"

ELIZABETH JAFFEE, M.D.
Johns Hopkins School of Medicine
"Isolation and Characterization of Tumor-Specific Peptides"

RICHARD SAMULSKI, Ph.D.
University of Pittsburgh
"Adeno-Associated Virus: A Novel Vector for Human Gene Therapy"

DOUGLAS WALLACE, Ph.D.
Emory University
"Diseases of the Mitochondrial DNA"

GARY NABEL, M.D., Ph.D.
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F. Grignani (I)
Perugia (I), April 15-17

"Molecular Basis of Inflammation"
J. Navarro (USA)
Heidelberg (D), April 21-23

"Metabolism in the Female Life Cycle" M.P. Diamond and F. Natholine (USA)
Taormina (I), May 17-18

"Recent Advances on Monoclonal Gammapathies and Related Malignancies"
B. Barlogie (USA) and F. Dammacco (I)
Evian (F), June 3-5

"Inhibin and Inhibin-Related Proteins" H.G. Burger (AUS)
Siena (I), June 17-18

"Cell and Molecular Biology of the Testis"
M.L. Dufau (USA) and A. Isidori (I)
Majorca (E), September 13-14

"GTPase-Controlled Molecular Machines" D. Corda and S. Garattini (I)
S. Maria Imbaro (I), Sept. 22-25

"Developmental Endocrinology" M.L. Aubert and P.C. Sizonenko (CH)
Geneva (CH), Sept. 30 - Oct. 2

"The Challenge of Biotechnology: from Laboratory Diagnosis to Clinical Therapy" S.A. Aaronson (USA) and R. Verna (I)
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Brain Mapping—Understanding Neurodegenerative Diseases: Alzheimer’s Disease
Sunday, 14 February, 8:30 am-11:15 am
Session Chair: Joseph B. Martin, Univ of Calif-San Francisco
Joseph B. Martin, Univ of Calif-San Francisco
Introduction—The human brain mapping initiative
Leonard Berg, Washington Univ School of Med
Alzheimer’s disease: The clinical and pathological syndrome
Kenneth S. Kosik, Harvard Med School
From the amyloid precursor protein to the plaques and tangles: Where does it go wrong?
Alison Goate, Washington Univ School of Med
Mutations in the amyloid precursor protein gene in Alzheimer’s disease
Brad Hyman*, Massachusetts General Hospital
An analysis of the memory deficit in Alzheimer’s disease
Donald L. Price, Johns Hopkins Univ School of Med
The biology of Alzheimer’s disease: Lessons from studies of model systems

Cellular and Molecular Mechanisms of Memory Storage
Sunday, 14 February, 1:15 pm-2:15 pm
Keynote Address: Eric R. Kandel, Columbia Univ College of Physicians & Surgeons/HHMI

Perceiving the World: An Exploration of the Senses
Sunday, 14 February, 2:30 pm-5:00 pm
Session Chair: David Van Essen*, Calif Inst of Tech
Randel Reed*, Johns Hopkins Univ
Genes involved in visual processing
John E. Dowling, Harvard Univ
Retinal processing of visual information
David Van Essen*, Calif Inst of Tech
Central processing of sensory information—the visual system
John S. Kauer, New England Med Center/Tufts Med School
Distributed representation of odor information: A paradigm for parallel neuronal processing
Stephen G. Lisberger, Univ of Calif-San Francisco
Sensory-motor processing for smooth eye movements

Memory and Learning: Lessons from Models
Monday, 15 February, 8:30 am-11:30 am
Session Chair: Marcus Raichle*, Washington Univ School of Med
Larry R. Squire, VA Medical Ctr/Univ of Calif-San Diego
Brain systems and the structure of memory
Gary Lynch, Univ of Calif-Irvine
Biological origins and computational features of memory in brain networks
Marcus Raichle*, Washington Univ School of Med
Contributions of brain imaging to an understanding of brain areas involved in memory and learning
Endel Tulving, Rotman Res Inst of Baycrest Center, Toronto
How do we think about memory?
Panel discussion: Sharing the data involved in dissecting brain functions

Experience with Brain Mapping
Monday, 15 February, 1:15 pm-2:15 pm
Keynote Address: Floyd E. Bloom, Scripps Res Inst

