American Association for the Advancement of Science

Science

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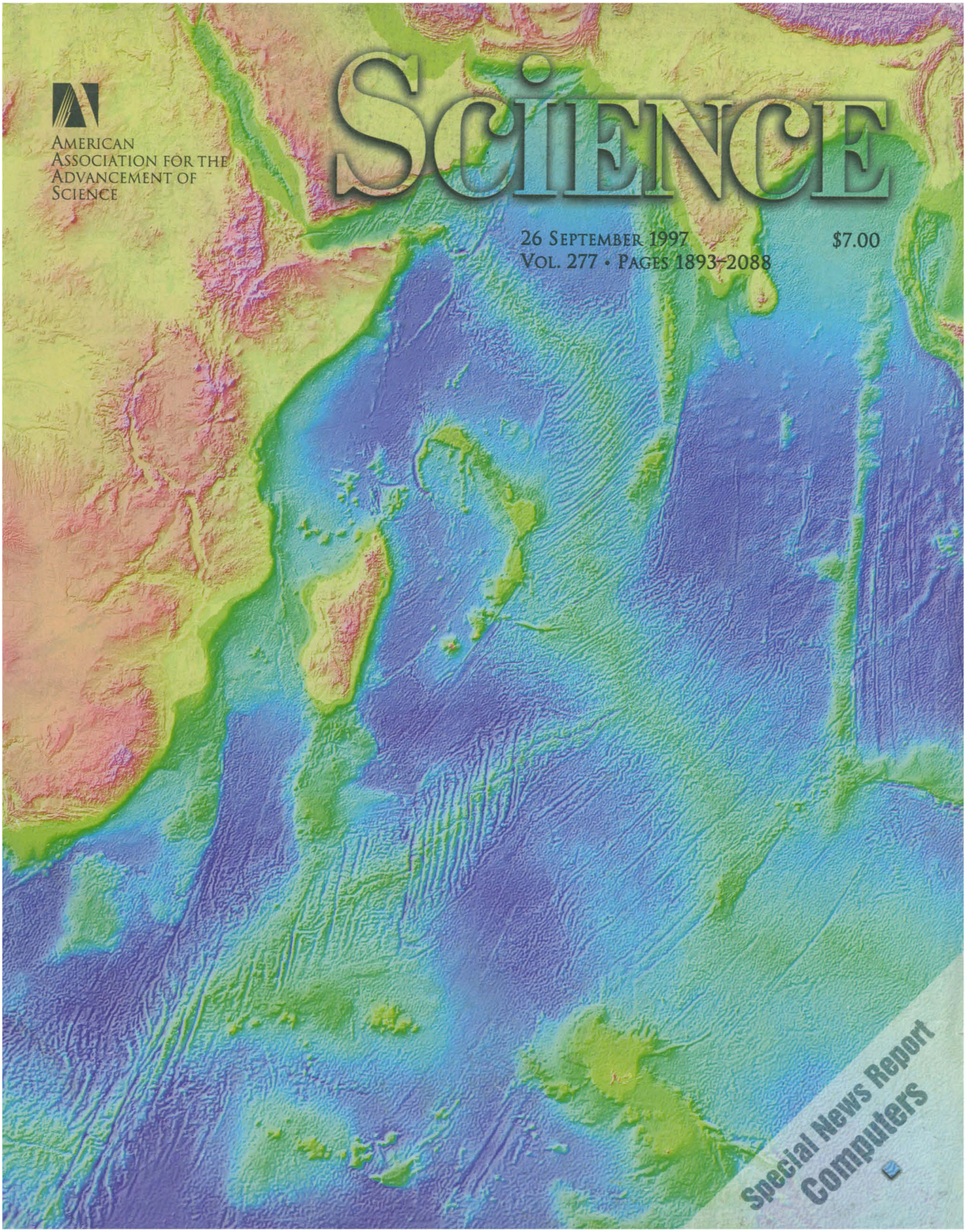

