

A photograph of a dense tropical forest. In the foreground, a large, thick tree trunk lies horizontally across the frame, partially covered in fallen leaves and debris. The background is filled with lush green foliage and tall trees, creating a sense of depth and a sun-dappled forest floor.

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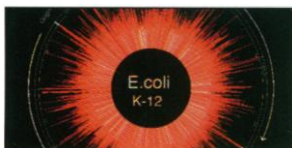
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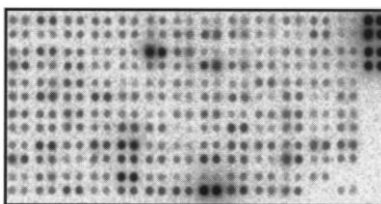
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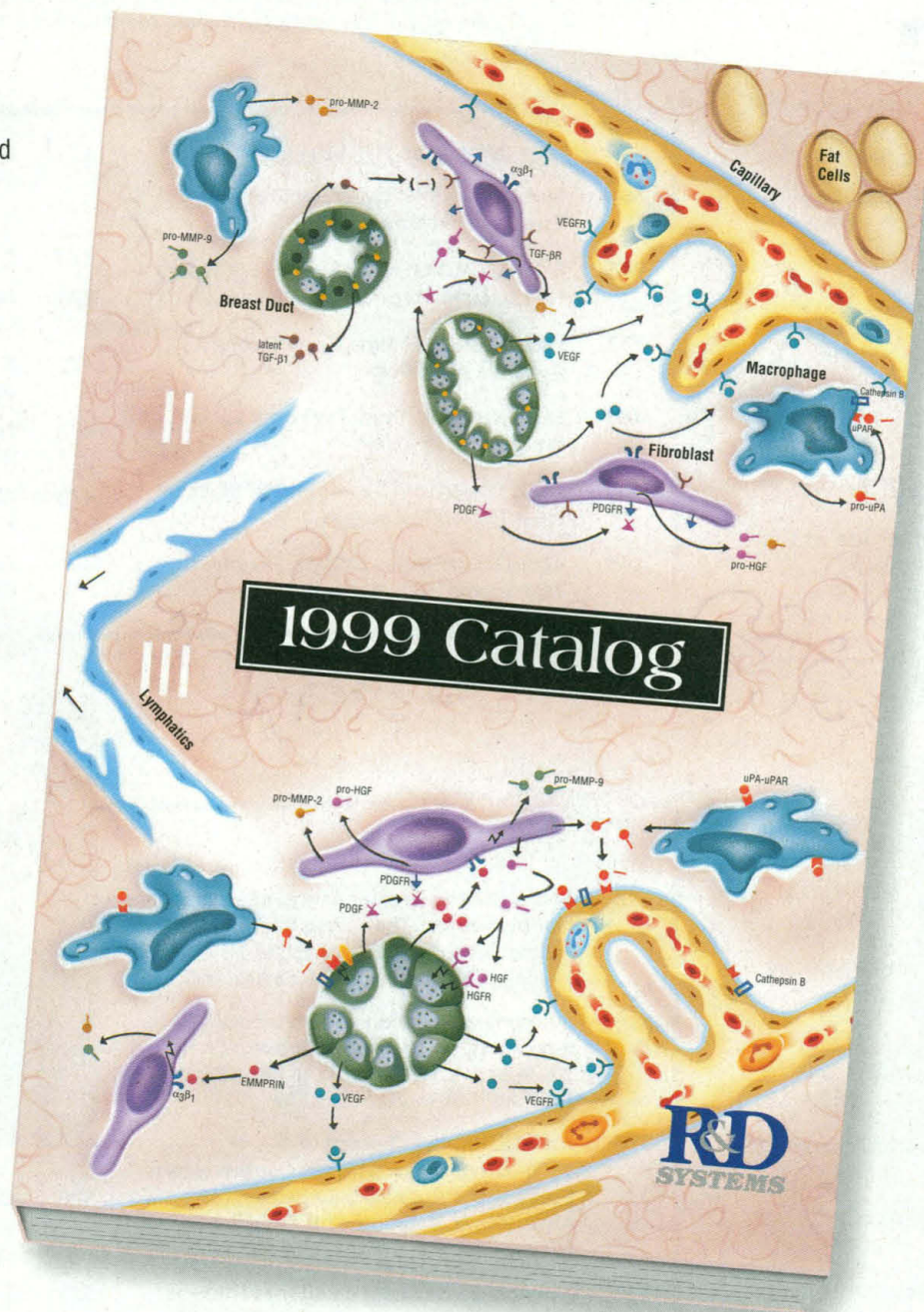
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COVER A small light gap created by a single fallen tree in the tropical forest on Barro Colorado Island in Lake Gatun of the Panama Canal, Panama. More than 1200 such gaps were monitored in this forest over a 13-year period, and the findings provide insight as to the role of such light-gap disturbances in maintaining the high diversity of tree species in tropical forests. [Photo: Marcos A. Guerra]

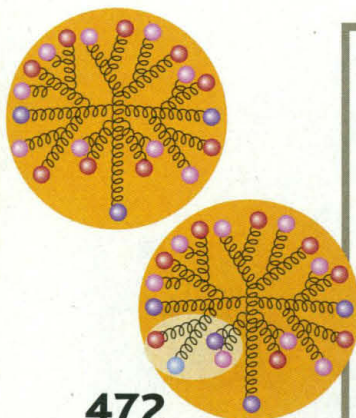


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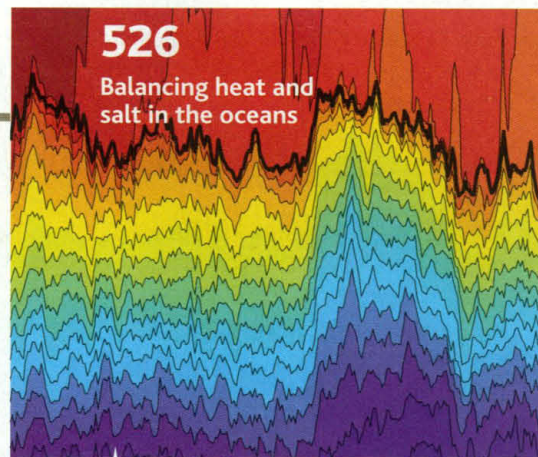
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Balancing heat and salt in the oceans



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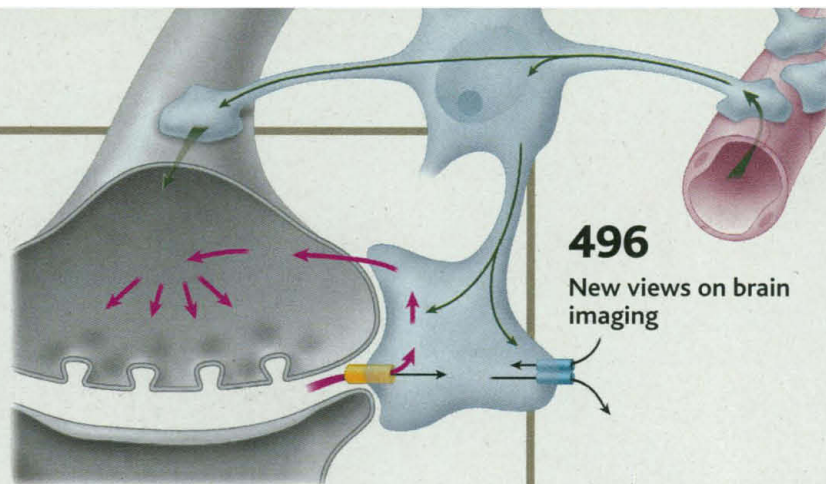
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Evolution of novelty: Butterfly eyespots

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ATTRACTIVE CALCULATIONS

Many astronomical observations are difficult to model because of the need to compute the gravitational interactions between millions of particles on a wide range of scales and dimensions. Hut and Makino (p. 501) review some key astrophysical results obtained on a series of specialized computers, called Gravity Pipe (GRAPE), that do only the detailed gravitational force interaction calculations between as many as one billion particles, while standard computers handle all the other instructions in the program. The GRAPE family of computers, among the fastest in the world, have refined the physical picture of core collapse in a dense globular cluster, the spiraling of two black holes when galaxies collide, and the process of planet formation from the collision of particles to the collision of planetesimals.