Mapping Strategies
Monday, 15 February, 2:30 pm-5:30 pm
Session Chairs: Constance M. Pechura, Inst of Med; Joseph B. Martin, Univ of Calif-San Francisco
Robert Langridge*, Univ of Calif-San Francisco
Mapping molecules: Computations in time and space
Bruce R. Schatz, Univ of Arizona
Mapping organisms: From a worm genome to a human brain
Joseph Coyle*, Harvard Med School
A neuroscientist’s view of the human brain
Vinton Cerf*, Corporation for National Research Initiative
A computer scientist’s view of the human brain
Alan I. Leshner, Natl Inst of Mental Health
The Human Brain Project: The federal role
Panel discussion and concluding remarks

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distributed in lognormal patterns with an SD that was varied systematically in intervals of 0.05 from 0 to 0.9. Then it tested recovery patterns for 83, 84, 85, 86, 87, and 88 tags, respectively, testing SDs every 0.01 from 0.31 to 0.43. The smallest total error was obtained with 86 tags distributed with an SD equal to 0.36 natural logarithm units.

4. For example, we have also used the empirical concentration of each tag to calculate probabilities that the tag might be coincidentally present in multiple clones. This analysis shows, with similar statistical significance, that some clones are widely dispersed.

5. Clonal analysis with a single marker in some cases also falsely interprets cells that are part of two different clones as a single clone. These "jumping errors" are not affected by the choice of statistical model.

6. We used a series of viral stocks, each of which had been diluted once from a single concentrated stock. Each tube of virus that was used to infect one or more litters of animals was made by adding at least \(3 \times 10^6\) colony-forming units (CFU) to varying volumes of diluent to give final dilutions of 1:5, 1:10, and 1:20. Three such tubes of diluted virus were used in all, and one animal was infected with undiluted virus stock directly pipetted from the concentrated stock. The titer of the concentrated virus stock was \(3 \times 10^7\) CFU per milliliter, and thus the dilutions contained from \(1.5 \times 10^6\) to \(8 \times 10^3\) CFU per microliter. From each tube of diluted virus, a pipette was filled with 3 to 5 \(\mu\)L and each injection was approximately 1 \(\mu\)L. Because of the large number of viral particles sampled in 1 \(\mu\)L of any dilution, nonuniformities introduced by sampling should have been minor. No new, additive error would have been introduced.

7. C. Walsh and C. L. Cepko, Soc. Neurosci. Abstr. 18, 925 (1992). These experiments also provided an additional "control": when clones were labeled by infection at embryonic day 15 (E15) (as in our original study), but analyzed earlier, at E18, no widespread dispersion was seen in 12 clones. This would be expected if later widespread dispersion was caused by migration that had not yet had time to occur, but would not make sense if widespread dispersion resulted only from coincidental infections of different clones by the same tag. We have also made a new library with at least 150 tags (using alkaline phosphatase as a histochemical marker) and again observed many widely dispersed clones (C. Walsh and C. L. Cepko, unpublished results).


10. The computer program for simulating statistical models (MONTAG), written by George Church (Department of Genetics, Harvard Medical School), is available through anonymous internet ftp from rascal.med.harvard.edu. It will run on most virtual memory operating system machines without recompiling. Type "run montag" and answer the queries. If there are problems, contact church@gnome.med.harvard.edu.

11. For example, in the experiment illustrated in figure 2A (f), three tags were present. One tag was present in a nonclustered clone with two subunits. Therefore, we calculated the probability that in three plus one equals four hypothetical clones, one tag is present coincidentally in two different clones. For the experiment shown in figure 2C (f), the two widespread clones (tags 47 and 52) were each simulated by calculating the probability of getting three hits by one tag out of 11 + 2 = 13 total hypothetical clones. These assumptions are conservative, because analyzing each clone separately understates how unlikely it is that multiple coincidences occur within one experiment.

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display devices (such as the surface-stabilized ferroelectric liquid crystal device, or SSFLC, invented by Clark and Lagerwall) but various kinds of optoelectrical devices, switches, and shutters now undergoing testing.

