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# SCIENCE

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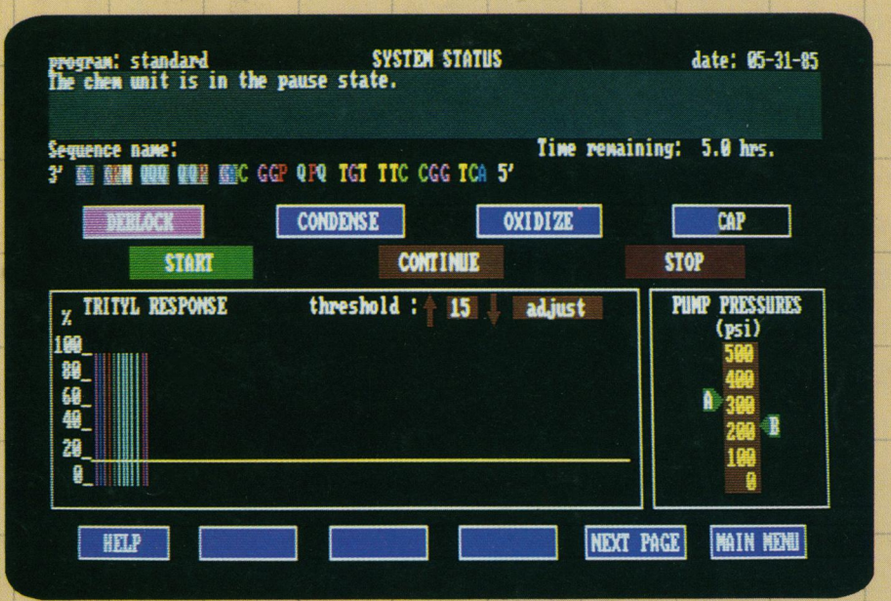


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# SCIENCE

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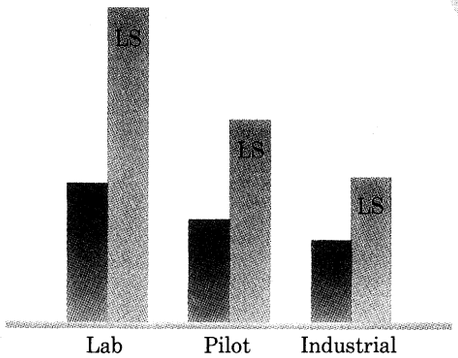


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# This Week in SCIENCE

## Origin of the moon

THE origin of the moon can be explained as part of a process, thought to have begun $4.6 \times 10^9$ years ago, during which the terrestrial planets—Earth, Mars, Venus, and Mercury—also formed (page 341). Planetesimals, small orbiting bodies, collided and merged; eventually only larger bodies, the planets, were left orbiting in nonintersecting paths. Boss explains how the moon may have formed when a planetesimal roughly the size of Mars crashed tangentially into the primitive Earth. Material from planetesimal and protoearth jetted off, went into orbit, and coalesced to become Earth's moon. Formation of the moon by a giant impact is thus conceived as but one event in the grand process by which the solar system formed.

## Homeotic mutation eyed in *Drosophila* ommatidia

A homeotic mutation, causing "something to change into the likeness of something else," has been identified in a single cell type in the eyes of mutant fruit flies (page 400). The compound eyes of *Drosophila* contain hundreds of ommatidia—structural units with eight photoreceptor cells positioned below four lens-secreting cone cells. Individual cells can be traced from early developmental stages to maturity. In each ommatidium, nuclei of five photoreceptors move through the epithelial layer to form a cluster at the apex; they are later joined by nuclei of three additional photoreceptor cells after which eight axons emerge from these cells to enter the optic stalk. The photoreceptor cluster ultimately sinks into the epithelium to a permanent position below the nuclei of four cone cells that have risen apically in pairs. Tomlinson and Ready showed in developing ommatidia of *sevenless* mutants that cells in the photoreceptor seven (R7) position did not produce axons at the appropriate time and their nuclei did not sink with those of other cells in the photoreceptor cluster. Instead, the nuclei remained with nuclei of cone cells, and the cell in the R7 position matured into a cone cell and became a member of the cone quartet. The defect, altering the fate of each cell in the R7 position, appears to reside in the cell's ability to respond appropriately to environmental cues rather than in the nature of the signals sent. The cellular machinery acting during development to produce the homeotic effect can now be analyzed.

## AIDS virus binds to T4 molecule on lymphocytes

THE molecules that bind the AIDS virus to lymphocytic cells have been identified: they are the envelope glycoprotein of the virus and the T4 molecule of the helper-inducer subset of lymphocytes (page 382). Blocking, coprecipitation, and chemical cross-linking experiments directly implicate these two molecules (whose roles for some time had been inferred) in the binding process. McDougal *et al.* suggest that a vaccine against the viral envelope glycoprotein or therapies that intervene in the interaction of virus and cell may effectively curb viral infection, replication, or pathologic effects in AIDS.

## Liquid crystals

LIQUID crystals have more molecular organization than liquids and less than solids and thus may represent a fourth state of matter (page 350). Compounds that can form liquid crystals undergo stepwise breakdown of order during melting from solid to liquid form; at each step, a distinctive thermodynamically stable state, called a mesophase, is attained. Goodby describes the microscopic structural features of liquid crystals that affect the macroscopic forms assumed and the combinations of variables that characterize liquid crystals in each mesophase: their degree of organization, their propensity to form helices, their optical activities, and their electrical properties. Liquid crystals for which the helical pitch is temperature-sensitive have been used in thermometers; others have been used in watch and calculator displays. More applications of these crystals will result from further understanding of the structure and properties of their ordered phases.

## Artificial blood vessel

AN artificial artery with features like those of natural arteries in muscles has been assembled from fibroblasts, collagen, endothelial cells, smooth muscle cells, and a Dacron mesh (page 397). Weinberg and Bell constructed the model artery and found that it could withstand physiologic pressures, that its cells could, like those of normal vessels, secrete collagen, von Willebrand factor, and prostacyclin and that an endothelial layer evenly lining the inner surface of the tube made the model impermeable to large molecules. In other respects the model was not like a natural vessel: its integrity depended on the presence of the Dacron mesh, and it did not contain elastin, a major connective tissue protein. The model can be used for studies of blood vessel functioning and as a prosthesis if it can be integrated into the host's vascular system without immunologic rejection.

## Seabirds monitor pollution

SEABIRDS feeding at the ocean surface (cover) unwittingly ingest petroleum, plastic particles, and other pollutants along with their food (page 373). Using gas chromatography, Boersma analyzed stomach contents of seabirds that characteristically regurgitate whatever they have ingested when captured by predators (including researchers). Samples contained fossil fuel hydrocarbons; levels of pollutants in stomach samples correlated with levels of pollution where the birds had been feeding. Since seabirds "spot sample" the ocean, feeding intermittently over large areas, stomach-content analyses may prove useful in efforts to monitor and protect the marine environment.