NANOTUBE ARRAYS

Recent advances in nanotube synthesis have allowed the growth of large areas of aligned nanotubes. Fan *et al.* (p. 512) have moved a step further by showing that through catalyst patterning of the surface prior to nanotube growth, patterns of nanotube blocks can be fabricated with a high degree of control. These blocks are shown to have advantageous electron field emission characteristics, such as low operating voltages and high current stability, that could be used in devices.

EL NIÑO HISTORY

How long has El Niño been operating and affecting climate along the Pacific margin? Rodbell *et al.* (p. 516; see the news story by Kerr and the Perspective by Sandweiss *et al.*) present a 15,000-year record from an alpine lake in Ecuador that may provide a clue. The lake sediments contain periodic debris flows that mark times of excessive rainfall into the lake basin. In modern times, the occurrence of these debris flows generally coincides with heavy rains brought about by El Niño. About 5000 years ago, the frequency of debris flows increased to a value near that of the present El Niño frequency.

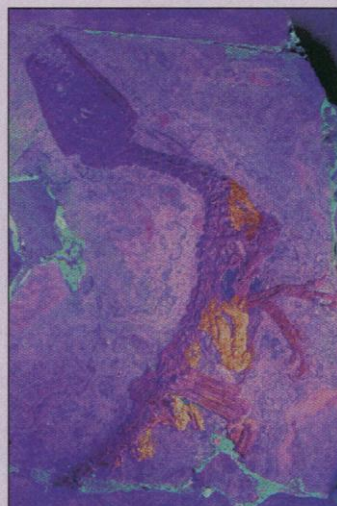
UPON REFLECTION

Antireflective coatings for glass surfaces not only limit unwanted reflections but improve the performance of optical systems by increasing transmission. However, for high performance, materials with extremely low refractive indices are needed. Walheim *et al.* (p. 520), borrowing from the approach originally taken by Fraunhofer in 1819, create a porous material, thus lower-

ing the dielectric by adding air. Whereas Fraunhofer etched his glass, the authors create nanoporous polymer films. Mixtures of polystyrene and poly(methyl methacrylate) that were spin-coated onto glass were phase-separated, and selective removal of one of the polymers created a low-refractive-index antireflective film. The method was applied to multilayer films and could be extended to mechanically harder materials such as fluoropolymers.

THE SOFT SIDE OF DINOSAURS

Most analysis of physiology of extinct animals such as dinosaurs has been based on the fossil record of hard tissues and analysis of presumed extant relatives and trace fossils. Some new rare dinosaur fossils are now providing a direct view of the soft tissues and internal organs and thus of their physiology. Ruben *et al.* (p. 514; see the news



story by Wuethrich) describe some of the remarkable features of the small theropod *Scipionyx*. Ultraviolet imaging was used to infer the position and extent of the liver and muscles of the visceral cavity. The authors conclude that this dinosaur used a diaphragm-assisted lung ventilation system and had an unusual pattern of exercise physiology.

STITCHING TOGETHER POLYMER CLUSTERS

Highly anisotropic polymer molecules can now be synthesized by partial cross-linking of smaller oligomers. Zubarev *et al.* (p. 523) synthesized oligomers in which a coiled styrene block is connect-

ed through a short polybutadiene block to a rigid rodlike block. Steric blocking of the polystyrene coils appears to inhibit reactivity of the polybutadiene groups; heating at 250°C of the liquid-crystalline oligomer does not form a fully cross-linked gel but instead produces a polymer with a molecular weight distribution that is highly peaked around 70,000. The polymer objects formed have an anisotropic shape (2 nanometers by 8 nanometers) that leads to even stronger liquid crystalline behavior relative to the precursor oligomer.

MINDING THE MIX

Atmospheric and oceanic processes are coupled largely through the upper 100 meters or so of the ocean, where surface heating or cooling, winds, and surface waves contribute to turbulence and water mixing processes. Many of the upper ocean mixing processes are not yet understood in detail. Rudnick and Ferrari (p. 526; see the Perspective by Schmitt) have performed high-resolution measurements in the upper ocean of temperature and salinity simultaneously on length scales from 20 meters to 10 kilometers. Analysis of these data show that horizontal mixing activated by density gradients dominates in the mixed layer, and temperature and salinity gradients compensate on all length scales in their effect on density.

MOLECULAR REDEPLOYMENT

Eyespots on butterfly wings are a relatively recent adaptation to avoid predators. Keys *et al.* (p. 532) show that the developmental organizer, the focus, that controls this pigmentation recruited many of the regulatory molecules already involved in wing development, such as Hedgehog. Cassettes of existing molecular instructions may be co-opted with modification by new structures during evolution, eliminating the need to reinvent entire regulatory pathways each time a new physical feature evolves.

NERVE BEGATS BLOOD

Progenitor cells may face various restrictions on what sorts of cells and tissues they can generate. However, Bjornson *et al.* (p. 534; see the news story by Muro) show that adult neural stem cells may be considerably less restricted. When injected into irradiated mice, these cells were able to generate hematopoietic cells. Thus, the developmental boundaries between the neuroectoderm and the mesoderm may be more negotiable than once thought.

CONTINUED ON PAGE 459

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THIS WEEK IN SCIENCE

CONTINUED FROM PAGE 457

TOBACCO SYNTAXIN

With an anchor in the plasma membrane attached to protein-interaction domains, a protein identified in tobacco by Leyman *et al.* (p. 537) shows similar structure and molecular functions to syntaxins known from yeast and mammalian cells. However, instead of aiding vesicle trafficking as other syntaxins do, this tobacco syntaxin mediates the cellular response to the plant hormone abscisic acid. The roles of vesicle trafficking in abscisic acid signaling, or of syntaxin functions other than vesicle trafficking, remain obscure but intriguing.

INHIBITED RHYTHMS

Patterns of synchronous neuronal firing can be found in epilepsy and also under normal physiologic conditions like sleep. The reticular nucleus of the thalamus generates a recurrent inhibitory output that may be important in modulating rhythmic and oscillatory firing of neurons. Huntsman *et al.* (p. 541) analyzed knockout mice that are missing the β_3 subunit of the γ -aminobutyric acid type A (GABA_A) receptor. This particular subunit is only expressed in specific locations in the brain, such as the thalamic reticular nucleus. In slices from knockout mice, GABAergic inhibition in the reticular nucleus was severely impaired and hyper-synchronous neuronal activity could be observed. Thus, lateral inhibition serves as an important mechanism in shaping synchronous neuronal output.

AVOIDING ACCIDENTAL DEATH

Normally the tumor necrosis factor receptor type 1 (TNF-R1) requires a trimer of its ligand, TNF, to aggregate the receptor and activate signal transduction through the TNF-R1 death domain. However, overexpression of TNF-R1 induces its activation in the absence of ligand. Jiang *et al.* (p. 543) detected a protein, called silencer of death domains (SODD), that was constitutively bound to the TNF-R1. After

binding of TNF, SODD was released and signaling proteins were then bound. SODD may normally function to prevent the accidental activation of TNF-R1 in the absence of ligand. Overexpression of TNF-R1 may overwhelm limiting quantities of SODD and lead to inappropriate activation.

PREDICTING GOOD PERFORMANCE

The multiplicity of ion channels in neurons and of neurons in the brain often renders modeling of behavior on the basis of molecules, an open-ended endeavor. Usher *et al.* (p. 549) have focused on locus coeruleus neurons in monkeys undertaking a visual discrimination task. They observe fluctuations in neuronal activity plausibly associated with behavioral performance. Through modeling, the authors were able to ascribe these fluctuations to changes in gap junction pathways. They then obtained experimental data supporting the proposal that these pathways underlie the neuronal activity that, in turn, influences visual attentiveness.

