

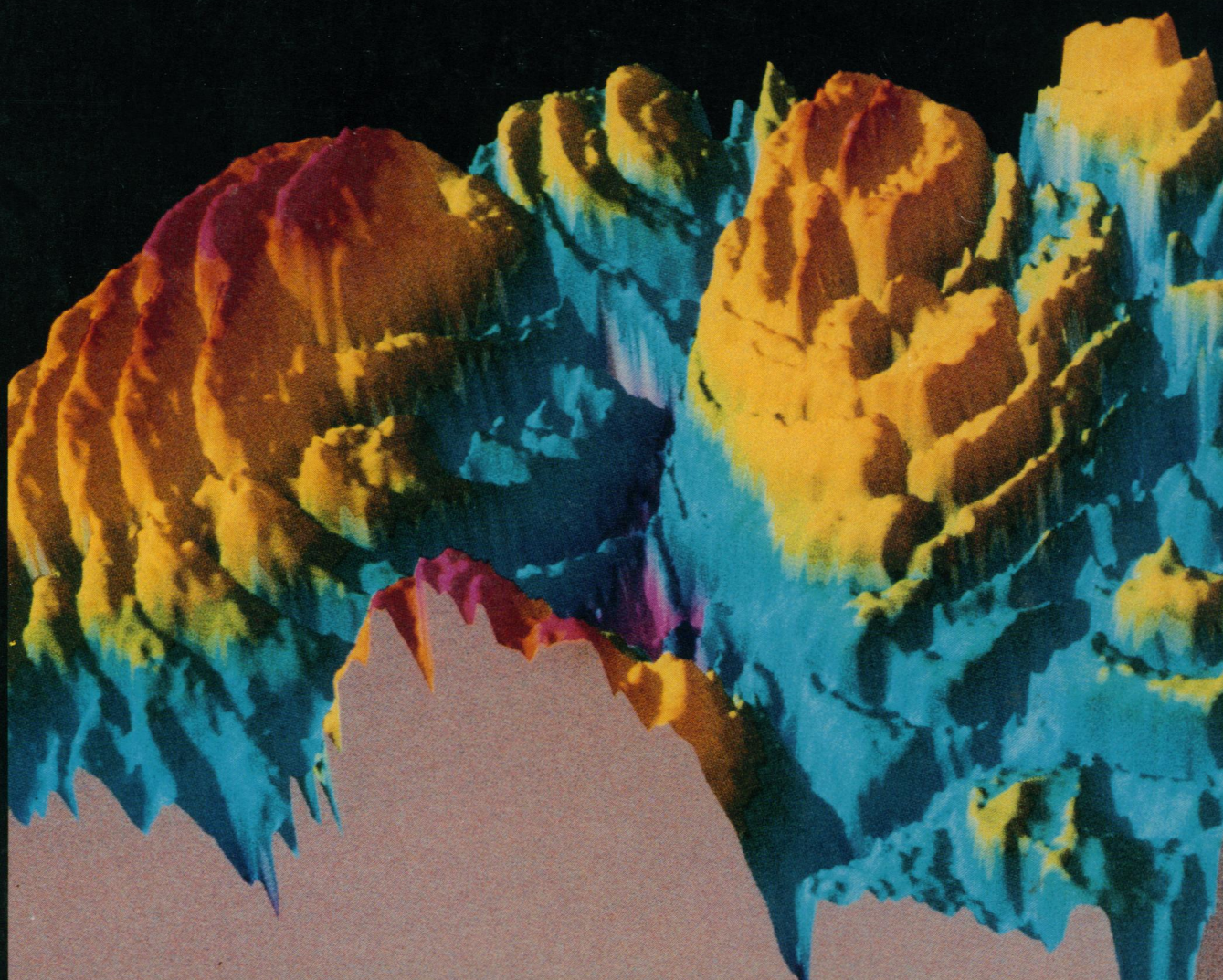
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29 MARCH 1991

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The Boston Digest

FRIDAY, MARCH 15, 1991

WEATHER REPORT

Today: Clouding up, mid-40's
Saturday: Partly Sunny, 45-50
High Tide: 3:24 am - 5:51 pm
Full report: Page 54