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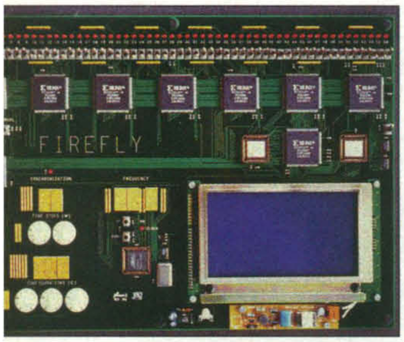

1931
Lifelike computers

1971
Stress-testing nanotubes

NEWS

SPECIAL NEWS REPORT

SILICON MIMICS LIFE

PERSPECTIVES

DEPARTMENTS

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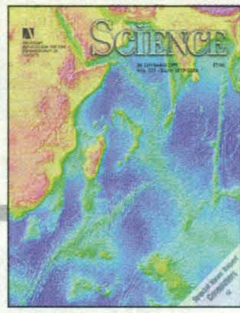
COVER



The topographic relief of the Indian Ocean floor and surrounding continents ranges from ~8 km above sea level [the Himalayas (red to lavender), upper right] to ~7 km below it [the Java Trench south of Sumatra (dark purple), right edge]. Combining satellite gravity data with ship depth soundings reveals the plate tectonic fabric of the sea floor in detail. Variations in the increase in depth away from mid-ocean ridges (greens) suggests a complex pattern of heat loss from Earth. See p. 1956 and the News story on p. 1921. [Image: W. H. F. Smith]

1994

Enzyme surprise from the sea

2007

Host-induced *Salmonella* survival genes

◩ Indicates accompanying feature

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On the Web

Dressing Scientists for Success: Male Case Study
www.nextwave.org

THIS WEEK IN SCIENCE

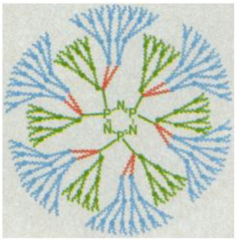
edited by PHIL SZUROMI

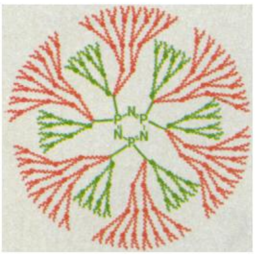
The rise and fall of the oceanic crust

Accurate measures of the depth of the ocean floor (bathymetry) are essential for understanding the structural and chemical evolution of the oceanic crust, the interaction of oceanic and continental plates or plate components, the dynamics of ocean circulation, and effects of all of these factors on marine biota. Smith and Sandwell (p. 1956; see the cover and the news story by McKenzie, p. 1921) have combined the most comprehensive collection of ship-depth soundings with satellite-derived (Geosat and ERS-1) gravity data to produce a high-resolution map of global sea floor topography. From the distribution of sea floor depth, area, and age, they conclude that global bathymetry cannot be explained by a simple lithospheric cooling model in which newly formed oceanic crust moves away from mid-ocean ridges, but requires some randomly placed reheating events to raise the sea floor in some places.

Growth from within

Dendrimer molecules are monodisperse, ordered polymers with a hierarchy of branched structures grown from a central core. Their surfaces and internal voids provide sites for encapsulation of molecules and for molecular rec-





ognition. Galliot *et al.* (p. 1981) show how an existing dendrimer can be chemically modified so that new dendrimer units can be grown from well-defined sites in the network. The synthesis route should allow a wide range of chemical species to be grown inside the dendrimer voids.

■

Small but strong

Most materials never approach their theoretical strengths because defects cause fractures that lead to mechanical failures; however, small structures, such as metal whiskers, can have low defect densities and can be much stronger. Wong *et al.* (p. 1971) have studied the strength of silicon carbide nanorods and carbon multiwall nanotubes by immobilizing tubes at one end and then measuring forces and deflections along their exposed length with an atomic force microscope. The silicon carbide nanorods were found to be significantly stronger than their larger cousins, and the bending of multiwall nanotubes occurred through an unusual elastic buckling process.