THE RICH STAY RICH

One explanation for the richness of species in tropical forests is the intermediate disturbance hypothesis: Local disturbances of the forest initiates a sequence of replacement species that ends with canopy trees, and if disturbances occur at an appropriate rate, then the forest will be a patchwork of different succession states. However, an experimental test has found this theory wanting. Hubbell *et al.*'s (p. 554; see the cover and the Perspective by Tilman), 13-year study of seedling and sapling establishment in natural gaps in a Panamanian tropical forest found that gaps are simply filled by whatever species are locally present. Thus, a species-rich forest is maintained not by dispersal and competitive traits but by the default process of being in the right place at the right time.

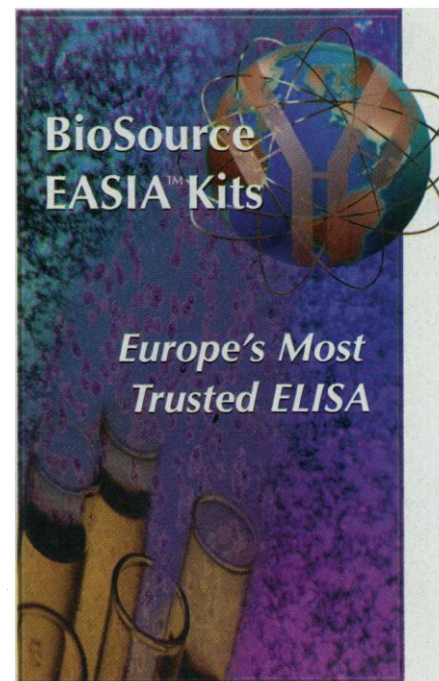
TECHNICAL COMMENT SUMMARIES

Proofreading by Isoleucyl-Transfer RNA Synthetase: Response

The full text of these comments can be seen at www.sciencemag.org/cgi/content/full/283/5401/459a

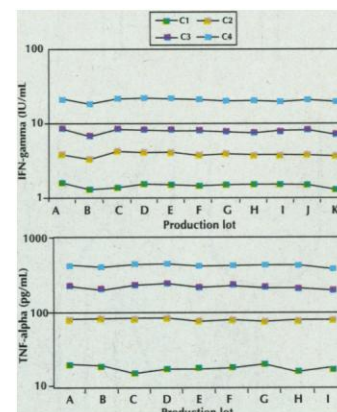
In their report of 24 April 1998, O. Nureki *et al.* described the structure of isoleucyl-transfer RNA (tRNA) synthetase. In his technical comment of 11 December 1998, Xiayang Qiu criticized figure 4 and its discussion in the report, which was a "stereoview of the IleRS editing site as a ball-and-stick representation."

In their response published today, Nureki *et al.* provide clarification and further details of their analysis and state that their "most recent experiments have confirmed the importance for editing of this region of [the insertion domain] CP1." They say that "the outstanding problem in the field is to determine how misactivated substrates move from the active site to the editing site. Most likely, a significant conformational change is involved."



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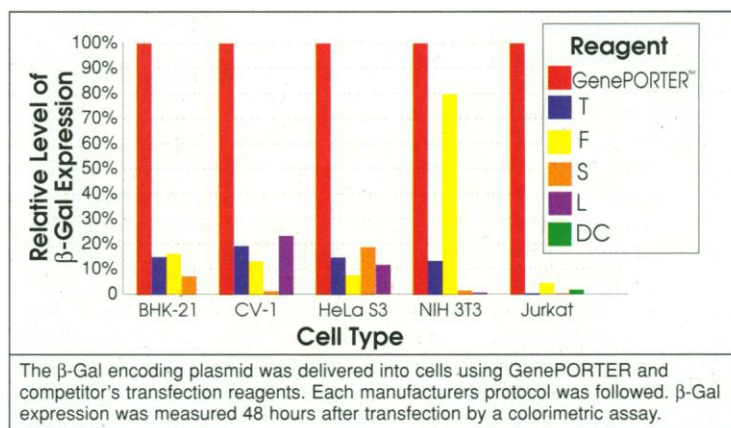
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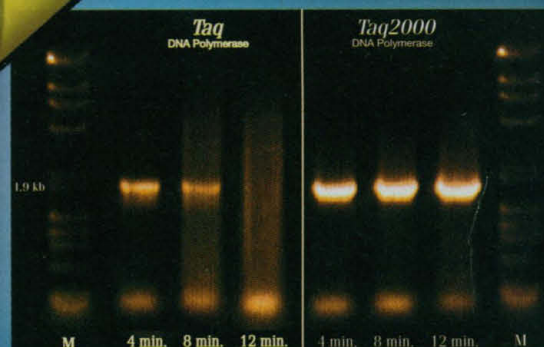
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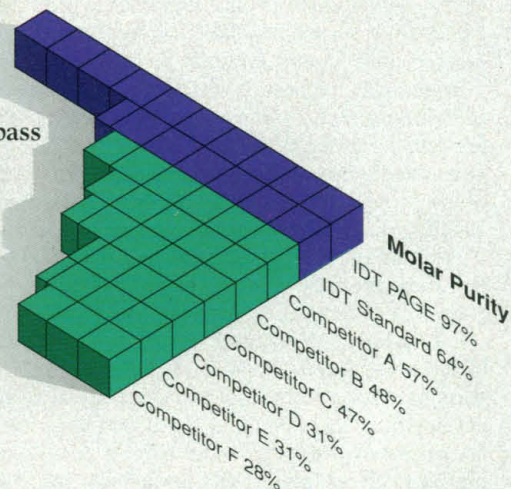
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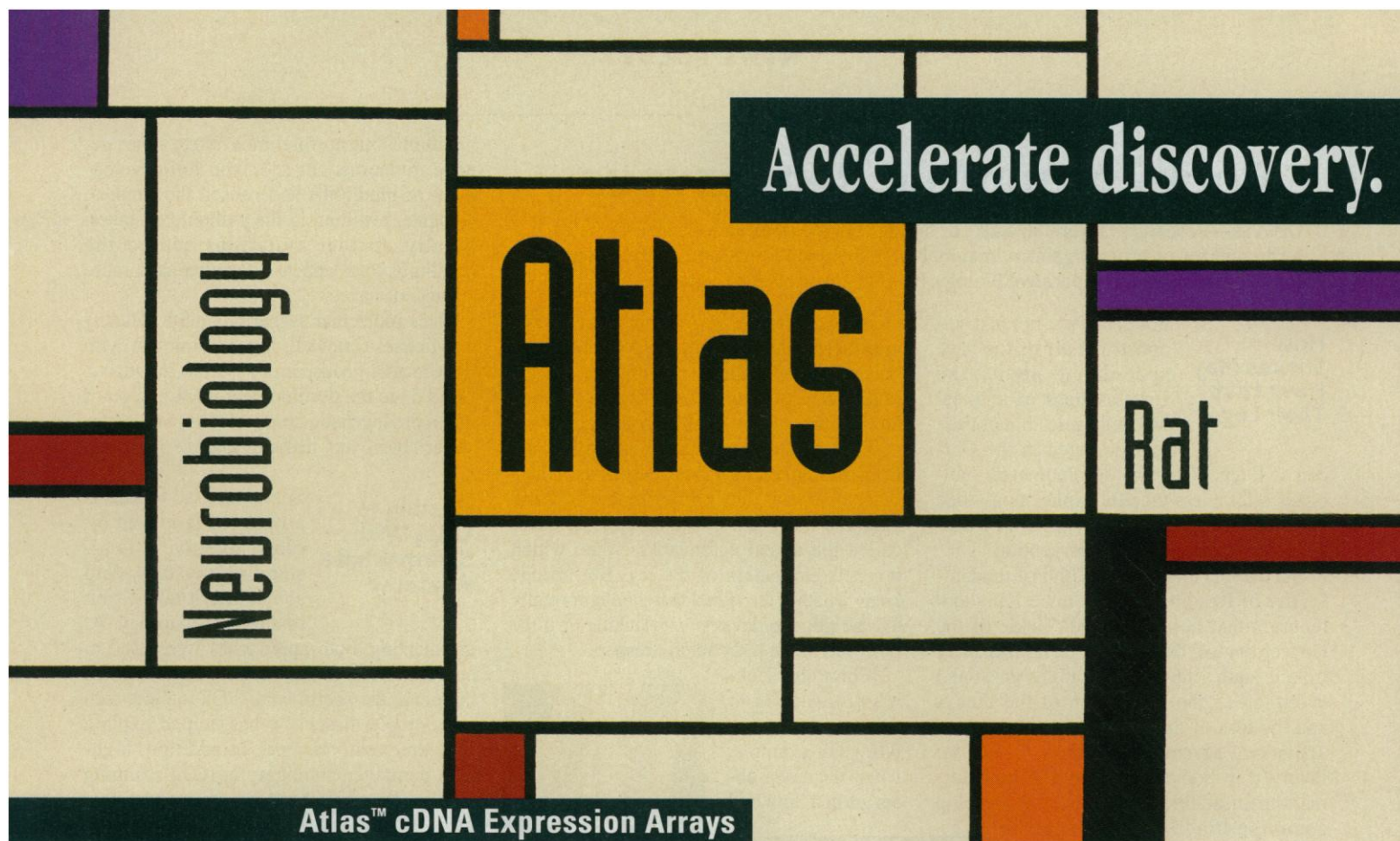