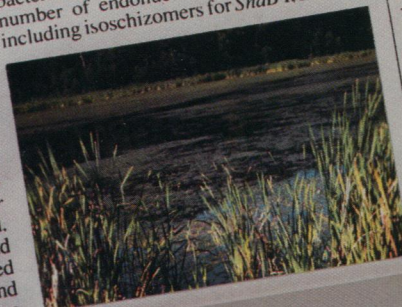
NEW ENGLAND BIOLABS DISCOVERS *Asc* I, A NEW 8-BASE CUTTER

Wetland Yields New Endonuclease

**GG[▼]CGCGCC
CCGCGC[▲]GG**

BOSTON - An exciting new restriction endonuclease has been found in an *Arthrobacter* species isolated from a Midwestern wetland. The researcher, Rick Morgan of New England Biolabs, reports that the bacteria was isolated from a small pond, dug nine years ago behind his brother's house. A recent family visit gave Morgan the opportunity to collect a water

sample from the mature pond. In Boston, NEB scientists isolated several bacterial strains from the "swamp" water. A number of endonucleases were identified, including isoschizomers for *Sna*B I, *Stu* I and



Scientists confirm global warming trend

By Judy Kramer
DIGEST STAFF

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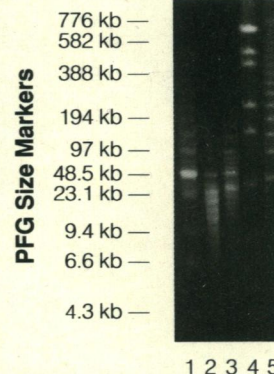
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Edited by C.C. Wang

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C.C. Wang, editor

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Contents

Preface: Understanding the Biology of Parasitism
—C.C. Wang

1. Sporozoite Malaria Vaccine: Where Do We Stand?
—V. Nussenzweig and R.S. Nussenzweig
2. Regulation of Cytokine Production in Chagas Disease
—R.L. Tarleton and G.S. Nabors
3. Experimental Immunologic Studies on Lymphatic Filariasis
—T.R. Klei
4. Glycosyl Phosphatidylinositol Membrane Anchors in African Trypanosomes
—K. Mensa-Wilmot, T.L. Doering, J. Raper, L. Buxbaum, G.W. Hart, P. T. Englund
5. The Procyclic Surface Protein of *Trypanosoma brucei*
—C. Clayton, J. Fueri, M. Mowatt
6. Variation in Expression of the 85 kDa Surface Antigen Gene Among Different Strains of *Trypanosoma cruzi*
—J.E. Manning, D.L. Fouts, B.J. Ruef
7. Biology of the *Leishmania* Surface Protease, gp63
—D.G. Russell, H.S. Ip, E. Medina-Acosta
8. The Ornithine Decarboxylase of *Trypanosoma brucei*: A Stable Protein in Vivo
—C.C. Wang

9. Metabolism and Mode of Anti-*Trypanosoma cruzi* Action of Gentian Violet
—R. Docampo, F.R. Gadelha, S.N.J. Moreno
10. Trypanothione Metabolism in the Chemotherapy of Leishmaniasis and Trypanosomiasis
—A.H. Fairlamb
11. The Hypoxanthine-Guanine Phosphoribosyltransferase of *Schistosoma mansoni*: A Potential Target for Chemotherapy
—S.P. Craig III, F.E. Cohen, L. Yuan, J.H. McKerrow, C.C. Wang
12. High-Efficiency, Stable DNA Transformation of the Human Parasite, *Leishmania major*
—S.M. Beverley, C.M. Coburn, G.M. Kapler
13. Gene Expression During Development of *Trypanosoma cruzi*
—S. Goldenberg
14. A Model for RNA Editing in Kinetoplastid Mitochondria
—B. Blum, N. Bakalara, L. Simpson
15. Development of Tools for Diagnosis and Epidemiological Studies of Chagas Disease: Detection and Strain Typing
—W.D. Degraeve, O. Thiemann, A.M. Goncalves, H. Avila, N. Sturm, L. Simpson, C.M. Morel