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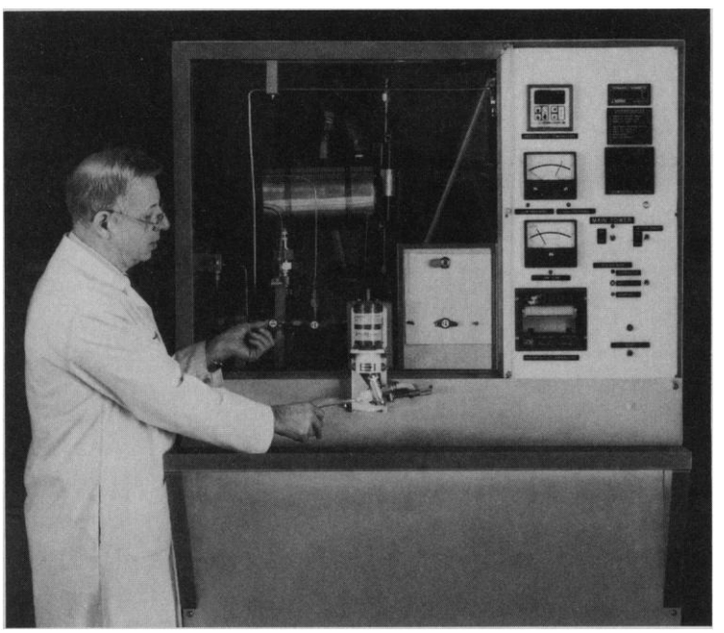

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| | 2.800 | 160 | 1.460 | 85 |
| Hold Time | 0.016 | 160 | 0.008 | 85 |
| | 3.030 | 87 | 1.568 | 65 |
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SCIENCE

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# Evolving State-University-Industry Relations

The scientific community faces a combination of uncertainties and irreversible change the like of which has not been experienced in several decades. Passage of the Gramm-Rudman legislation, which is aimed at a balanced budget, makes the level of federal support for academic research a chancy business. Already pressures had developed and were increasing for expanded university interaction with industry. This will continue.

Federal appropriations fluctuate, and some unforeseen event could change the picture. But the emphasis on applications has deep roots and will endure. Faltering ability to compete in international trade and attendant industrial unemployment will not be alleviated soon. An earlier confidence that support of basic research would inevitably guarantee applications and prosperity has faded. Governor Bruce Babbitt of Arizona voiced the opinion of many governors and other politicians when he said, " . . . the application of scientific knowledge is the basis for economic expansion and diversification, the key to formation of new businesses and the competitive survival of old ones." Babbitt further stated that there is a "new awareness that the fruits of university research and development activity have little economic value unless they are systematically harvested in the marketplace."

When the history of this era of science and technology is written, the role of the National Governors' Association will have special attention. This organization was ahead of the federal government in recognizing and indoctrinating in its members the need for greater academic-industrial interactions. Another key element was a study by David Birch of the Massachusetts Institute of Technology. He found that small companies—that is, those with fewer than 20 employees—generated two-thirds of all new jobs. Many of the governors concluded that state and local policies could lead to new companies and new jobs through the use of science and technology.

In an effort to create new companies and new jobs, many states have begun to provide funds for a variety of programs to foster application of research. In a 1983 report, the U.S. Office of Technology Assessment estimated that states and localities had formulated about 150 programs. Today there are perhaps as many as 500 programs, and virtually all the states are involved. No two states are fostering identical programs, although some common features have emerged. These include research parks located close to universities, incubator facilities on campus or close by, various kinds of financial support for start-up companies, encouragement of faculty to initiate commercial enterprises, cofunding with industry of academic-industrial research centers, and extension services to companies in the state.

Incubators create favorable environments for small companies. They usually involve low-cost space, services, and technical, business, and marketing advice. Interactions among the fledgling entrepreneurs are helpful as is access to university facilities and personnel.

In attempting to foster R&D in their states and create jobs, state governments are faced with questions of where to allocate limited funds. One approach is to depend on the judgment of private enterprise. If a group of companies is willing to provide funds to enter into collaborative efforts with a university or group of universities, the state administrators feel relatively comfortable about furnishing funds that match or partially match.

For public universities and particularly land-grant schools, agricultural extension services have a long history. A natural counterpart is technical and business services to small companies. Only a few states have adopted such programs, but in Ohio and Pennsylvania they have proven to be effective. Though relatively low in cost, they bring the expertise of the state universities closer to their publics and have a substantial potential for increased political clout.

In their efforts to involve their campuses in job creation and entrepreneurial activities, state administrators are likely to make mistakes. Some will raise unrealistic expectations while interfering with educational processes. However, a great many experiments are being conducted. Some will turn out well, and their successful procedures may serve as models. In any event, a significant change in state-university-industry relations is in progress. The strong campus bias of the 1960's and 1970's against applications and industry has diminished and will not be reestablished soon.—PHILIP H. ABELSON

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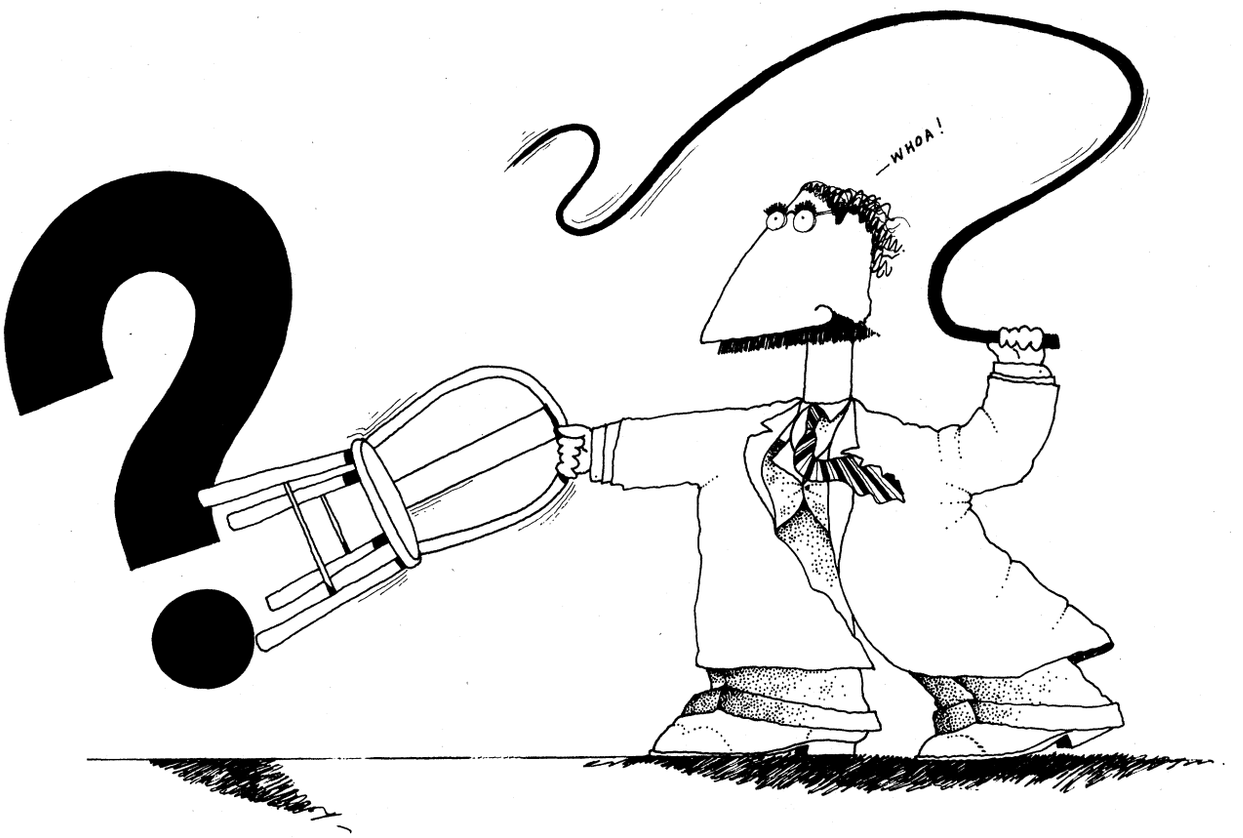