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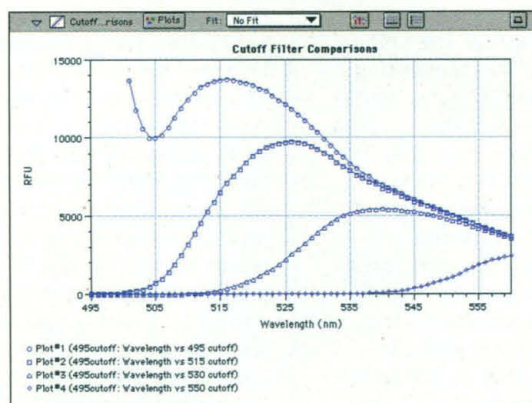
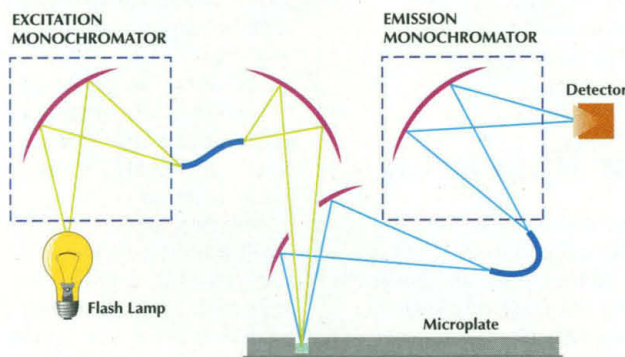
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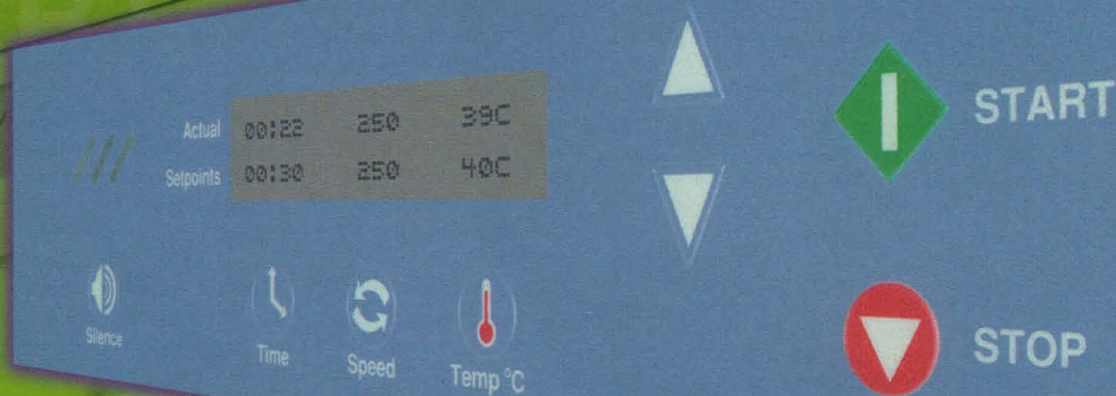


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QUALITY

SERVICE

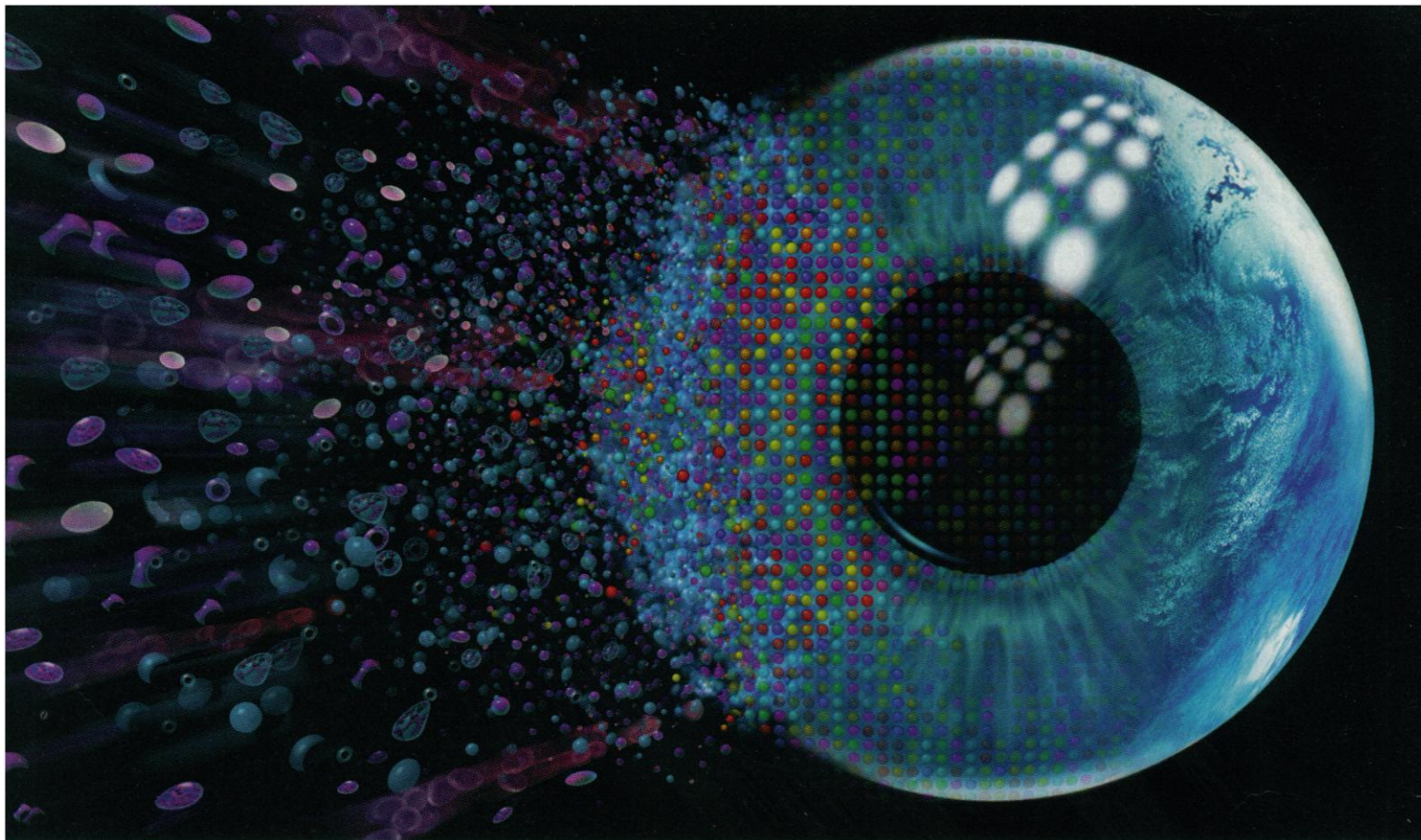
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INNOVATION



By joining forces with Roche, we can now offer you the benefits of one of the health care industry's largest investments in pharmaceutical and diagnostic research and development. Roche's commitment to innovation, paired with our quality and reliability, is already resulting in new, better solutions for your lab. Look for them on our website, from our people, in our 1999 catalog, or wherever you see our new name, Roche Molecular Biochemicals.