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1543 This Week in *Science*

Editorial

1549 An Overview of Overhead

Letters

1546 An Analysis of Citation Analysis: R. C. VON BORSTEL ■ Clean Air Act Amendments: W. G. ROSENBERG ■ Evaluating Teaching: J. M. PASACHOFF; W. DEBLER; T. D. JOHNSTON

ScienceScope

1551 Vacuum vs. magnet engineers at LEP; managers *vs.* physicists at the SSC; etc.

News & Comment

1552 NIH Finds Fraud in *Cell* Paper ■ Warm Praise for a Whistle-Blower ■ The Report's Principal Conclusions
1554 Who Found AZT Works for AIDS?
1555 OTA Challenges Dogma on Research Funding
1556 Slimmer Station Wins White House Approval
1557 Suitable Creative Thinker for Rent
1558 Better Data Needed on Sensitivity Syndrome

Research News

1559 Ranking the Rain Forests
1561 Déjà Vu All Over Again: Can Chimpanzees Talk?
1562 Rising Chemical "Stars" Could Play Many Roles
1564 "Spiral Forest" May Hold Clue to Thin-Film Superconductivity
1566 *Briefings*: Brain Food? ■ A Physical Paradox ■ Psychological Risk Assessment ■ Selling the SSC to the Next Generation ■ Getting Around the Cosmic Censor ■ Environmental Prize ■ Searching for Words ■ Correction

Articles

1568 America's Soaring Prison Population: P. A. LANGAN
1574 Chemical and Biological Microstructures as Probed by Dynamic Processes: J. M. DRAKE, J. KLAFTER, P. LEVITZ
1580 Cocaine Addiction: Psychology and Neurophysiology: F. H. GAWIN

Reports

1587 Growth Mechanism of Sputtered Films of YBa₂Cu₃O₇ Studied by Scanning Tunneling Microscopy: M. HAWLEY, I. D. RAISTRICK, J. G. BEERY, R. J. HOULTON
1590 Self-Arrangement of Molybdenum Particles into Cubes: A. S. EDELSTEIN, G. M. CHOW, E. I. ALTMAN, R. J. COLTON, D. M. HWANG

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COVER Scanning tunneling microscope image of a high-transition temperature film of sputtered $\text{YBa}_2\text{Cu}_3\text{O}_7$ on MgO showing spiral grains with step heights of about one unit cell (12 Å). The perspective-shaded plot was generated with a computer program called SCOPE; colors represent increasing altitude from blue to red-violet. See page 1587. [Image by Melvin L. Prueitt, computer graphics group, and data by Marilyn Hawley, MST-7, Los Alamos National Laboratory]

- 1592 San Andreas Fault Zone Head Waves Near Parkfield, California: Y. BEN-ZION AND P. MALIN
- 1594 Microtektites, Microkrystites, and Spinels from a Late Pliocene Asteroid Impact in the Southern Ocean: S. V. MARGOLIS, P. CLAEYS, F. T. KYTE
- 1597 Characterization of a Human TAR RNA-Binding Protein That Activates the HIV-1 LTR: A. GATIGNOL, A. BUCKLER-WHITE, B. BERKHOUT, K.-T. JEANG
- 1600 In Vitro and in Vivo Consequences of VLA-2 Expression on Rhabdomyosarcoma Cells: B. M. C. CHAN, N. MATSUURA, Y. TAKADA, B. R. ZETTER, M. E. HEMLER
- 1603 An Immunogenic *Onchocerca volvulus* Antigen: A Specific and Early Marker of Infection: E. LOBOS, N. WEISS, M. KARAM, H. R. TAYLOR, E. A. OTTESEN, T. B. NUTMAN
- 1605 A Multisubunit Ribozyme That Is a Catalyst of and Template for Complementary Strand RNA Synthesis: J. A. DOUDNA, S. COUTURE, J. W. SZOSTAK
- 1608 Adrenergic Excitation of Cutaneous Pain Receptors Induced by Peripheral Nerve Injury: J. SATO AND E. R. PERL
- 1611 Regulation of Adhesion to ICAM-1 by the Cytoplasmic Domain of LFA-1 Integrin β Subunit: M. L. HIBBS, H. XU, S. A. STACKER, T. A. SPRINGER
- 1613 Permeation of Calcium Ions Through Non-NMDA Glutamate Channels in Retinal Bipolar Cells: T. A. GILBERTSON, R. SCOBAY, M. WILSON
- 1616 Control of Embryonic Motoneuron Survival in Vivo by Ciliary Neurotrophic Factor: R. W. OPPENHEIM, D. PREVETTE, Y. QIN-WEI, F. COLLINS, J. MACDONALD