Ferroelectric Liquid Crystals is intended to guide the reader through the basic physics and chemistry of the smectic C* phase to the rather complicated structures and experimentation currently used in the development of applications. The contributions to the book, which consists of six sections mainly with different authorship, have three basic themes (although they are not organized this way): the physics of the phase itself and its applications (described in two sections by Clark and Lagerwall), the chemistry in relation to physical properties (discussed in detail by Goody and in more general terms by Yoshino and Sakurai), and some theoretical issues (treated briefly in the sections by Pikin and Osipov and by Zekš and Blinc).

In their introduction to the physics of the smectic C* phase and to SSFLCs, Clark and Lagerwall focus on simple concepts (such as the Ginzburg-Landau description) and models (such as molecular models relating tilt angle to polarization) rather than attempt mathematical rigor. They begin with the fundamental properties of the smectic C and the chiral C* phase, including their general electric behavior, and then narrow their discussion to SSFLCs, a focus of their research, providing a (somewhat shortcut) review of the history of the subject and an extended exposition of the complicated local structures in SSFLC cells. The discussion covers the layer structures and the optical and electro-optical properties of the cells. Possible applications and questions of practical concern such as matrix addressing, wave-form influence, gray scale, and colors are discussed in their second section (though developments later than 1988 are not covered). In addition, the electroclinic effect in the smectic A phase of the chiral molecules, which has recently attracted new interest, is treated briefly.

The section by Goody on the microscopic aspects and chemistry of the smectic C* and related phases has the character of a monograph. It does not deal at all with the synthesis of the molecules but explains in a comprehensive and self-contained way what is known about the relationship between the chemical composition and the physical properties of the phases. Goody takes a rather critical approach and not only gives the rules of thumb but discusses the exceptions to them. He also provides an introduction to the phase behavior of liquid crystals in general, though only chiral smectic phases are discussed in detail, and an analysis of the sometimes misleading nomenclature used in the field (such as the word "ferroelectric" itself). The structures of various chemical moieties that can give rise to chiral smectic phases are also covered. These are contrasted and related to the macroscopic properties of the phase, with special emphasis on optical (activity, twist sense, birefringence, and optical tilt) and electrical properties (polarization and its magnitude, sign, and temperature dependence). Goody concludes his section with chapters on peculiarities of mixtures, which are important to applications, and the identification and alignment (orientation) of a chiral smectic phase, which are prerequisite to any investigation. Without doubt, this part of the book fulfills the interdisciplinary requirements of the field well and with its extensive tables and figures will also serve as a reference for those working on applications. The information here is augmented in the section by Yoshino and Sakurai, who provide data on phase sequences, transition temperatures, and some electrical properties of various chemical compounds.

Two sections on the theory of chiral phases (Pikin and Osipov on the general theory and Zekš and Blinc on the effects of electrical and magnetic fields) are disappointing. On the phenomenological level they focus exclusively on the Ginzburg-Landau approach, which is described elsewhere in the book, and ignore any other type of description, and they essentially reproduce older papers by the authors without any noticeable attempt to adapt them for a broader readership. The microscopic aspects are described in one of Pikin and Osipov's chapters by using the statistical mechanics approach developed mainly by the Dutch school. It conveys the (correct) impression that there is still no realistic microscopic model that can accurately reproduce all the electrical properties of the chiral phase.

Here the citation is out of sequence and some references are never cited in the text. Overall, this book serves its intended purpose (with some restrictions on the theoretical side). It reflects the state of the art as of 1990 and focuses on classical smectic C* phases without digressing too much into more exotic phases or polymeric systems.