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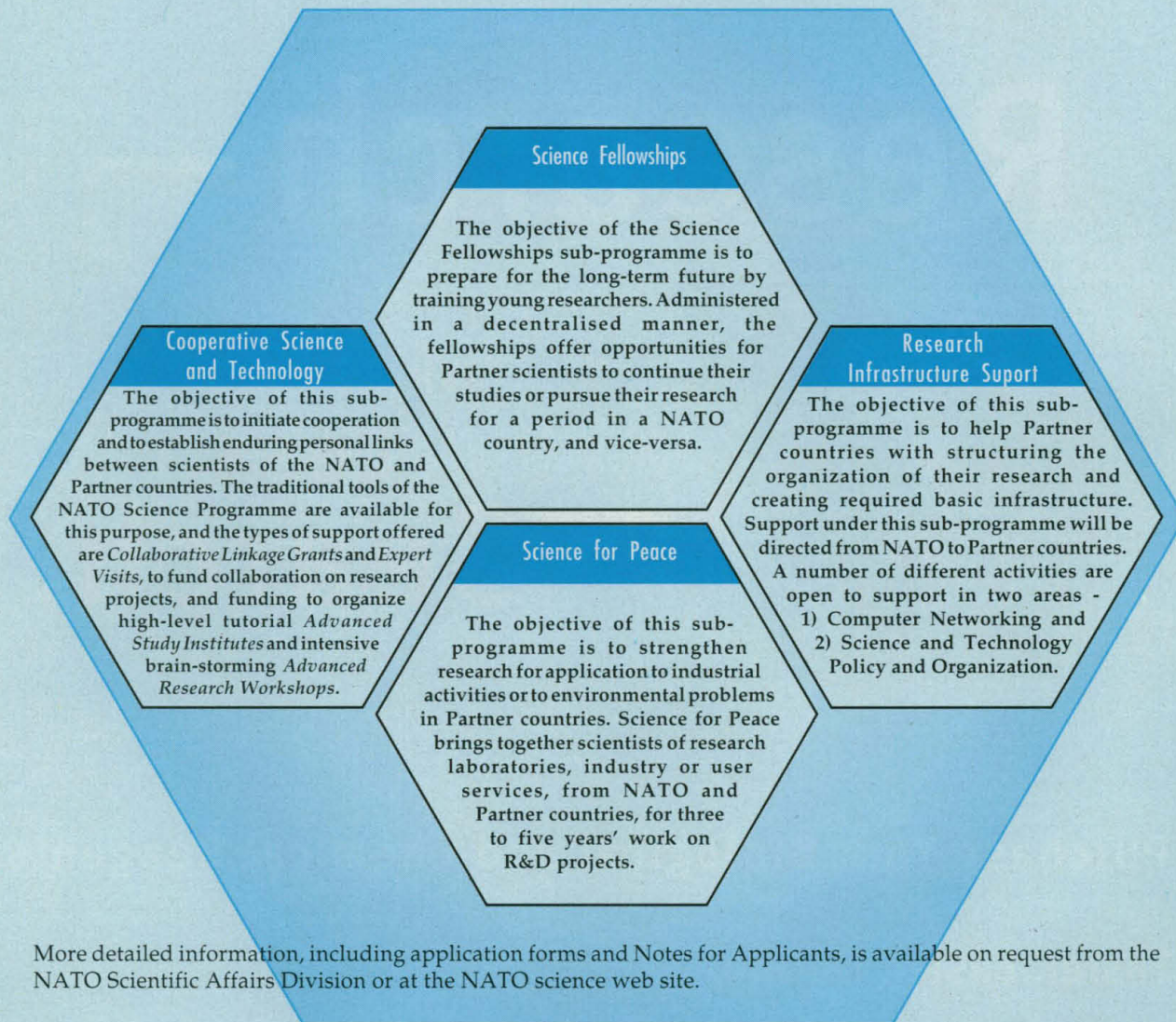
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Circle No. 10 on Readers' Service Card

NATO SCIENCE PROGRAMME

1999

The NATO Science Programme offers support for international collaboration between scientists from countries of the Euro-Atlantic Partnership Council (EAPC). Awards are made following consideration of applications received from individual scientists in EAPC countries. The Science Programme has been revised and restructured to direct support towards collaboration between Partner-country and NATO-country scientists and to incorporate new support mechanisms. The Programme is now grouped into four sub-programmes, described below.



More detailed information, including application forms and Notes for Applicants, is available on request from the NATO Scientific Affairs Division or at the NATO science web site.

CALENDAR OF MEETINGS

A list of the NATO Advanced Study Institutes (ASIs) and NATO Advanced Research Workshops (ARWs) to be held in 1999 is given in the following pages. Each ASI and ARW is held under the responsibility of its director(s): all requests for information, attendance or support should be addressed to the contact person listed. Locations and Dates may change. Some participants from NATO countries or Partner countries may obtain grants from the meeting director(s) to assist with travel and living expenses. This Calendar of Meetings is also posted at the web site, and will be updated continuously as further meetings are selected for support.

Scientific Affairs Division
NATO
Bd. Leopold III
1110 Brussels, Belgium
<http://www.nato.int/science>

1999 ADVANCED STUDY INSTITUTES

Advanced Study Institutes (ASIs) are high-level tutorial courses of two weeks' duration where a subject is treated in depth by lecturers of international standing. Presentations are made to about 100 scientists or research students already specialised in the field, or who have an advanced general scientific background. Attendance at ASIs is open to all suitably-qualified applicants irrespective of nationality, upon application to the contact person listed below.

Life Sciences

Human Monitoring after Environmental and Occupational Exposure to Chemical and Physical Agents

May 1999 : Antalya, Turkey

Contact: Dr. D. Anderson, BIBRA International, Woodmansterne Road, Carshalton, Surrey SM5 4DS, UK. (Fax: 44 181 661 7029)
Co-Director: Dr. Radim Sram, Academy of Science of the Czech Rep., Prague, Czech Republic

972842

Dynamics, Structure and Function of Biological Macromolecules

25 May 99 - 5 Jun 99 : Erice, Italy

Contact: Prof. J.F. Lefevre, Louis Pasteur University, Bld Sebastien Brant, 67400 Strasbourg-Illkirch, France
(Fax: 33 88 655343 E-mail: Lefevre@bali.u-strasbg.fr)

972910

Protein, Lipid and Membrane Traffic : Pathways and Targeting

7 Jun 99 - 19 Jun 99 : Cargese, France

Contact: Dr. J. Op den Kamp, University of Utrecht, Ctr. for Biomembranes & Lipid Enzymology, Padualaan 8, PO Box 80054, 3508 TB Utrecht The Netherlands
(Fax: 31 30 252 2478 E-mail: j.a.f.opdenkamp@chem.ruu.nl)
URL: <http://cble.chem.uu.nl/cargese99>

972873

Mathematical Problems Arising from Biology

14 Jun 99 - 24 Jun 99 : Toronto, Canada

Contact: Prof. R. Durrett, Cornell University, Depts. of Math and ORIE, Ithaca, NY 14853, USA
(Fax: 607 255 9129 E-mail: rtd1@cornell.edu)

972868

Targeting of Drugs : Strategies for Gene Constructs and Delivery

24 Jun 99 - 5 Jul 99 : Cape Sounion Beach, Greece

Contact: Prof. Gregory Gregoriadis, University of London, Center for Drug Delivery Research, The School of Pharmacy, 29-39 Brunswick Square London WC1N 1AX, UK
(Fax: 44 171 753 5820 E-mail: Gregoriadis@cual.ulsop.ac.uk)