Technical Comment

- 1619 Carbamate Formation and the Neurotoxicity of L- α Amino Acids: P. B. NUNN, A. J. DAVIS, P. O'BRIEN; J. W. OLNEY, C. ZORUMSKI, M. T. PRICE, J. LABRUYERE

Book Reviews

- 1621 Gunnar Myrdal and America's Conscience, *reviewed by* K. O'S. SEE ■ History of CERN, L. HODDESON ■ Some Other Books of Interest ■ Books Received

Author Index to Volume 251 is found on pages I-X

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This Week in SCIENCE

Cocaine addiction

JUST 10 years ago cocaine was considered a safe and nonaddictive substance. Today, as many as 3 million people in the United States alone are addicted to it. The illusion that cocaine is safe may in part have come from the long lag—generally from 2 to 4 years—between a first exposure to the drug and the time when outright addiction is obvious; nonetheless, other cocaine epidemics—one in the 1890s and one in the 1920s—made clear the dangers of this drug. Of the people who experiment with cocaine it is estimated that 10 to 15% become addicted, but there has not emerged a personality profile for susceptible individuals. Profiles are being developed, however, of the psychological features and neurophysiologic underpinnings of the euphoria of early use, the dependency period, and the various stages of withdrawal (page 1580). Gawin discusses the interplay of psychological and neurophysiological factors in cocaine dependence and what is known about each. Both animal and human studies are instructive and have contributed to the development of a variety of treatment strategies.

Self-arranging cubes

ARGON ION sputtering of materials onto substrates is a common method for building thin films from individual atoms or clusters. The sputtered clusters typically exhibit a range of sizes and shapes. However, an unexpected and interesting phenomenon has been observed that represents quite a departure from this norm: when a vapor of molybdenum was sputtered onto an amorphous carbon film at a critical pressure, most of the molybdenum was deposited as single crystalline cubes (page 1590). For the most part the cubes were of only two sizes. The smaller cubes, consisting of some 7000 atoms each, had edge dimensions of 4.8 nanometers. The larger cubes were assembled in the vapor from the smaller ones into 3 by 3 by 3 superstructures (27 cubes altogether). Such “self-ar-

rangement” is known for structures assembled from small building blocks (atoms, molecules, or small atomic clusters), but it has not been reported in the case of larger building blocks such as the molybdenum cubes. Edelstein *et al.* present high resolution micrographs and diffraction patterns for these cubes; why they grow in this way, instead of atom by atom, remains a puzzle.

Impact spherules

ABOUT 2.3 million years ago an asteroid crashed into the southern Pacific Ocean some 1400 kilometers west of Cape Horn; at this site, glassy spherules have now been recovered from deep-sea sediments (page 1594). The spherules, which comprise less than 1% of the fallout material, come in an array of shapes—from perfect spheres to dumbbells to stringers—sometimes have inclusions, and range in size from about 50 micrometers to about 200 micrometers in length. Other types of debris associated with this late Pliocene event have been recovered and described previously. Both the abundance of the spherules and the nature of their inclusions recall the glassy spherules that have been found in Cretaceous-Tertiary boundary sediments (from 65 million years ago). This suggests that both sets of spherules formed under similar conditions—an asteroid impact—and in similar chemical environments. Margolis *et al.* provide new details on the generation and composition of these spherules, which are seen as forming when molten silicate droplets condense out of vapor clouds that were produced by the asteroid impacts.