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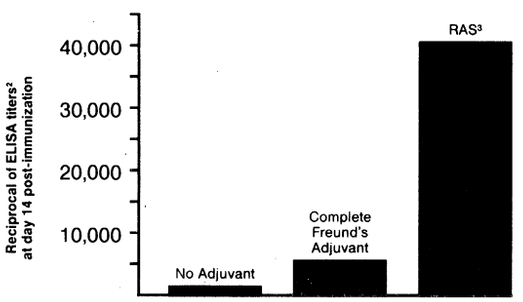


[1] Mice were injected with 25 ug of bovine galactosyltransferase.

[2] ELISA titers were determined with a solid-phase plate assay according to standard methods.

[3] Monophosphoryl Lipid A (MPL) + Trehalose Dimycolate (TDM)

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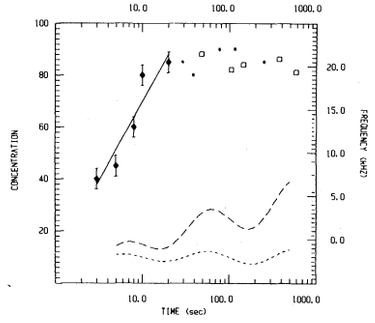


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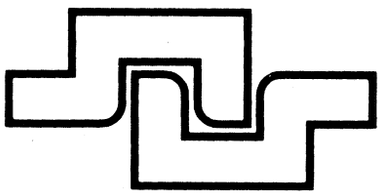
| **Advanced Study Institutes ASIs**<br>60 tutorial meetings a year on advanced topics not in regular university course. International faculty. Two weeks' duration. |  | **Advanced Research Workshops ARWs**<br>30 working meetings a year for intense exchanges between senior scientists to review progress in a given field and recommend future research. |

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# 1986
# Advanced Study Institutes

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***BIOSTATISTIQUES DANS LA RECHERCHE CLINIQUE EXPERIMENTALE SUR L'ATHEROSCLEROSE***
*Dr. PL DUCIMETIERE, Unité INSERM d'Epidémiol. cardiovasc., 15 rue de l'Ecole de Médecine, 75006 Paris, France*
*31 August - 12 September 1986 : Les Arcs, France* 546/84

**DNA-LIGAND INTERACTIONS : FROM DRUGS TO PROTEINS**
***INTERACTION ADN-LIGANDS : DES DROGUES AUX PROTEINES***
*Dr. W GUSCHLBAUER, Dépt. de Biologie, CEN-Saclay, Bât. 142, 91191 Gif-Sur-Yvette Cedex, France*
*1 - 12 September 1986 : Fontevraud (Saumur), France* 020/85

**MEMBRANE RECEPTORS, DYNAMICS AND ENERGETICS**
*Prof. KWA WIRTZ, Biochemistry Lab., Rijksuniversiteit, Postbus 80.054, 3584 CH Utrecht, Netherlands*
*17 - 30 August 1986 : Spetsai, Greece* 308/85

**BIOPOLYMERS**
*Prof. CA NICOLINI, Biophysics, Faculty of Medicine, Viale Benedetto XV, 2, Genova, Italy*
*22 June - 5 July 1986 : Erice, Italy* 315/85

**MOLECULAR GENETICS OF MICROORGANISMS, BIOTECHNOLOGICAL APPLICATIONS**
***GENETIQUE MOLECULAIRE DES MICROORGANISMES, APPLICATIONS EN BIOTECHNOLOGIE***
*Dr. M GRUNBERG-MANAGO, Inst. Biologie Physico Chimique, 13 rue P&M Curie, 75005 Paris, France*
*31 August - 13 September 1986 : Spetsai, Greece* 453/85

**RADIOLABELED MONOCLONAL ANTIBODIES FOR IMAGING AND THERAPY : POTENTIAL, PROBLEMS AND PROSPECTS**
*Dr. SC SRIVASTAVA, Medical Dept., Bldg. 801, Brookhaven National Laboratory, Upton, NY 11973, USA*
*20 July - 1 August 1986 : Il Ciocco, Italy* 553/85

**NERVOUS SYSTEMS IN INVERTEBRATES/*LES SYSTEMES NERVEUX DES INVERTEBRES***
*Prof. MA ALI, Dépt. de Biologie, Université, CP 6128, Succ. A, Montreal, PQ H3C 3J7, Canada*
*20 July - 2 August 1986 : Lennoxville, Québec, Canada* 625/85

**MOLECULAR BIOLOGY OF THE ARTERIAL WALL**
*Prof. G SCHETTLER, Universität, Medizinische Klinik, Bergheimerstr. 58, 6900 Heidelberg, Germany*
*22 September - 3 October 1986 : Heidelberg, Germany* 454/85

**ANIMAL SONAR SYSTEMS**
*Dr. PE NACHTIGALL, Research Br., Naval Ocean Syst. Ctr., P.O.B. 997, Kailua, Hawaii 96734-0997, USA*
*10 - 19 September 1986 : Denmark* 622/85

**MOLECULAR BASIS OF VIRAL REPLICATION**
*Dr. R PEREZ-BERCOFF, 11A Catt. di Virologia, V. di Porta Tiburtine 28, 00185 Rome, Italy*
*26 August - 6 September 1986 : Maratea, Italy* 785/85

**PRINCIPLES AND CLINICAL IMPLICATIONS OF NEURORECEPTOR MODULATION**
*Dr. B WEISS, Dept. Pharmacology, Med. College of PA, 3300 Henry Avenue, Philadelphia, PA 19129, USA*
*16 - 27 June 1986 : Corfu, Greece* 818/85

## ECOLOGY — *ECOLOGIE*

**TOXICOLOGY OF PESTICIDES - EXPERIMENTAL, CLINICAL AND REGULATORY PERSPECTIVES**
*Prof. Corrado GALLI, Inst. Pharmacol. & Pharmacognosy, Univ. of Milan, V. Balzaretti 9, 20133 Milan, Italy*
*6 - 15 October 1986 : Limone sul Garda, Italy* 652/85