972880

Molecular Mechanisms of Signal Transduction

16 Aug 99 - 28 Aug 99 : Island of Spetses, Greece

Contact: Prof. J. Bos, Utrecht University, Laboratory for Physiological Chemistry, Universiteitsweg 100, 3584 CG Utrecht The Netherlands
(Fax: 31 30 2539035 E-mail: j.l.bos@med.ruu.nl)
URL: <http://ruummc.med.uu.nl>

972864

Structure and Function of Macromolecular Complexes

29 Aug 99 - 9 Sep 99 : Island of Spetses, Greece

Contact: Prof. J.W.B. Hershey, University of California, Dept. of Biological Chemistry, School of Medicine, Davis, CA 95616 USA (Fax: 1 530 752 3516 E-mail: jwhershey@ucdavis.edu)
Co-Director: Dr. L. Kisselev, Engelhardt Institute of Molecular Biology, Moscow, Russia

972882

Etiology and Treatment of Acute Lung Injury

5 Sep 99 - 15 Sep 99 : Cortu, Greece

Contact: Prof. Sadis Matalon, University of Alabama, Department of Anesthesiology, 619 South 19TH Street, Birmingham, AL 35233-6810 USA
(Fax: 205 934 7437 E-mail: sadis.matalon@ccc.uab.edu)

973856

Mathematics, Physics and Astronomy

Topological Defects and the Non-Equilibrium Dynamics of Symmetry Breaking Phase Transitions

16 Feb 99 - 26 Feb 99 : Les Houches, France

Contact: Dr H Godfrin, CNRS-CRTBT, 25 av. des Martyrs, BP 166, F-38042 Grenoble Cedex 09 France
(Fax: 33 4 76 87 50 60 E-mail: Godfrin@labs.poly.cnrs-gre.fr.)

972879

Soft Condensed Matter : Configurations, Dynamics and Functionality

6 Apr 99 - 16 Apr 99 : Gellio, Norway

Contact: Prof. A.T. Skjeltorp, Institute for Energy Technology, PO Box 40, N-2007 Kjeller, Norway (Fax: 47 638 10 920 E-mail: arne.skjeltorp@ife.no)
URL: <http://www.ife.no/departments/physics/ASI99.html>

972878

Progress in String Theory and M-theory

24 May 99 - 5 Jun 99 : Cargese, France

Contact: Dr. L. Baulieu, Universite Pierre & Marie Curie Paris VI, LPTHE, Tour 16 (1er Etage), 4 Place Jussieu, 75252 Paris Cedex 05 France
(Fax: 033 1 44 277088 E-mail: baulieu@lpthe.jussieu.fr)

972877

Photonic Crystals and Light Localization

31 May 99 - 10 Jun 99 : Heraklion, Greece

Contact: Prof. C.M. Soukoulis, Iowa State University, Department of Physics and Astronomy, Ames, IA 50011, USA
(Fax: 515-294-0689 E-mail: soukoulis@ameslab.gov)

972798

The Neutron Star - Black Hole Connection

7 Jun 99 - 18 Jun 99 : Elounda, Greece

Contact: Prof. J. Ventura, University of Crete, Iraklion, Department of Physics, PO Box 2208, 71003 Heraklion, Crete Greece
(Fax: 3081-394201 E-mail: ventura@physics.ucl.gr)

972891

Quantum Mesoscopic Phenomena and Mesoscopic Devices in Microelectronics

13 Jun 99 - 25 Jun 99 : Ankara, Turkey

Contact: Prof. I.O. Kulik, Bilkent University, Department of Physics, 06533 Bilkent, Ankara, Turkey (Fax: 90 312 266 45 79 E-mail: kulik@fen.bilkent.edu.tr)
URL: <http://www.fen.bilkent.edu.tr/mesoscop.html>

971400

PDEs in Models of Superfluidity, Superconductivity and Reactive Flows

21 Jun 99 - 3 Jul 99 : Cargese, France

Contact: Prof. H. Berestycki, University Paris VI, Labo d'Analyse Numerique, 4 Place Jussieu, F-75252 Paris Cedex France
(Fax: 33-1-44-27-72-00)

972786

Recent Developments in Particle Physics and Cosmology

28 Jun 99 - 9 Jul 99 : Halkidiki, Greece

Contact: Prof. Q. Shafi, University of Delaware, Bartol Research Institute, Newark, DE 19716, USA
(Fax: 302 831 1843 E-mail: shafi@bartol.udel.edu)

972861

Stochastic Games and Applications

1 Jul 99 - 1 Jul 99 : Stony Brook, USA

Contact: Prof. A. Neyman, State University of New York, Department of Economics, Stony Brook, NY 11794 USA (E-mail: aneyman@datalab2.sbs.SUNYsb.edu)

973874

Soft and Fragile Matter : Nonequilibrium Dynamics, Metastability and Flow

8 Jul 99 - 22 Jul 99 : St. Andrews, Scotland, UK

Contact: Dr. M. Cates, The University of Edinburgh, Department of Physics and Astronomy, James Clerk Maxwell Build, Mayfield Road Edinburgh EH9 3JZ, UK
(Fax: 0131 650 7165 E-mail: m.e.cates@ed.ac.uk)

972836

Structure Formation in the Universe

26 Jul 99 - 6 Aug 99 : Cambridge, UK

Contact: Prof. N. Turok, Cambridge University, DAMTP, Silver Street, Cambridge CB3 9EW U.K.
(Fax: (44) 1223 337918 E-mail: N.G.Turok@damtp.cam.ac.uk)

Co-Director: Prof. V. Rubakov, Russian Academy of Sciences, Moscow Russia

973885

Particles Physics : Ideas and Recent Developments

26 Jul 99 - 7 Aug 99 : Cargese, France

Contact: Prof. J. Aubert, Centre de Physique des Particules de Marseille, Case 907, 163, avenue de Luminy, F-13288 Marseille Cedex 09 France
(Fax: 4 91 82 85 91 E-mail: aubert@cpm.in2p3.fr)

972793

Coherent Atomic Matter Waves

26 Jul 99 - 27 Aug 99 : Les Houches, France

Contact: Dr. C. Westbrook, CNRS, Institut d'Optique, BP 147, 91403 Orsay Cedex France
(Fax: 33 1 69 35 87 00 E-mail: christoph.westbrook@iota.u-psud.fr)

972799

Particle Production Spanning MeV and TeV Energies

8 Aug 99 - 20 Aug 99 : Nijmegen, The Netherlands

Contact: Dr. P.J. Mulders, Vrije Universiteit, Dept. of Physics & Astronomy, De Boelelaan 1081, NL-1081 HV Amsterdam The Netherlands
(Fax: 31 20 444 7999 E-mail: mulders@nat.vu.nl)

Co-Director: Prof. A. Bialas, Jagellonian University, Krakow Poland

972839

Advances in Solar Research at Eclipses , from Ground and from Space

9 Aug 99 - 20 Aug 99 : Bucharest, Romania

Contact: Dr. J-P Zahn, Observatoire de Paris, Section Astrophysique de Meudon, F-92195 Meudon, France (Fax: 33-1-45-07-78-72 E-mail: zahn@obspm.fr)
Co-Director: Dr. M. Stavinschi, Astronomical Institute, Bucharest, Romania

973001

Quantum Geometry

9 Aug 99 - 20 Aug 99 : Akureyri, Iceland

Contact: Prof. L. Thorlacius, Princeton University, Dept of Physics, Princeton, NJ 08544, US
(Fax: 609-258-1549 E-mail: larus@feynman.princeton.edu)

973348

Current Topics in Astrofundamental Physics: The Cosmic Microwave Background

5 Dec 99 - 16 Dec 99 : Erice, Italy

Contact: Prof. N. Sanchez, Observatoire de Paris Demirm, Ministere de L'Ens. Sup. et de la Recherche, 61 Avenue de l'Observatoire, 75014 Paris France
(Fax: 33 1 4051 2002 E-mail: sanchez@mesioib.obspm.fr)

972800

Chemistry and Materials

Crystal Engineering : From Molecules and Crystals to Materials

12 May 99 - 23 May 99 : Erice, Sicily, Italy

Contact: Prof. D. Braga, University of Bologna, Department of Chemistry, Via F. Selmi 2, 40126 Bologna Italy
(Fax: 39 51 259456 E-mail: dbraga@ciam.unibo.it)
URL: <http://catullo.ciam.unibo.it/erice.html>

972040

Structure Development in Processing for Polymer Property Enhancement

17 May 99 - 28 May 99 : Alvor, Portugal

Contact: Dr. A.M. da Cunha, Universidade Do Minho, Departamento de Polimeros, Campus de Azurem, 4800 Guimaraes Portugal (Fax: (351) 53 51 0249 E-mail: amcunha@eng.uminho.pt)
Co-Director: Prof. S. Fakirov, Sofia University, Bulgaria

973871

1999 ADVANCED STUDY INSTITUTES- continued

Carbon Filaments and Nanotubes: Common Origins, Differing Applications?