■

Snuggling up

Ordered arrays of small particles offer the prospect of designing materials with optical or electrical properties that can be tuned by changing the interparticle separation, the particle size, or the particle stoichiometry. Collier *et al.* (p. 1978) show that when monolayers of silver particles capped with alkylthiol layers suspended on a water surface are compressed, they undergo an insulator-to-metal transition that can be observed visually as the formation of a mirror. The optical response is a characteristic of quantum interactions between the particles, that is, an overlap between the wave functions of the different particles.

■

Familiar words to a child

How generalizable are early learning mechanisms? Jusczyk and Hohne (p. 1984) show that infants as young as 8 months reliably identify words from lists as either familiar or novel depending on whether they were used frequently in children's stories heard 2 weeks earlier. The authors suggest that this long-term storage of words reflects not only early abilities in segmenting speech but also the development of a lexicon that associates the acoustic properties of words with their visual or conceptual representations.

■

Clues to Huntington's disease

Although the expansion of a polyglutamine repeat in the gene that encodes huntingtin is known to be associated with Huntington's disease, it is unclear how the gene is linked to the neurodegeneration that occurs in the striatum and cortex. DiFiglia *et al.* (p. 1990) may have a clue to this process that is a direct outgrowth of work done in a mouse model of the disease. Mice transgenic for a fragment of huntingtin have previously been shown to have intraneuronal nuclear structural features or inclusions and dystrophic neurites (representing axons of degenerating cortical neurons) that contain aggregates of the transgene product. The authors now show that these inclusions and dystrophic neurites are also present in the brains of individuals affected with Huntington's disease. The longer the polyglutamine repeat, the more huntingtin accumulated. The presence of ubiquitin in these structures suggests that mutant huntingtin is resistant to degradation by normal proteolytic cleavage mechanisms and that the abnormal accumulation is related to the development of disease.

■

Telling helpers apart

T helper cells have different functions and participate in different types of immune responses. The type 1 helper (T_H1) cells are found in inflamed tissues and activate macrophages by interferon-γ production, whereas the type 2 helpers (T_H2) produce interleukin-4 (IL-4) and -5 and are found at sites of allergic reaction, along with eosinophils and basophils. How the T_H2 cells find the appropriate tissues has been unknown. Sallusto *et al.* (p. 2005) found that human T_H2 cells, but not T_H1, express the CCR3, a chemokine receptor that binds eotaxin. CCR3 was previously detected primarily on eosinophils and basophils, thus providing a possible explanation for the selective arrival of the major cell types that contribute to an inflammatory allergic response. CCR3 is also the only molecule shown thus far that can distinguish T_H2 cells from other classes of T helper cells.

■

Enzymes, smoke, and emphysema

The main risk factor for emphysema, which affects 14 million Americans, is cigarette smoking. The initial accumulation of leukocytes in the airways ultimately leads to the characteristic destruction of the elastic fibers of the lung, which could be caused by the activation of a number of enzymes. Hautamaki *et al.* (p. 2002) found that, unlike normal mice subjected to cigarette smoke, mice that were deficient for macrophage elastase did not have increased numbers of macrophages in their lungs or develop emphysema.