## SOCIAL, BEHAVIOURAL AND POLITICAL SCIENCES
## *SC. SOCIALES, POLITIQUES ET DU COMPORTEMENT*

**KINDLING - A MODEL FOR BEHAVIORAL NEUROSCIENCE**
*Dr. DI MOSTOFSKY, Dept. of Psychology, Boston Univ., 64 Cummington Street, Boston, MA 02215, USA*
*18 - 29 May 1986 : Maratea, Italy* 283/85

**THE EVOLUTIONARY BIOLOGY OF INTELLIGENCE**
*Prof. HJ JERISON, Dept. of Psychiatry & Biobehavioural Sc., UCLA Med. Sch., Los Angeles, CA 90024, USA*
*7 - 18 July 1986 : Poppi, Perugia, Italy* 567/85

**BIOLOGICAL BASES OF ANTISOCIAL BEHAVIOR**
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**MULTIPLE CRITERIA DECISION MAKING AND RISK ANALYSIS USING MICROCOMPUTERS**
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*5 - 15 August 1986 : Istanbul, Turkey* 671/85

## PHYSICS AND CHEMISTRY — *PHYSIQUE ET CHIMIE*

**GIANT RESONANCES IN ATOMS, MOLECULES AND SOLIDS**
***LES RESONANCES GEANTES DANS LES ATOMES, LES MOLECULES ET LES SOLIDES***
*Prof. JP CONNERADE, Blackett Lab., Imperial College, London SW7 2AZ, UK*
*16 - 26 June 1986 : Les Houches, France* 098/85

**PHYSICS OF STRONG FIELDS**
*Prof. W GREINER, Theoretische Phys., Univ., Robert-Mayer-Str. 10, 6000 Frankfurt am Main, Germany*
*1 - 14 June 1986 : Maratea, Italy* 267/85

**AQUEOUS IONIC SOLUTIONS**
***SOLUTIONS AQUEUSES IONIQUES***
*Dr. MC BELLISSENT-FUNEL, L.L.B., CEN-Saclay, 91191 Gif-Sur-Yvette Cedex, France*
*22 June - 5 July 1986 : Cargèse, Corsica, France* 273/85

**LOW DIMENSIONAL CONDUCTORS AND SUPERCONDUCTORS**
***CONDUCTEURS ET SUPRACONDUCTEURS DE BASSE DIMENSIONNALITE***
*Dr. D JEROME, Lab. de Physique des Solides, Univ. Paris Sud, 91405 Orsay, France*
*24 August - 6 September 1986 : Magog, Quebec, Canada* 277/85

**CHANCE AND MATTER/*LE HASARD ET LA MATIERE***
*Mr. R STORA, Division Théorique, CERN, 1211 Geneva 23, Switzerland*
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**PHYSICOCHEMICAL HYDRODYNAMICS - INTERFACIAL PHENOMA**
*Prof. MG VELARDE, U.N.E.D.-Facultad Ciencias, Apartado 50.487, Madrid, Spain*
*1 - 11 July 1986 : La Rabida (Huelva), Spain* 285/85

**SYNCHROTRON RADIATION FOR X-RAY CRYSTALLOGRAPHY**
*Prof. M HART, Department of Physics, The University, Manchester M13 9PL, UK*
*10 - 19 June 1986 : Erice, Italy* 538/85

**LOCALIZATION AND INTERACTION IN DISORDERED METALS AND DOPED SEMICONDUCTORS**
*Dr. DP TUNSTALL, Physics Dept., The University, North Haugh, St. Andrews, Fife, KY16 9SS, UK*
*21 July - 8 August 1986 : St. Andrews, Scotland* 541/85

**CARBON DIOXIDE : CHEMICAL AND BIOCHEMICAL USES AS A SOURCE OF CARBON**
*Prof. M ARESTA, Dept. of Chemistry, University of Bari, 173 Via Amendola, 70126 Bari, Italy*
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**TECHNIQUES AND CONCEPTS OF HIGH ENERGY PHYSICS**
*Prof. T FERBEL, Dept. of Physics, University of Rochester, Rochester NY 14627, USA*
*19 - 30 June 1986 : St. Croix, Virgin Islands, USA* 544/85

**HIGH BRIGHTNESS PARTICLE ACCELERATORS**
*Dr. AH GUENTHER, Air Force Weapons Lab/CCN, Kirtland Air Force Base, New Mexico 87117-6008, USA*
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*3 - 15 August 1986 : Camerino, Italy* 565/85

**STRUCTURE/REACTIVITY AND THERMOCHEMISTRY OF IONS**
*Dr. P AUSLOOS, Ctr. for Chemical Physics, Nat Bureau of Standards, Gaithersburg, MD 20899, USA*
*30 June - 11 July 1986 : Les Arcs, France* 566/85

**PHYSICS AND CHEMISTRY OF INTERFACES UNDER LASER IRRADIATION ●**
***PHYSIQUE ET CHIMIE DES INTERFACES SOUS IRRADIATION LASER***
*Prof. LD LAUDE, Lab. de Phys. de l'état solide, Université, Av. Maistriau 23, 7000 Mons, Belgium*
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*Prof. M LEVY, Musée Nat. des Sc., des Techn. et des Industries, 211 Av. J. Jaurès, 75019 Paris, France*
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**PHYSICS OF THE TWO-DIMENSIONAL ELECTRON GAS**
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*2 - 14 June 1986 : Corsendonk, Belgium* 710/85

**ADVANCES IN HIGH PRESSURE STUDIES OF CHEMICAL AND BIOCHEMICAL SYSTEMS**
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*28 September - 11 October 1986 : Corfu, Greece* 793/85

**CHEMICAL DYNAMICS OF SEASONAL SNOWCOVERS**
*Prof. HG JONES, INRS-EAU, Univ. du Québec, 2700 Einstein, Ste-Foy, Québec G1V 4C7, Canada*
*13 - 27 July 1986 : Les Arcs, France* 807/85

**THE LIMITS OF NUCLEAR STABILITY**
***LES LIMITES DE LA STABILITE NUCLEAIRE***
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*5 - 30 August 1986 : Les Houches, France* 815/85

**MICROELECTRONIC MATERIALS AND PROCESSES ●**
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*30 June - 11 July 1986 : Il Ciocco, Italy* 827/85

## GEOPHYSICS AND ASTROPHYSICS
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**STATISTICAL TREATMENTS FOR ESTIMATION OF MINERAL AND ENERGY RESOURCES**
*Dr. AG FABBRI, Ist. di Geologia Marina del C.N.R., Via Zamboni 65, 40127 Bologna, Italy*
*22 June - 4 July 1986 : Il Ciocco, Italy* 413/85

**GENESIS AND PROPAGATION OF COSMIC RAYS**
*Prof. MM SHAPIRO, 205 Yoakum Pkwy., 2-1720, Alexandria, VA 22304, USA*
*1 - 9 June 1986 : Erice, Italy* 571/85