14 Jun 99 - 26 Jun 99 : *Alvor, Portugal*

Contact: Dr. G.G. Tibbets, GM R&D Center, Physics and Physical Chemistry Department, 30500 Mound Road, Warren, Michigan 48090-9055 USA

(Fax: 810 986 3091 E-mail: gtibbett@notes.gmr.com)

Co-Director: Dr. L.P. Biro, Research Institute for Tech. Physics & Materials Science, Budapest, Hungary

973853

Combinatorial Methods for High Throughput Catalyst Design and Testing

11 Jul 99 - 24 Jul 99 : *Vilamoura, Portugal*

Contact: Prof. Eric Derouane, University of Liverpool, Leverhulme Ctr for Innovative Catalysis, Department of Chemistry, P.O. Box 147, Liverpool L69 3BX UK

(Fax: 44-151-794.3589 E-mail: derouane@liverpool.ac.uk)

972888

Materials for Lithium-Ion Batteries : Design and Optimization

1 Sep 99 - 12 Sep 99 : *Sozopol, Bulgaria*

Contact: Dr. C. Julien, Université Pierre et Marie Curie, UMR-CNRS 7603, Lab. des Milieux Désordonnés et Hétérogènes, 4 Place Jussieu, Case 86 75252 Paris Cedex 05, France

(Fax: 33 1 44273854 E-mail: cjuil@ccr.jussieu.fr)

Co-Director: Prof. Z. Stoyanov, Central Lab. of Electrochemical Power Sources, Sofia, Bulgaria

HT973911

Multiscale Phenomena in Plasticity : from Experiments to Phenomenology, Modelling and Materials Engineering

6 Sep 99 - 17 Sep 99 : *Ouranopolis, Greece*

Contact: Prof. G. Saada, CNRS UMR 104-ONERA, LEM,

29 av. de la Division Leclerc, BP 72, 92322 Chatillon Cedex France

(Fax: 331 46734155 E-mail: saada@onera.fr)

Co-Director: Dr. P. Lejcek, Academy of Science of the Czech Republic, Praha Czech Republic

973875

Structure and Dynamics of Polymer and Colloidal Systems

14 Sep 99 - 24 Sep 99 : *Les Houches, France*

Contact: Prof. R. Pecora, Stanford University, Department of Chemistry, Stanford, California 94305-5080, USA

(Fax: 1 415 725 0259 E-mail: pecora@leland.stanford.edu)

URL: http://www.cermap.cnrs.fr/polymer_colloid_99/

972841

Environmental and Earth Sciences

Chemistry and Radiation Changes in the Ozone Layer

15 May 99 - 24 May 99 : *Kolymari, Crete, Greece*

Contact: Prof. C.S. Zerefos, University of Thessaloniki, Laboratory of Atmospheric Physics, PO Box 149, 54006 Thessaloniki Greece

(Fax: 30 31 283752 E-mail: zerefos@olymp.ccf.auth.gr)

971376

Coping with Flash Floods

1 Nov 99 - 11 Nov 99 : *Ravello, Italy*

Contact: Dr. E. Grunfest, University of Colorado, Geography and Envir. Studies, PO Box 7150, Colorado Springs, CO 80933 USA

(Fax: +1 719 262 4066 E-mail: ecg@brain.uccs.edu)

972806

Applied Sciences and Engineering

Foundations of Secure Computation

27 Jul 99 - 8 Aug 99 : *Marktoberdorf, Germany*

Contact: Prof. F.L. Bauer, Technische Universität München, Institut für Informatik, D-80290 München, Germany

(Fax: 89 289 28183)

973285

Microwave Superconductivity

29 Aug 99 - 10 Sep 99 : *Viella, Spain*

Contact: Dr. H. Weinstock, Air Force Office of Scientific Research, AFOSR/NE, 110 Duncan Avenue, Ste B115, Bolling AFB, DC 20332-8050 USA

(Fax: 1 202 767 4986 E-mail: weinstoc@afosr.af.mil)

972802

Social and Behavioural Sciences

Effective Prevention of Crime and Violence Among Persons with Major Mental Disorders

16 May 99 - 26 May 99 : *Il Ciocco, Italy*

Contact: Prof. S. Hodgins, University of Montreal, Department of Psychology, C.P. 6128, Succ. Centre-Ville, Montreal, Quebec H3C 3J7 Canada

(Fax: 514 343 2285 E-mail: hodgins@ere.umontreal.ca)

970012

Security-Related Civil Science

Enzymes in Heteroatom Chemistry

19 Jun 99 - 30 Jun 99 : *Nijmegen, Netherlands*

Contact: Prof. B. Zwanenburg, University of Nijmegen, Department of Organic Chemistry, Toernooiveld, 6525 ED Nijmegen, The Netherlands

(Fax: 31-24 2652929 E-mail: zwanenb@sci.kun.nl)

Co-Director: Prof. M. Mikolajczyk, Polish Academy of Sciences, Lodz, Poland

URL: <http://www.sci.sci.kun.nl/orgchem/zwanenburg>

DT972953



1999 ADVANCED RESEARCH WORKSHOPS

Advanced Research Workshops (ARWs) are working meetings of about four days' duration, where scientists and engineers researching at the frontiers of a subject are able to engage in an intense but informal exchange of views, aiming at a critical assessment of existing knowledge and identification of directions for future action. Attendance at ARWs is mainly by invitation, but a few places are available for particularly well-qualified scientists of all nationalities upon application to the contact person listed below.

Life Sciences

Technological and Medical Implications of Metabolic Control Analysis

10 Apr 99 - 16 Apr 99 : *Visegrad, Hungary*

Contact: Dr. A.J. Cornish-Bowden, C.N.R.S. - LCB, B.P. 71, 31 Chemin Joseph-Aiguier, 13402 Marseille Cedex 20 France

(Fax: 33 491 718914 E-mail: athel@ibsm.cnrs-mrs.fr)

Co-Director: Dr. J. Ovadi, Hungarian Academy of Sciences, Budapest, Hungary

URL: <http://ir2lcb.cnrs-mrs.fr/~athel/meet99.htm>

HT973390

Plant Tolerance to Abiotic Stresses in Agriculture: Role of Genetic Engineering

13 Jun 99 - 18 Jun 99 : *Mragowa, Poland*

Contact: Prof. J.H. Cherry, Auburn University, Dept. of Botany and Microbiology, 129 Funchess Hall, Auburn, AL 36849 USA

(Fax: 334-844-1645 E-mail: jcherry@acesag.auburn.edu)

Co-Director: Prof. A. Rychter, University of Warsaw, Warsaw, Poland

HT973178

Biological, Biophysical & Theoretical Aspects of Polymer Structure and Transport

15 Jun 99 - 20 Jun 99 : *Bikal, Hungary*

Contact: Prof. D. Deamer, UC Santa Cruz,

Department of Chemistry, Santa Cruz, CA 95064, USA

(Fax: 1-831 459 5158 E-mail: deamer@hydrogen.ucsc.edu)

