LETTERS
Newton and Mercury Poisoning: J. J. Goldwater; Cost of Research: J. W. Green; V. A. Lupidi; C. A. Mandel; Future Planetary Missions: N. W. Hinners; Giant Geoduck: W. Aron; S. O. Landry, Jr.; T. H. Lewis; Trace Elements: M. Colgan

EDITORIAL
R & D at Bell Laboratories

ARTICLES
Hurricane Allen's Impact on Jamaican Coral Reefs: J. D. Woodley et al.
Colonization Lessons from a Tropical Forest: N. J. H. Smith
Diagnosis of Cardiovascular Disease by Digital Subtraction Angiography: C. A. Mistretta and A. B. Crummy

NEWS AND COMMENT
Reactor Safety and the Research Budget
Physicists Give ISABELLE a Yes, But
Acid Rain Bills Reflect Regional Dispute
IOM Counsels Secret Service
Briefing: New Mistakes Uncovered at Diablo Canyon Reactors; Computer Data Banks; The Delights and Dangers; Weak Creationist Bill Filed in Maryland; Peace Commission Calls for Federal Establishment

RESEARCH NEWS
Drug Found to Help Heart Attack Survivors
Genes Regulated Through Chromatin Structure
Cornell Submicron Facility Dedicated

ANNUAL MEETING
Chronological Summary of Symposia and Lectures; Advance Registration and Hotel Reservation Forms

BOOK REVIEWS
Statistics in Britain, 1865–1930, reviewed by T. M. Porter; The Origins of Cauchy's Rigorous Calculus, R. E. Rider; Much Ado about Nothing, E. Sylla; Evolution and Variation of Multigene Families, W. R. Engels
REPORTS

A Gel Partition Model for Organic Desorption from a Pond Sediment:  
D. H. Freeman and L. S. Cheung ........................................... 790

Heparin Facilitates the Extraction of Tissue Fibronectin: B. A. Bray,  
I. Mandl, G. M. Turino ............................................. 793

Lamellar Twinning Explains the Nearly Racemic Composition of Chiral, Single  
Crystals of Hexahelicense: B. S. Green and M. Kossow .................. 795

Incorporation of 4-Amino-5-Hydroxymethylpyrimidine into Thiamine by  
Microorganisms: R. H. White ............................................ 797

Lectins Mimic Insulin in the Induction of Tyrosine Aminotransferase:  
J. D. Smith and A. Y.-C. Liu .......................................... 799

Islets of Langerhans: Dye Coupling Among Immunocytochemically Distinct  
Cell Types: R. L. Michaels and J. D. Sheridan .......................... 801

Further Heterogeneity of Human α Interferon mRNA Species:  
P. B. Sehgal, A. D. Sagar, I. A. Braude .................................. 803

Detection of Circulating Metallothionein in Rats Injected with Zinc or  
Cadmium: J. S. Garvey and C. C. Chang ................................ 805

Phototherapy-Induced Hypocalcemia in Newborn Rats: Prevention by  
Melatonin: D. O. Hakanson and W. H. Bergstrom ......................... 807

Increased Pyrophosphate in Fibroblasts and Lymphoblasts from Patients with  
Hereditary Diffuse Articular Chondrocalcinosis: G. Lust et al. ........... 809

Different Command Neurons Select Different Outputs from a Shared Premotor  
Interneuron of Crayfish Tail-Flip Circuitry: A. P. Kramer, F. B. Krasne,  
K. L. Bellman .............................................................. 810

Spatial Frequency Columns in Primary Visual Cortex: R. B. Tootell,  
M. S. Silverman, R. L. De Valois ....................................... 813

Competition Between Ant Species: Outcome Controlled by Parasitic Flies:  
D. H. Feener, Jr. .............................................................. 815

Individual Hippocampal Mossy Fiber Distribution in Mice Correlates with  
Two-Way Avoidance Performance: H. Schweger et al. ..................... 817

Early Experience Determines Song Dialect Responsiveness of Female Sparrows:  
M. C. Baker, K. J. Spiller-Nabors, D. C. Bradley ......................... 819