**PHYSICAL PROCESSES IN ASTROPHYSICS**
*Dr. G MORFILL, MPI für Physik und Astrophysik, Inst. f. extraterrestrische Physik, 8046 Garching, Germany*
*August 1986 : Europe* 573/85

**THE GALAXY**
*Dr. G GILMORE, Inst. of Astronomy, University of Cambridge, Madingley Road, Cambridge CB3 0HA, UK*
*4 - 15 August 1986 : Cambridge, UK* 806/85

**THE EARLY UNIVERSE**
*Prof. WG UNRUH, Dept. Physics, Univ. of B. C., 6224 Agriculture Rd, Vancouver, BC V6T 2AT, Canada*
*17 - 30 August 1986 : Vancouver Island, Canada* 816/85

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**INDIGENOUS COGNITION AND MODELS OF INFORMATION PROCESSING**
*Dr. JW BERRY, Psychology Dept., Queens University, Kingston, Ontario, Canada*
*16 - 20 June 1986 : Kingston, Ontario, Canada* 546/85

**THE PSYCHOPHYSICS OF SPEECH PERCEPTION**
*Dr. MEH SCHOUTEN, Inst. of Phonetics, Rijksuniversiteit, Trans 14, 3512 JK Utrecht, Netherlands*
*30 June - 4 July 1986 : Utrecht, Netherlands* 549/85

**MATHEMATICAL ECONOMICS**
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*8 - 20 September 1986 : Florence, Italy* 558//85

**CRIME AND ITS VICTIMS - INTERNATIONAL RESEARCH & PUBLIC POLICY ISSUES**
*Prof. E VIANO, The American University, School of Justice, Washington, DC 20016, USA*
*May 1986 : Bari, Italy* 670//85

**SOCIAL AND ENVIRONMENTAL PSYCHOLOGY AND EUROPEAN INTEGRATION**
*Prof. JC JESUINO, ISC do Trabalho e da Empresa, Av. das Forcas Armadas, 1600 Lisbon, Portugal*
*1 - 5 April 1986 : Lisbon, Portugal* 798/85

**LANGUAGE GENERATION** ●
*Prof. GAM KEMPEN, Psychol. Lab., Univ. of Nijmegen, Montessoril. 3, 6525 HR Nijmegen, Netherlands*
*19 - 23 August 1986 : Nijmegen, Netherlands* 844/85

## PHYSICS AND CHEMISTRY — *PHYSIQUE ET CHIMIE*

**CHEMISTRY AND PHYSICS OF FRACTURE** ●
*Dr. RM LATANISION, Materials Sc. & Eng., MIT, 77 Mass. Ave. 8-202, Cambridge, MA 02139, USA*
*23 June - 1 July 1986 : Bad Reichenhall, Germany* 255/85

**RELATIVISTIC PARTICLE CHANNELING**
*Prof. JA ELLISON, Dept. of Math. & Stat., University of New Mexico, Albuquerque, NM 87131, USA*
*31 March - 4 April1986 : Maratea, Italy* 294/85

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*Dr. M PINERI, Ctre d'études Nucléaires, DRF/SHP/PCM, 85 X, 38041 Grenoble Cedex, France*
*15 - 21 June 1986 : Villard de Lans, Isère, France* 370/85

**STRUCTURE AND DYNAMICS OF WEAKLY BOUND MOLECULAR COMPLEXES**
*Dr. A WEBER, Molecular Spectr. Div., Nat. Bureau of Standards, Gaithersburg, MD 20899, USA*
*22 - 26 September 1986 : Maratea, Italy* 583/85

**PATTERNS, DEFECTS AND MICROSTRUCTURES IN NONEQUILIBRIUM SYSTEMS** ●
*Prof. I PRIGOGINE, Serv. Chimie Phys. II, CP 231, Campus Pl. ULB, Bld. du Triomphe, 1050 Bruxelles, Belgium*
*24 - 28 March 1986 : Austin, Texas, USA* 559/85

**STOCHASTICITY AND INTRAMOLECULAR REDISTRIBUTION OF VIBRATIONAL ENERGY**
***ASPECTS STOCHASTIQUES ET REDISTRIBUTION INTRAMOLECULAIRE DE L'ENERGIE DE VIBRATION***
*Prof. R LEFEBVRE, Lab. de Photophysique Moléc., Campus d'Orsay, 91405 Orsay, France*
*2 - 12 June 1986 : Orsay, France* 627/85

**QUANTUM VIOLATIONS, RECENT AND FUTURE EXPERIMENTS AND INTERPRETATIONS**
*Dr. WM HONIG, Div. of Sc. & Eng., W. Australian Inst. of Techn., Perth, Sth Bentley, 6102 W. Australia*
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*Dr. CRA CATLOW, Dept. of Chemistry, Keele University, Keele, Staffs ST5 5BG, UK*
*31 August - 6 September 1986 : Keele, Staffordshire, UK* 796/85

**SUPER FIELD THEORIES**
*Dr. HC LEE, Theoretical Physics Br., Chalk River Nuclear Labs., Chalk River, Ont. KOJ 1JO, Canada*
*25 - 30 July 1986 : Vancouver, Canada* 811/85

**POLYMER COLLOIDS** ●
*Prof. MS EL-ASSER, Emul. Polymers Inst., 226 Sinclair Lab. No. 7, Lehigh Univ., Bethlehem, PA 18015, USA*
*30 June - 5 July 1986 : Wingspread, Racine, Wisconsin, USA* 834/85

**OPTICAL PROPERTIES OF NARROW GAP LOW DIMENSIONAL STRUCTURES**
*Prof. RA STRADLING, Dept. of Phys., Blackett Lab., Imperial College, Prince Consort Rd., London SW7 2BZ, UK*
*29 July - 1 August 1986 : St. Andrews, Scotland, UK* (CSLD) 810/85

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*Dr. RFC FARROW, IBM Research Lab., 5600 Cottle Road K32/281, San Jose, CA 95193, USA*
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**THE STRUCTURE AND DYNAMICS OF PARTIALLY SOLIDIFIED SYSTEMS**
*Prof. D LOPER, Geophysical Fluid Dynamics Inst., Florida State University, Tallahassee, FL 32306, USA*
*12 - 16 May 1986 : Tahoe, California, USA* (GTM) 785/84

**SUBSTITUENT EFFECTS IN RADICAL CHEMISTRY**
***EFFETS DE SUBSTITUTION EN CHIMIE DES RADICAUX***
*Prof. HG VIEHE, Lab. of Organic Chem., UCL, Place Louis Pasteur, 1, 1348 Louvain-La-Neuve, Belgium*
*20 - 24 January 1986 : Louvain-la-Neuve, Belgium* (SAM) 832/84

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***CHIMIE ORGANOMETALLIQUE DES SURFACES -***
***APPROCHE MOLECULAIRE DES SURFACES ET CATALYSE***
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*25 - 30 May 1986 : Grospierres, France* (SAM) 814/85