Co-Director: Dr. M. Kellermayer, University Medical School of Pecs, Hungary

URL: <http://www.carb.nist.gov/biotech/NATO99/index.html>

HT973551

Frontiers in Molecular Diversity : From Biology to Material Science

20 Sep 99 - 23 Sep 99 : *Moscow, Russia*

Contact: Prof. A.V. Eliseev, SUNY at Buffalo,

Department of Medicinal Chemistry, 414 Hochstetter Hall, Buffalo, NY 14260 USA

(Fax: 1 716 645 2393 E-mail: eliseev@acsu.buffalo.edu)

Co-Director: Dr. N. Zefirov, Moscow State University, Russia

HT974628

Mathematics, Physics and Astronomy

Optical Properties of Semiconductor Nanostructures

13 Jun 99 - 17 Jun 99 : *Ustron-Jaszowiec, Poland*

Contact: Dr. M. Potemski, Grenoble High Magnetic Field Laboratory, MPI/KFK and CNRS, BP 166, 38042 Grenoble Cedex 9 France

(Fax: 33 0 4 76855610 E-mail: potemski@labs.polycnrs-gre.fr)

Co-Director: Prof. M. Grynberg, Warsaw University, Poland

HT973454

Chemistry and Materials

Piezoelectric Materials: Advances in Science, Technology and Applications

24 May 99 - 27 May 99 : *Predeal, Romania*

Contact: Dr. Carmen Galassi, CNR-IRTEC Research Institute for Ceramics Tech, Via Granarolo, 64, I-48018 Faenza (RA), Italy

(Fax: 39-546 46381 E-mail: carmen@irtec1.irtec.bo.cnr.it)

Co-Director: Dr. M. Dinescu, Institute of Atomic Physics, Bucharest, Romania

URL: <http://irtec1.irtec.bo.cnr.it/natoarw.htm>

HT972209

Polymers and Composites for Special Applications

21 Jun 99 - 25 Jun 99 : *Poznan, Poland*

Contact: Prof. P. Prasad, University of New York, Photonics Research Laboratory, 426 Natural Science Complex, Buffalo, New York 14260-3000 USA

(Fax: 1 716 645 6945 E-mail: pnprasad@acsu.buffalo.edu)

Co-Director: Prof. R. Kozlowski, Institute of Natural Fibres, Poznan, Poland

HT973889

Investigations and Applications of Severe Plastic Deformation

10 Aug 99 - 13 Aug 99 : *Moscow, Russia*

Contact: Dr. T. Lowe, Los Alamos National Laboratory, Material Science and Technology Division, MS G754, NM 87545 Los Alamos USA (Fax: 505-665-4584 E-mail: tlowe@lanl.gov)

Co-Director: Prof. R.Z. Valiev, Ufa State Aviation Technical University, Russia

HT972937

1999 ADVANCED RESEARCH WORKSHOPS - continued

Defects and Surface-Induced Effects in Advanced Perovskites

23 Aug 99 - 25 Aug 99 : *Jurmala, Latvia*

Contact: Prof. Gunnar Borstel, University of Osnabrück,

Dept of Physics, D-49069 Osnabrück, Germany

(Fax: 49 541 969 4888 E-mail: gborstel@rz.uni-osnabrueck.de)

Co-Director: Prof. Andris Krumins, University of Latvia, Riga Latvia

HT973877

Multiphoton and Light Driven Multielectron Processes in Organics : New Phenomena,

Materials and Applications

26 Aug 99 - 31 Aug 99 : *Menton, France*

Contact: Dr. F. Kajzar, CE Saclay, Commissariat à l'Energie Atomique,

LETI - DEIN/SPE, 91191 Gif sur Yvette Cedex France

(Fax: 33 1 6908 6810 E-mail: kajzar@serin cea.fr)

Co-Director: Prof. V.M. Agranovich, Russian Academy of Sciences,

Troitsk, Russia

HT974599

Environmental and Earth Sciences

Responding to Environmental Conflicts: Implications for Theory and Practice

21 Jan 99 - 23 Jan 99 : *Budapest, Hungary*

Contact: Mr. A. Carius, Ecologic GmbH, Friedrichstrasse 165, 10117 Berlin, Germany

(Fax: 49 30 2265 1136 E-mail: carius@ecologic.de)

Co-Director: Dr. A. Vincze, Zrinyi Miklos University of National Defense,

Budapest, Hungary

ES971760

Applications of Space Technologies in the Prevention and Monitoring of Environmental Crimes in the Global Environmental Security Context

24 Feb 99 - 27 Feb 99 : *Vilnius, Lithuania*

Contact: Dr. M. Scaramella, ECPP, C.P. 503, 80100 Naples, Italy

(E-mail: scaramella@unina.it)

Co-Director: Mr. I. Lazdinis, Minister of Environment, Vilnius, Lithuania

ES972715

Remote Sensing Environmental Data in Albania - A Strategy for Integrated Management

Spring 1999 : *Tirana, Albania*

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ES971678

Caspian Sea : A Quest for Environmental Security

15 Mar 99 - 20 Mar 99 : *Venice, Italy*

Contact: Prof. W. Ascher, Duke University, Center for International Devel. Research, Durham,

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ES973303

Sustainable Solid Waste Management in the Southern Black Sea Region

22 Mar 99 - 26 Mar 99 : *Sofia, Bulgaria*

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Bulgaria

ES974630

Transboundary Water Resources Management in the Balkans : Initiating Regional

Monitoring Networks

26 Apr 99 - 30 Apr 99 : *Thessaloniki, Greece*

Contact: Prof. J. Ganoulis, Aristotle University of Thessaloniki,

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Co-Director: Prof. M. Brilly, University of Ljubljana, Ljubljana, Slovenia

ES973334

Coping with Floods : Lessons Learned from Recent Experience

25 May 99 - 29 May 99 : *Ostrava, Czech Republic*

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ES974600

Strong Motion Instrumentation for Civil Engineering Structures

31 May 99 - 4 Jun 99 : *Istanbul, Turkey*

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Republic of Macedonia

ES972734

Acridogenic and Anthropogenic Hazards to the Grassland Biome : Managing Grasshopper

Outbreaks without Risking Environmental Disaster

September 1999 : *USA*

Contact: Prof. J.A. Lockwood, University of Wyoming,

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ES974520

Applied Sciences and Engineering

Statistical Physics Applied to Practical Problems

28 Apr 99 - 1 May 99 : *Budapest, Hungary*

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971423

Increase in Coronary Heart Disease in Central and Eastern Europe: Stress- and Gender-related Factors

23 May 99 - 27 May 99 : *Budapest, Hungary*

Contact: Prof. G. Weidner, State University of New York, Stony Brook,

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972419

Confluence of Computer Vision and Computer Graphics

29 Aug 99 - 31 Aug 99 : *Ljubljana, Slovenia*

Contact: Prof. R. Bajcsy, University of Pennsylvania, Computer and Info. Sci. Dept.,

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HT974582

Science and Technology Policy

Industry as a Stimulator of Technology Transfer

18 Mar 99 - 20 Mar 99 : *Warsaw, Poland*

Contact: Prof. H. Etzkowitz, State University of New York, Science Policy Institute, 735

Anderson Hill Road, Purchase, N.Y. 10577-1400 USA

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STP972923

Reform of Government Scientific Research Policy Laboratories

3 Jun 99 - 5 Jun 99 : *Manchester, UK*

Contact: Dr. P. Gummert, University of Manchester, PREST, Oxford Road, Manchester M13 9PL

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STP974648

Security-Related Civil Science

Environmental Aspects of Converting CW Facilities to Peaceful Purposes

8 Mar 99 - 12 Mar 99 : *Spiez, Switzerland*

Contact: Dr. R. McGuire, Lawrence Livermore Natl. Lab., L-175,

P.O. Box 808, Livermore, CA 94550, USA (Fax: 510 422 6434)

Co-Director: Prof. V. Petrunin, SRI OCT, Moscow, Russia

DT972921

Nuclear Physical Methods in Radioecological Investigations of Nuclear Test Sites

7 Jun 99 - 10 Jun 99 : *Almaty, Kazakhstan*

Contact: Dr. S. Hecker, Los Alamos National Laboratory,

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DT973310

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Further information on the NATO Science Programme may be obtained from
<http://www.nato.int/science>
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