Melatonin: Identification of Sites of Antigonal Action in Mouse Brain:  
J. D. Glass and G. R. Lynch ............................................. 821

Optimization Theory Fails to Predict Performance of Pigeons in a Two-Response  
Situation: J. E. Mazur ....................................................... 823

PRODUCTS AND MATERIALS

Respiratory Gas Mixing Incubator; Automatic Image Analysis; Data Logger;  
Chemistry Analyzer; Microcarrier Stirrer; Instruction in Sample  
Preparation; Computer System for Laboratory Management; Literature .... 826

COVER

Severe soil erosion in a community along Brazil’s Transamazon Highway.  
Because of the broken terrain and torrential rainfall, soil erosion is a major  
constraint on the agricultural development of the colonization scheme. Note  
the bright red earth which is derived from weathered basalt. See page 755.  
[Nigel J. H. Smith, University of Florida, Gainesville 32611]
R & D at Bell Laboratories

Bell Laboratories is esteemed for its innovative excellence, creativity, and enlightened policies with respect to basic research. Other companies have been notably innovative and some have contributed to the advancement of science. But, in general, sponsorship of basic research by industry has left much to be desired. Some major research-oriented companies give freedom to a small fraction of their staff and are willing to forgo short-term benefits from them. Virtually all companies place heavy emphasis on obtaining proprietary advantages through the work of their scientists. This is, of course, expectable. But it can be carried too far. Emphasis on proprietary advantage creates an atmosphere of secrecy. Even after patents have been obtained, scientists often do not publish results of basic research. Few managements encourage publication. In this respect, Bell Laboratories is exemplary. Last year, its members published about 2300 papers, most of them in peer-reviewed journals. That seven of its scientists have received the Nobel Prize attests to the level of excellence of work at the laboratories. Research there has created new fields of science, such as radio astronomy. Its work in basic physics and related materials sciences has led research throughout the world. The discovery of the transistor led to a great expansion of solid state electronics that is the basis of modern communications and a host of consumer products as well as computers.

Bell Laboratories is the focus for research and development in the Bell System, which includes Western Electric, a manufacturing arm, and most of the major telephone companies of this country. At the beginning of 1981, Bell Laboratories employed 12,000 scientists and engineers of whom about 3000 were Ph.D.'s. As is common with companies carrying on R&D work, about 90 percent of the effort is devoted to development.

Good industrial laboratories have some advantages over academic institutions. For example, they tend to be better equipped and they are more effective in conducting interdisciplinary research. Another advantage is the ease with which results of basic research are conveyed to those who can use them in development and, conversely, the ease with which engineers can communicate their needs to scientists.

In the course of numerous visits to Bell Laboratories, I have noted many instances of good interaction between scientists and engineers. An important ingredient in channeling basic research toward useful objectives is a clearly stated mission. At Bell Laboratories everyone understands that the mission is to provide new telecommunications technology. This includes equipment designs, the engineering and planning of a telecommunications network, and the technology for its operation and maintenance. It is the function of research to support this mission. Within this framework, the latitude for individual scientists is remarkably broad. Research is for the most part concerned with the creation of new knowledge that will lead to technological development over the long term.

In the effort to attain excellence in research at Bell Laboratories, management has at least two objectives. One is the obvious wish to create an in-house capability for leadership. The second is to provide a good interface with research that is being conducted elsewhere. By very active participation in scientific meetings and by publishing, Bell scientists become well known throughout the world and are sought out for informal conversations. In addition, outside scientists exchange much information during visits to Bell Laboratories. By contrast, many companies maintain such a tight policy with respect to release of information that their employees are not particularly welcomed by other scientists.

Spokesmen for the Reagan Administration have held out the hope that with tax breaks, companies might be inclined to support more basic research. However, most companies do not seem to know how to create conditions under which research can flourish and at the same time be useful. They cannot be expected to attempt a slavish imitation of Bell Laboratories, but they could learn lessons there. —PHILIP H. ABELSON