**THE DESIGN, ACTIVATION AND TRANSFORMATION OF ORGANOMETALLICS INTO COMMON & EXOTIC MATERIALS**
*Dr. RM LAINE, Chem. Program, SRI International, 333 Ravenswood Ave, Menlo Park, CA 94025, USA*
*Date and Place to be announced* (SAM) 865/85

## GEOPHYSICS AND ASTROPHYSICS
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**GALAXY DISTANCES AND DEVIATIONS FROM THE UNIVERSAL EXPANSION**
*Dr. RB TULLY, Inst. for Astronomy, 2680 Woodlawn Drive, Honolulu, HI 96822, USA*
*13 - 17 January 1986 : Kona, Hawaii, USA* 293/85

**POLYCYCLIC AROMATIC HYDROCARBONS AND ASTROPHYSICS**
***HYDROCARBURES POLYCYLIQUES AROMATIQUES, ET ASTROPHYSIQUE***
*Dr. A LEGER, Grpe Phys. des solides de l'ENS, Univ. Paris 7-Tr. 23, 2 Pl. Jussieu, 75251 Paris Cedex 05, France*
*17 - 22 February 1986 : Les Houches, France* 687//85

**HIGH ENERGY GAMMA RAY ASTRONOMY**
*Dr. KE TURVER, Dept. of Physics, Univ. Science Labs., South Rd., Durham DH1 3LE, UK*
*11 - 15 August 1986 : Durham, UK* 825/85

**ORIGINS OF IGNEOUS LAYERING**
*Dr. I PARSONS, Dept. of Geology and Mineralogy, Marischal College, Aberdeen AB9 1AS, UK*
*1 - 14 August 1986 : Narssarssuaq, Greenland* (GTM) 802/85

## MATHEMATICS — *MATHEMATIQUES*

**DYNAMICS OF INFINITE DIMENSIONAL SYSTEMS**
*Prof. JK HALE, Div. of Applied Maths., Brown University, Providence, RI 02912, USA*
*19 - 24 May 1986 : Lisbon, Portugal* 296/85

**PERIODIC SOLUTIONS OF HAMILTONIAN SYSTEMS**
*Prof. PH RABINOWITZ, Dept. of Mathematics, Univ. of Wisconsin-Madison, Madison, WI 53706, USA*
*October 1986 : Il Ciocco, Italy* 372/85

**GEOMETRIES AND GROUPS, FINITE AND ALGEBRAIC**
*Dr. AM COHEN, CWI - Ctr. for Math. & Computer Sc., 1098 SJ Amsterdam, Netherlands*
*24 - 28 March 1986 : Amsterdam, Netherlands* 592/85

**MATHEMATICAL ASPECTS OF GRAVITY AND SUPERGRAVITY**
*Prof. A ROSENBLUM, Dept. of Physics, Utah State University, Logan, Utah 84322, USA*
*21 - 25 July 1986 : Logan, Utah, USA* 788/85

**NUMERICAL INTEGRATION - RECENT DEVELOPMENTS, SOFTWARE AND APPLICATIONS**
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*18 - 22 August 1986 : Halifax, Nova Scotia, Canada* 800/85

## INFORMATICS — *INFORMATIQUE*

**INFORMATION SYSTEMS - A METHOD OF FAILURE ANALYSIS**
*Prof. A DEBONS, Information Sc. Dept., Univ. of Pittsburgh, 730 Lis Building, Pittsburgh, PA 15260, USA*
*18 - 22 August 1986 : Tournai, Belgium* 823/85

**EXPERT JUDGMENT AND EXPERT SYSTEMS** ●
*Dr. J MUMPOWER, Rockefeller Coll. Public Affairs and Policy, Milne 103, SUNY, Albany, NY 12222, USA*
*August 1986 : Porto, Portugal* 838/85

**MACHINE INTELLIGENCE AND KNOWLEDGE ENGINEERING FOR ROBOTIC APPLICATIONS**
*De. AKC WONG, Dept. of Systems Design Eng., University of Waterloo, Waterloo, Ontario N2L 3G1, Canada*
*May 1986 : Maratea, Italy* (Rob) 018/85

**PYRAMIDAL SYSTEMS FOR IMAGE PROCESSING AND COMPUTER VISION**
*Dr. V CANTONI, Dip. Informatica e Sistemistica, Strada Nuova 106/C, 27100 Pavia, Italy*
*5 - 9 May 1986 : Maratea, Italy* (Rob) 170/85

## APPLIED SCIENCES AND ENGINEERING
## *SCIENCES APPLIQUEES ET INGENIERIE*

**HALIDE GLASSES FOR INFRARED FIBEROPTICS**
*Dr. RMA ALMEIDA, Ctr. De Fisica Molec., Inst. Sup. Tecn., Av. Rovisco Pais, 1000 Lisboa Codex, Portugal*
*31 March - 4 April 1986 : Vilamoura (Algarve), Portugal* 292/85

**MECHANICAL VIBRATIONS AND AUDIBLE NOISE IN ALTERNATING CURRENT MACHINES** ●
*Mr. R BELMANS, Dept. of Electrical Engineering, Kard. Mercierlaan 94, B-3030 Leuven-Heverlee, Belgium*
*4 - 8 August 1986 : Leuven, Belgium* 15/85

**FUNDAMENTALS OF PHYSICAL-CHEMISTRY OF PULVERIZED COAL COMBUSTION** ●
***ASPECTS FONDAMENTAUX DE LA CHIMIE-PHYSIQUE DE LA COMBUSTION DU CHARBON PULVERISE*** ●
*Dr. J LAHAYE, Ctre de Rech. sur la Phys.-Chim. des surf. solides, 24 Av. Prés. Kennedy, 68200 Mulhouse, France*
*11 - 15 August 1986 : Le Bischenberg, France* 584/85

**INTERACTIONS AT THE SOIL COLLOID - SOIL SOLUTION INTERFACE**
*Prof. MFL DE BODDT, Fakulteit Landbouw, RUG, Coupure Links 533, 9000 Gent, Belgium*
*3 - 9 August 1986 : Gent, Belgium* 797/85

**SENSORS AND SENSORY SYSTEMS FOR ADVANCED ROBOTS**
*Dr. P DARIO, Centro "E. Piaggio", University of Pisa, Via Diotisalvi 2, 56100 Pisa, Italy*
*28 April - 3 May 1986 : Maratea, Italy* (Rob) 623/85

**LANGUAGES FOR SENSOR-BASED CONTROL IN ROBOTICS**
*Prof. U REMBOLD, Universität Karlsruhe, Inst. f. Informatik III, Postfach 6380, 7500 Karlsruhe 1, Germany*
*September 1986 : Limone sul Garda, Italy* (Rob) 871/85

**KINEMATIC AND DYNAMIC ISSUES IN SENSING-BASED CONTROL**
***PROBLEMES CINETIQUES ET DYNAMIQUES DANS LE CONTROLE A BASE DE SENSEURS***
*Dr. B ESPIAU, IRISA, Campus de Beaulieu, 35042 Rennes Cédex, France*
*October 1986 : Limone sul Garda, Italy* (Rob) 872/85