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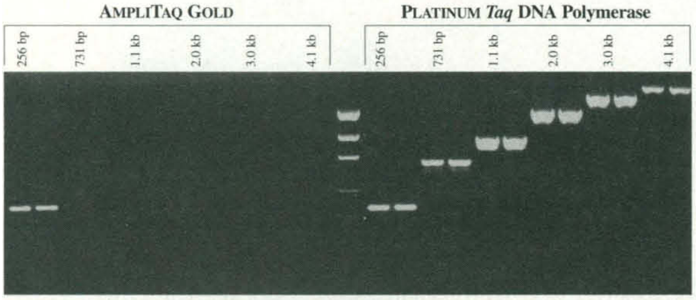

Automatic Hotstart setup at Room Temperature with 100 ng K562 Human DNA. Human betaglobin primers were used in 0.2 µM amounts. **PLATINUM *Taq* DNA Polymerase:** 1.5 mM $MgCl_2$, 0.2 mM dNTPs, 10X PCR buffer with PCR protocol–94°C, 1 min.; 94°C, 30 s; 55°C, 30 s; 72°C, 4 min 30 s. 35 Cycles of PCR performed. **AMPLITAQ GOLD™:** 2.5 mM $MgCl_2$ (as specified by PE), 0.2 mM dNTPs; 10X PCR buffer (PE); 2 units of AMPLITAQ GOLD. PCR protocol–PRE-INCUBATION 10 min @ 94°C prior to cycling; 94°C, 1 min; 94°C, 30 s; 55°C, 30 s; 72°C, 4 min 30 s; 35 Cycles of PCR performed.

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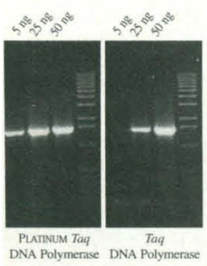

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SCIENCE

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■ The American Association for the Advancement of Science was founded in 1848 and incorporated in 1874. Its objectives are to further the work of scientists, to facilitate cooperation among them, to foster scientific freedom and responsibility, to improve the effectiveness of science in the promotion of human welfare, to advance education in science, and to increase public understanding and appreciation of the importance and promise of the methods of science in human progress.


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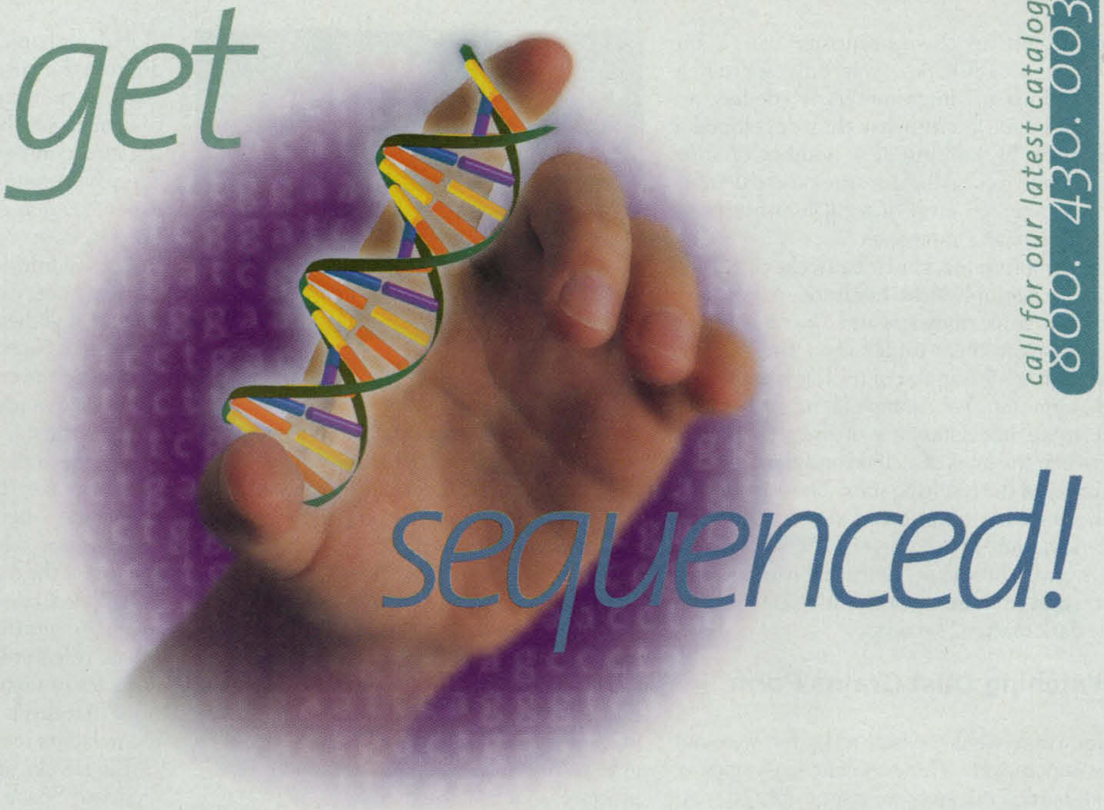