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<td>The Tumor Virus Epidemiology Repository (TVER) contains sera and other biological samples from more than 13,000 patients and controls sampled in 12 different countries. The TVER was established primarily to support collaborative research on the role of Epstein-Barr virus (EBV) in Burkitt’s lymphoma, nasopharyngeal carcinoma, and related diseases. The TVER is able to adjust its collection to facilitate the development of new collaborative studies. In addition, some samples are available for reagents and independent research. The most extensive collections are serum samples from patients with Burkitt’s lymphoma (sera from more than 1,000 patients).</td>
<td>Dr. Paul H. Levine, Environmental Epidemiology Branch, DCE, NCI, NIH, Executive Plaza North, Room 434, Bethesda, MD 20892 (301) 496-8115</td>
<td>Free to Collaborating Investigators; Others: Dependent on Processing Time</td>
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<td>The National Institute of Allergy and Infectious Diseases and the National Cancer Institute have developed a repository of biological specimens from homosexual men. The specimens were collected through contracts with five major U.S. universities for studies of the natural history of acquired immune deficiency syndrome (AIDS). Information about applying for collaborative use of these specimens is available from the NIAID Project Officer or the NCI Co-Project Officer.</td>
<td>Chief, Epidemiology Branch, AIDS Program, National Institute of Allergy and Infectious Diseases, CDC Bldg., Room 240, National Institutes of Health, Bethesda, MD 20892 or Chief, Extramural Programs Branch, EBP, Division of Cancer Etiology, NCI, Executive Plaza North, Room 535, Bethesda, MD 20892</td>
<td>Free to collaborating investigators. Others: $70U/sell line</td>
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<td>The Epidemiology and Biostatistics Program of the National Cancer Institute has developed the Observed versus Expected (O/E) software system which calculates: (1) the number of observed events (e.g. cancer cases or deaths) in a study group at risk; (2) the number of expected events in a study group based on the rate of occurrence in some standard or referent population; (3) the ratio of observed to expected events; and (4) the significance of this ratio. The system is user friendly and capable of executing a series of calculations by different variables such as age, time group, date of exposure, age at date of exposure, duration of exposure, year relative to entry and cause of event. The O/E System provides tables by race, sex and user defined variables, allows user defined latency intervals and accepts standard or user prepared rates. O/E is written in COBOL and is exportable to most mainframes.</td>
<td>Ruth Wolfson, Epidemiology and Biostatistics Program, Division of Cancer Etiology, NCI, Executive Plaza North, Room 531, Bethesda, MD 20892 (301) 496-1696</td>
<td>Free to investigators interested in epidemiologic research</td>
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### Environmental Cancer

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<th>Description</th>
<th>Contact</th>
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<td>The National Cancer Institute has available the Animal Morbidity/Mortality Survey of Colleges of Veterinary Medicine in North America (also known as the Veterinary Medical Data Program). This unique registry of veterinary medical information represents patient data on animals seen at collaborating veterinary teaching facilities. 3 million hospital episodes have been abstracted and computerized in a standardized record format. Disease information is coded using the scheme of the Standard Nomenclature of Veterinary Disease and Operations. The tapes will be made available upon request.</td>
<td>Dr. Howard M. Hayes, Environmental Epidemiology Branch, Epidemiology and Biostatistics Program, Division of Cancer Etiology, Executive Plaza North, Room 443, Bethesda, MD 20892 (301) 496-1691</td>
<td>Inquire</td>
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<td>The Special Assistant for Environmental Cancer, Office of the Director, announces the availability of a limited number of copies of the following publications, which have been prepared under contract to NCI: Survey of Compounds Which Have Been Tested for Carcinogenic Activity, PHS-149, 1987-1988 and 1989-1990.</td>
<td>Dr. Thomas P. Cameron, Office of the Director, Division of Cancer Etiology, National Cancer Institute, Executive Plaza North, Room 712, Bethesda, MD 20892 (301) 496-1625</td>
<td>Inquire</td>
</tr>
<tr>
<td>The National Cancer Institute, along with the National Institute of Environmental Health Sciences, the Centers for Disease Control, and the Food and Drug Administration, has, for many years, supported a study by the Michigan Department of Public Health dealing with an accidental exposure to polybrominated biphenyls. The Michigan Long Term PBB Study is a well-maintained longitudinal database on 4,000 participants from rural farms in Michigan. This group was exposed to polybrominated biphenyls through consumption of contaminated farm animals and food products. The cohort was enrolled and characterized in 1975-76, establishing a database containing demographic, health history, medical condition, reproductive history, blood and tissue analyses, and chemical/environmental exposure information. Major life events—birth, death, cancer and major illnesses have been confirmed and updated annually. The project is currently completing a detailed recharacterization of all cohort members and their children. This longitudinal database is available for collaborative research investigating biological and human health outcomes from halogenated biphenyl exposure.</td>
<td>Dr. Harold E. B. Humphrey, Michigan Department of Public Health, Division of Health Risk Assessment, 3473 North Logan, P. O. Box 30195, Lansing, MI 48909 (517) 335-8350</td>
<td>Free to qualified investigators</td>
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