**Further information on a particular meeting should be obtained from the meeting Director named above.**

**Further information on the NATO Science Programmes may be obtained from : NATO Scientific Affairs Division, B-1110 Brussels, Belgium.**

**NEUTRON STARS, AGN, AND JETS - NATURE OF THE ENGINES AND THEIR JETS**
*Prof. W KUNDT, Inst. F. Astrophysik, Univ. Bonn, Auf dem Hügel 71, 53 Bonn, Germany*
*17-25 September 1986 : Erice, Italy* 830/85

**PHYSICALLY-BASED MODELLING AND SIMULATION OF CLIMATE AND CLIMATIC CHANGE**
*Prof. ME SCHLESINGER, Dept. of Atmospheric Sc., Oregon State University, Corvallis, OR 97331, USA*
*11-23 May 1986 : Erice, Italy* (GTM) 598/84

## MATHEMATICS — *MATHEMATIQUES*

**DEFORMATION THEORY OF ALGEBRAS AND APPLICATIONS**
*Prof. M HAZEWINKEL, CWI, P.O.B. 4079, 1009 AB Amsterdam, Netherlands*
*1-14 June 1986 : Il Ciocco, Italy* 347/85

**VARIATIONAL METHODS IN NONLINEAR PROBLEMS**
***METHODES VARIATIONNELLES DANS LES PROBLEMES NON LINEAIRES***
*Prof. A DAIGNEAULT, Dépt. de Math. et de Stat., Univ., CP 6128, Succ. A, Montreal, PQ H8C 3J7, Canada*
*7-25 July 1986 : Montreal, Canada* 569/85

## INFORMATICS — *INFORMATIQUE*

**LOGIC OF PROGRAMMING AND CALCULI OF DISCRETE DESIGN** ●
*Prof. FL BAUER, Inst. für Informatik, Technische Univ., Postfach 20 2420, 8000 Munchen 2, Germany*
*29 July-10 August 1986 : Marktoberdorf, Nr. Munich, Germany* 321/85

**PERFORMANCE LIMITS IN COMMUNICATION, THEORY AND PRACTICE** ●
*Dr. JK SKWIRZYNSKI, Marconi Res. Ctr., Hanningfield Rd., Great Baddow, Chelmsford Essex CM2 8HN, UK*
*7-19 July 1986 : Il Ciocco, Italy* 568/85

**LOGIC SYNTHESIS AND SILICON COMPILATION FOR VLSI DESIGN** ●
*Prof. P ANTOGNETTI, Dept. of Electronics (DIBE), Univ. of Genova, V. Causa 13, 16145 Genova, Italy*
*7 June-18 July 1986 : L'Aquila, Italy* 572/85

**DISTRIBUTED OPERATING SYSTEMS - THEORY AND PRACTICE** ●
*Prof. Y PAKER, Polytechnic Central London, 115 New Cavendish St., London W1M 8JS, UK*
*18-29 August 1986 : Cesme, Izmir, Turkey* 651/85

**GAUGE THEORY AND THE EARLY UNIVERSE**
*Prof. DN SCHRAMM, Astron. & Astroph. Ctr., Univ. of Chicago, 5640 So. Ellis Ave., Chicago, IL 60637, USA*
*20-30 May 1986 : Erice, Italy* 657/85

**PATTERN RECOGNITION THEORY AND APPLICATIONS** ●
*Dr. P DEVIJVER, Philips Res. Labs., Av. Van Becelaere, 2, Box 8, 1170 Brussels, Belgium*
*9-20 June 1986 : Spa, Belgium* 831/85

**MATHEMATICS AND COMPUTER SCIENCE IN MEDICAL IMAGING**
*Dr. MA VIERGEVER, Dept. of Math. & Inform., Delft Univ. of Techn., P.O.B. 356, 2600 A.J. Delft, Netherlands*
*21 September-4 October 1986 : Il Ciocco, Italy* 842/85

## APPLIED SCIENCES AND ENGINEERING — *SCIENCES APPLIQUEES ET INGENIERIE*

**MINERAL PROCESSING AT A CROSSROADS - PROBLEMS AND PROSPECTS** ●
*Dr. BA WILLS, Camborne School of Mines, Pool, Redruth, Cornwall, UK*
*24 March-4 April 1986 : Falmouth, Cornwall, UK* 251/85

**SOLAR ENERGY UTILIZATION FUNDAMENTALS AND APPLICATIONS**
*Dr. HY YUNCU, Dept. of Mechanical Engineering, Middle East Techn. University, Ankara, Turkey*
*23 June-4 July 1986 : Cesme, Turkey* 257/85

**COMPUTER AIDED OPTIMAL DESIGN - STRUCTURAL AND MECHANICAL SYSTEMS** ●
*Prof. CA MOTA SOARES, CEMUL/IST., Technical Univ., Av. Rovisco Pais, P-1096 Lisboa Codex, Portugal*
*29 June-11 July 1986 : Troia, Portugal* 274/85

**CEREBRAL BLOOD FLOW - MATHEMATICAL MODELS, INSTRUMENTATION, AND IMAGING TECHNIQUES**
*Dr. CC DUNCAN, Neurosurgery, Yale Univ. School of Medicine, 333 Cedar Str., New Haven, CT 06510, USA*
*2-13 June 1986 : L'Aquila, Italy* 299/85

**PHYSICS AND TECHNOLOGY OF HYPERTHERMIA**
*Prof. C FRANCONI, Medical Physics Inst., II University of Rome, Via O. Raimundo, 00173 Rome, Italy*
*25 July-9 August 1986 : Urbino, Italy* 542/85

**OPTICAL FIBER SENSORS** ●
*Prof. S MARTELLUCCI, Mechanical Eng. Dept., 2nd Univ. of Rome, Via O. Raimondo, 00173 Rome, Italy*
*2-10 May 1986 : Erice, Italy* 594/85

**REMOTE SENSING APPLICATIONS IN METEOROLOGY AND CLIMATOLOGY**
*Prof. AP CRACKNELL, Carnegie Lab. of Physics, The University, Dundee DD1 4HN, UK*
*17 August-6 September 1986 : Dundee, UK* (GTM) 1023/83

# 1986
# Advanced Research Workshops

## LIFE SCIENCES — *SCIENCES DE LA VIE*

**AUDITORY FREQUENCY SELECTIVITY**
*Dr. BCJ MOORE, Dept. of Experim. Psychology, The University, Downing St., Cambridge CB2 3EB, UK*
*23-27 June 1986 : Cambridge, UK* 574/84

**ADVANCED DRUG DELIVERY SYSTEMS FOR PEPTIDES AND PROTEINS** ●
*Prof. SS DAVIS, Dept. of Pharmacy, The University, University Park, Nottingham NG7 2RD, UK*
*28 May-1 June 1986 : Copenhagen, Denmark* 678/84