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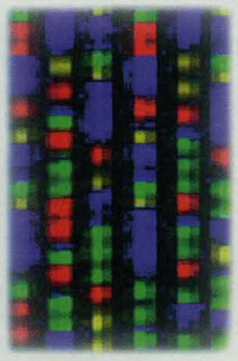

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1. The PCR process is covered by patents owned by Hoffman-La Roche.

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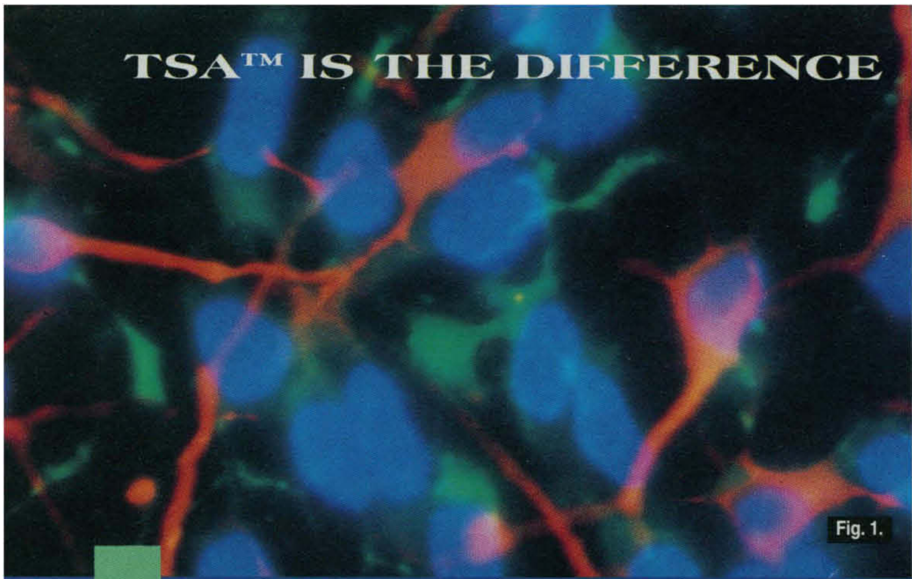

Fig. 1.

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Fig. 1. Multicolor detection using TSA-Direct.
Courtesy of Kevin Roth, M.D., Washington University School of Medicine, St. Louis, Missouri.