River blindness

AN early diagnostic test is now available for determining if people are infected with the parasite that causes river blindness (page 1603). This tropical disease affects some 18 million people in Africa and Latin America. Lobos *et al.* have used bioengineering strategies to develop an

immunoassay based on the antigen OV-16, which appears to be released by the parasites. Antibodies could be detected not only in individuals who have river blindness but also in those who do not yet have symptoms of the disease; in the latter, many months may pass before infection can be determined by other (invasive) procedures. OV-16 has much higher species specificity than do a number of other antigens of the parasites, and in studies of exposed individuals in Mali the test showed 98% specificity. Because treatment strategies depend on the species of the infectious agent, specificity determinations are essential. This and similar immunoassays based on other antigens of the parasite could help in the establishment of more comprehensive testing and screening procedures and, in conjunction with vector control and drug therapy, might lead to effective methods for control and prevention of this disease.

Synthetic ribozyme

HOW did life emerge from the prebiotic world? At this time, the most popular hypothesis is that RNA that could self-replicate was one of the first crucial organics and a key player in the evolution of life. What would such a self-replicating RNA molecule look like? It is predicted to require two very different types of components—a folded region for carrying out the molecule's catalytic functions and an unstructured region to act as a template for replication. Doudna *et al.* illustrate that such a molecule could fairly easily be produced (page 1605). They have assembled a multisubunit ribozyme molecule using segments of a group I self-splicing intron, which catalyzes phosphodiester exchange reactions; the assembled complex acts as an RNA polymerase while the individual subunits can function as templates. The multisubunit ribozyme has many of the features predicted for a primordial RNA molecule—a small size, discrete subunits, catalytic activity, and the ability to replicate a stretch of RNA resembling one of its own subunits.

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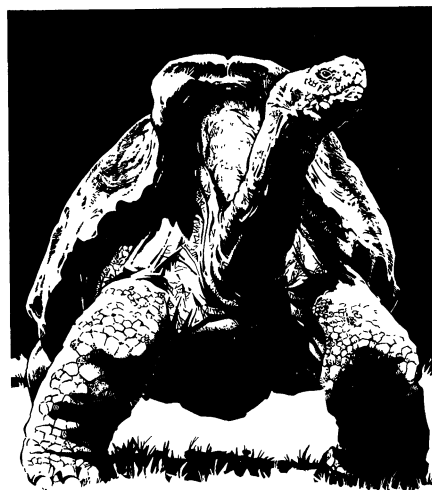
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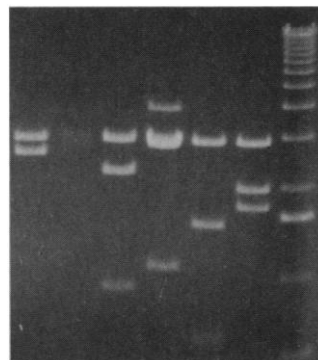
mRNA* SAMPLE	LIBRARY SIZE (CHEMICAL)	LIBRARY SIZE (ELECTROPORATION)
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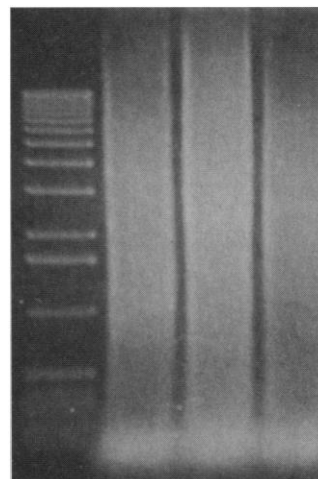


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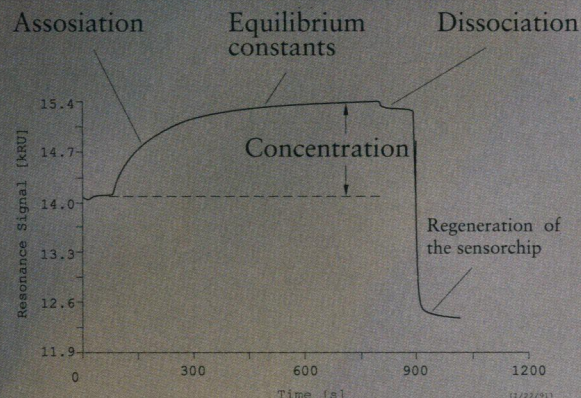
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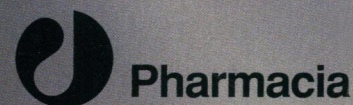
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