**CEREBELLUM AND BEHAVIOURAL PLASTICITY**
*Prof. M GLICKSTEIN, Neural Mechanisms of Behav., Univ. College, 3 Malet Place, London WC1E 7JG, UK*
*7-9 April 1986 : Oxford, UK* 295/85

**ADVANCED TECHNOLDGIES & THEIR NUTRITIONAL IMPLICATIONS IN THE PRODUCTION OF EDIBLE FAT** ●
*Prof. Claudio GALLI, Ist. di Farmacologie e di Farmacognosia, Via A. Del Sarto 21, 20129 Milan, Italy*
*17-20 March 1986 : Milan, Italy* 591/85

**BIOMECHANICS OF CELL DIVISION**
*Dr. N AKKAS, Graduate Sch. of Natural and Applied Sc., Ankara Univ., F.K. 39, Altindag, Ankara, Turkey*
*1-31 October 1986 : Istanbul, Turkey* 412/85

**SOMITE DEVELOPMENT**
*Prof. R BELLAIRS, Anatomy and Embryology Dept., Univ. College, Gower Street, London WC1E 6BT, UK*
*6-9 April 1986 : Glasgow, Scotland, UK* 563/85

**LIPID MEDIATORS, IMMUNOLOGY AND SHOCK** ●
***MEDIATEURS LIPIDIQUES ET IMMUNOLOGIE DANS LE CHOC SEPTIQUE ASSOCIE AUX LESIONS THERMIQUES*** ●
*Dr. PG BRAQUET, Inst. Henri Beaufour, 17 Av. Descartes, F-92350 Le Plessis Robinson, France*
*10-15 August 1986 : Copenhagen, Denmark* 589/85

**CELLULAR AND HUMORAL COMPONENTS OF CEREBROSPINAL FLUID IN MULTIPLE SCLEROSIS**
*Prof. A LOWENTHAL, Dept. Neurochem., Borne-Bunge Found. Un. Antwerp, Univ. plein 1, 2610 Wilrijk, Belgium*
*20-24 April 1986 : Hengelhoef, Houthalen, Limburg, Belgium* 794/85

**BIOLOGY OF ICOSANOIDS AND RELATED SUBSTANCES IN BLOOD AND VASCULAR CELLS**
***BIOLOGIE DES ICOSANOIDES ET DES SUBSTANCES VOISINES DANS LES CELLULES SANGUINES ET VASCULAIRES***
*Dr. M LAGARDE, U63, Lab. d'Hémobiologie, Inst. Pasteur, Fac. A. Carrel, 69372 Lyon Cédex 08, France*
*Septembre 1986 : Lyon, France* 801/85

**THE BIOLOGICAL SIGNIFICANCE OF THE MAJOR HISTOCOMPATIBILITY COMPLEX**
*Dr. AJ MUNRO, Dept. of Pathology, Cambridge University, Tennis Court Rd., Cambridge, CB2 1QP, UK*
*16-28 April 1986 : Sorrento, Italy* 821/85

**RECOGNITION IN MICROBE-PLANT SYMBIOTIC AND PATHOGENIC SYSTEMS**
*Prof. EJJ LUGTENBERG, The University, Botanical Lab., Nonnensteeg 3, 2311 VJ Leiden, Netherlands*
*11-16 May 1986 : Dronten, Netherlands* (C-CS) 703/84

**MESENCHYMAL-EPITHELIAL INTERACTIONS IN NEURAL DEVELOPMENT**
*Prof. JR WOLFF, Zentrum Anatomie der Universität, Kreuzbergring 36, 3400 Göttingen, Germany*
*17-21 March 1986 : Berlin, Germany* (C-CS) 815/84

**MOLECULAR AND CELLULAR PROCESSES UNDERLYING DESENSITIZATION AND ADAPTATION TO SIGNAL MOLECULES**
*Prof. TM KONIJN, Zoological Lab., The University, Kaiserstraat 63, 2311 GP Leiden, Netherlands*
*29-31 May 1986 : Noordwijkerhout, Netherlands* (C-CS) 824/84

**PLANT HORMONE RECEPTORS**
*Dr. D KLAMBT, Dept. of Botany, University of Bonn, Meckenheimer Allee 170, 5300 Bonn 1, Germany*
*18-22 August 1986 : Bonn, Germany* (C-CS) 837/84

**MECHANISM OF FUNCTION OF THE ACETYLCHOLINE RECEPTOR**
*Prof. A MAELICKE, MPI für Ernahrungsphys., Rheinlanddamm 201, 4600 Dortmund 1, Germany*
*12-17 May 1986 : Santorin (Thira), Greece* (C-CS) 767/84

**HOST-PARASITE RECOGNITION AND INTERACTION IN PROTOZOAN DISEASES OF MAN**
*Prof. KP CHANG, Univ. of Health Sciences, 333 Green Bay Rd., N. Chicago, IL 60064, USA*
*28 September-1 October 1986 : Maratea, Italy* (C-CS) 769/84

**MODIFICATION OF CELL TO CELL SIGNALS DURING NORMAL AND PATHOLOGICAL AGEING**
*Dr. S GOVONI, Inst. of Pharmacology & Pharmacognosy, Via A. del Sarto 21, 20129 Milan, Italy*
*11-17 May 1986 : Limone, Italy* (C-CS) 476/85

**GANGLIOSIDES AND MODULATION OF NEURONAL FUNCTIONS**
*Prof. DH RAHMANN, Zoological Inst., Univ. Stuttgart-Hohenheim, 7000 Stuttgart 70, Germany*
*19-24 October 1986 : Stuttgart, Germany* (C-CS) 809/85

**THE SEMIOTICS OF CELLULAR COMMUNICATION IN THE IMMUNE SYSTEM**
*Dr. EE SERCARZ, Dept. of Microbiology, Univ. of California, Los Angeles, CA 90024, USA*
*5-10 May 1986 : Bellagio, Italy* (C-CS) 837/85

## ECOLOGY — *ECOLOGIE*

**NUMERICAL ECOLOGY**
*Prof. P LEGENDRE, Dépt. de Sc. Biologiques, Université, CP 6128, Succ. A, Montreal H3C 3J7, Canada*
*3-11 June 1986 : Roscoff, Brittany, France* 590/85

**TAXONOMY OF PORIFERA FROM NE ATLANTIC AND MEDITERRANEAN SEA**
***TAXONOMIE DES PORIFERES DANS LE N-E ATLANTIQUE ET LA MEDITERRANEE***
*Dr. J VACELET, Ctre d'Océanol., Station Marine d'Endoume, r. Batterie des Lions, 13007, Marseille, France*
*22-27 September 1986 : Marseille, France* 820/85

**POPULATION DYNAMICS AND CONSERVATION OF SEABIRDS**
***DYNAMIQUE DE LA POPULATION ET PRESERVATION DES OISEAUX DE MER***
*Dr. X MONBAILLIU, MEDMARAVIS, 20 rue St. Martin, 75004 Paris, France*
*26-31 March 1986 : Alghero, Sardinia, Italy* 850/85