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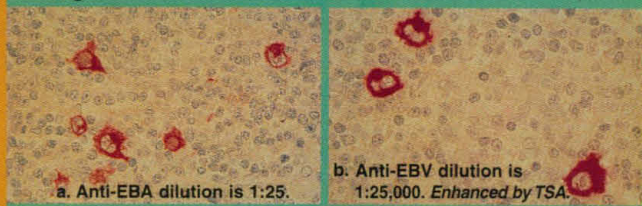
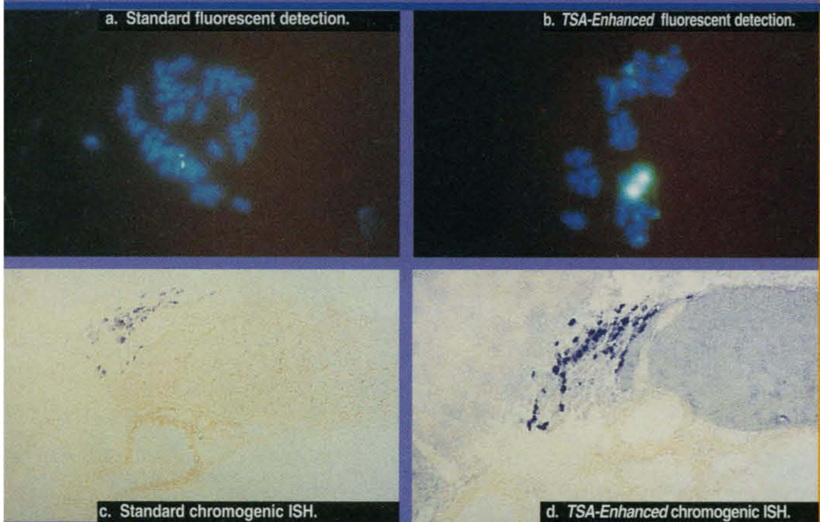
Fig. 3



Figs. 3 a-b. IHC of EBV antigen in Hodgkin's Lymphoma of mixed cellularity.
Courtesy of R. Von Wasielewski and S. Gignac, Pathologisches Institut de Medizinischen Hochscule, Hannover, Germany.

Fig. 2



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Figs. 2 a-b. Fluorescent detection of chromosome centromere probes in metaphase spreads.
Figs. 2 c-d. In situ chromogenic detection of oxytocin in rat brain tissue sections.

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NATO
Science
Programme

PROGRAMME ANNOUNCEMENT
SCIENCE FOR PEACE

A PROGRAMME OF THE NATO SCIENCE COMMITTEE

Introduction

The Science for Peace Programme (SfP) is the most recent initiative of the NATO Science Committee. It aims at assisting Partner countries in their transition towards a market-oriented and environmentally sound economy. The Programme will give a new dimension to the Science Committee's ongoing cooperative activities by enabling Partner scientists to engage in applied Research and Development (R&D) projects jointly with NATO counterparts. In helping to strengthen the socioeconomic infrastructure of the Partner countries, it is expected that the programme will contribute to overall stability and peace.

Objectives

The objectives of the Programme are:

1. To support applied science and technology projects that relate to industrial, environmental or security related problems.
2. To help Partner scientists to increase contacts in the NATO science community, while building a stronger science infrastructure in their home countries.

Scope

SfP projects will be of a cooperative nature, jointly carried out among NATO and Partner countries. Projects involving more than one Partner country will be encouraged. Projects will have a duration of three to five years.

Science for Peace projects will have as essential characteristics:

- High quality applied science and technology with a potential for commercialization in the case of industry-oriented projects.
- Ability to contribute to the solution of problems of long term significance dealing with industrial or environmental issues or security-related issues with multilateral ramifications.
- Ability to promote collaboration among scientists, industry and end-users.
- Good prospects for promoting the integration of the country's scientists into the international R&D community.
- Encourage the participation of younger scientists.

Science for Peace projects should also have as characteristics:

- They will be non-proprietary and fully open to inspection by all project participants, SfP Programme Staff and NATO appointed experts.
- They will have well-defined objectives, well-defined budgets and well-defined schedules.
- They will involve cooperation between at least one NATO country and at least one Partner country.
- They will take place in the Partner country.

NATO

Science

Programme

Funding

- NATO funding to participants in research institutions in Partner countries as well as in Greece and Turkey will be provided for experts, scientific equipment, computers, software, travel, training of project personnel and project-specific consumables.
- NATO funds will not be provided to pay for salaries or for overhead costs, such as the construction of buildings, the maintenance of premises and the supply of consumables including electricity and heating oil. NATO funds will also not be provided for office equipment, copiers and fax machines.
- For all projects, NATO funds for Partners must be complemented with a national contribution which will, as a minimum, include salaries of personnel working on the project.

Application Procedure

Proposals should to be submitted to the NATO SfP Programme Office on a four page standard application form and will be evaluated by the SfP Steering Group. Deadlines for submitting proposals are: 15th January 1998 and 15th May 1998.

Applications procedures for the Science for Peace Programme are described in detail in the "Guidelines for Project Proposals for the SfP Programme".

Application forms and Guidelines for SfP Project Proposals are available from the address below:

Science for Peace Programme Office
Scientific Affairs Division
NATO
B-1110 Brussels, Belgium

Tel: (32-2) 707 4619 • Fax: (32-2) 707 4232
E-mail: science.sfp@hq.nato.int

They can also be retrieved from NATO's home page:

http://www.nato.int/science

September 1997

LIST OF EAPC[1] COUNTRIES

NATO countries: Belgium, Canada, Denmark, France, Germany, Greece, Iceland, Italy, Luxembourg, Netherlands, Norway, Portugal, Spain, Turkey, United Kingdom, United States.

Partner countries eligible for SfP funding: Albania, Armenia, Azerbaijan, Belarus, Bulgaria, Czech Republic, Estonia, Georgia, Hungary, Kazakhstan, Kyrghyz Republic, Latvia, Lithuania, Moldova, Poland, Romania, Russian Federation, Slovak Republic, Slovenia, Tajikistan, the former Yugoslav Republic of Macedonia [2], Turkmenistan, Ukraine, Uzbekistan.

Partner countries not eligible for SfP funding: Austria, Finland, Sweden, Switzerland.

[1] Euro Atlantic Partnership Council
[2] Turkey recognises the Republic of Macedonia with its constitutional name.

(1939)

WILLIAM T. GOLDEN CENTER FOR SCIENCE & ENGINEERING

DEDICATION CEREMONIES

SEPTEMBER 4, 1997

photos © Bill Fitz-Patrick

Dr. Jane Lubchenco, Chair of the AAAS Board of Directors, welcomes AAAS officers, distinguished guests, and staff to the ribbon-cutting.

Guests and staff waiting for the official opening of the William T. Golden Center for Science & Engineering.

Cutting the ribbon, left to right, M.R.C. Greenwood, AAAS President-elect; William T. Golden, AAAS Treasurer; Jane Lubchenco, AAAS Chair; and Mildred Dresselhaus, AAAS President.

Bill Golden, his daughter, Ms. Sibyl R. Golden, and Mrs. Rollin Eckis chatting before the ceremony.

Drs. Neva and Philip H. Abelson at the dedication ceremonies.

Jane Lubchenco dedicating the named public spaces flanked by the AAAS logo and major contributors to the Center.

Dr. and Mrs. Hans Nussbaum find their names on the Center's Wall of Honor.

▲ Onstage in the auditorium for the dedication ceremonies (l to r) Jane Lubchenco, Bill Golden, Ann David, Ed David, Ellen Revelle Eckis, Philip Abelson, Neva Abelson, and Ruth Scheer.

Revelle Family members who attended the ceremony pose in the conference room named in memory of Roger Revelle.

Ann and Ed David in the grand foyer of the public spaces which is named in their honor.

Ruth Scheer, representative for the Cabot Family and Cabot Corporation, at the entrance of the Cabot Teaching Laboratory.

▲ Pinky Nelson, former astronaut now with Project 2061, and two of our special guests in the Cabot Teaching Laboratory sharing a hands-on science experience.

▲ Cindy Johnson of the Bristol-Myers Squibb Foundation (right) in the conference room named for this member of our corporate circle talking with Anne Revelle Shumway.

Francisco Ayala, past president of AAAS (center), tries his hand at the APA exhibit while Rosemary Rieser, Leonard Rieser, AAAS past president (left), and Catherine Morrison (right) await their turns.

▲ One of our special guests tries his hand at hands-on science in the Cabot Teaching Laboratory.