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YOU ARE HOLDING THE LAST PAPER COPY OF THE BEMS NEWSLETTER

With the Board's decision in February to cut printing and mailing costs at many levels, the Bioelectromagnetics Society's Newsletter is to change distribution methods, from mailing paper copies by regular post to electronic mailing of a portable document file (pdf) or Word version. The change is effective with the next issue—for July/August—this year.

The action follows the Board's decision to take several steps toward reducing costs of printing and mailing. It is estimated that the Society could save as much as \$15,000 per year by distributing only electronic versions of the Annual Meeting Abstract Book and the newsletter. A projected \$6,000 to \$7,000 in printing and mailing expenses could also be saved by successfully moving to electronic distribution of Calls for Nominations and Papers, and by conducting electronic elections for officers and board members.

Distributing digital materials to members who have access to the Internet and e-mail may also help to reduce the problem of printed materials being lost in the mail, according to Executive Director Gloria Parsley.

How Will It Work?

This article is the official notice and inquiry from the BEMS office asking whether you are able to receive electronic versions of future newsletters, as well as informational mailings and ballots from the BEMS Office. If you are unable to receive news and official notices from the Society by electronic mail, you MUST notify Executive Director Gloria Parsley and her staff by filling in the form on page 2 of this newsletter or by other written notice mailed or faxed to:

Gloria Parsley, Executive Director, The Bioelectromagnetics Society, 2412 Cobblestone Way, Frederick, MD 21702-2626 USA; FAX +1 (301) 694-4948.

Only those who notify the BEMS office will continue to receive traditional mailings on paper. Also, every BEMS member with Internet access should visit the "Member Only" part of www.bioelectromagnetics.org and make sure that his or her e-mail address is correct, because e-mail will become the key method of communication from the Society to members after July 1, 2004. If you have any problems with BEMS e-mail, please call +1 301 663 4252 and speak with Gloria or her staff about it.

Important Message on Voting

This year's election was processed electronically by the majority of voters. Using Campus Vote.com's service, BEMS sent voters their ballot packages with instructions on how to cast votes electronically. Results from this electronic balloting will be provided at the Annual Business Meeting on June 23, 2004, at the Omni Shoreham Hotel in Washington, DC. Please note the BEMS office will not mail paper ballots in future to voting members unless specifically requested to do so.

What Do I Do Next?

1. Go to the BEMS Web site, <<http://www.bioelectromagnetics.org>> and enter the "Members Only" section. Find yourself in the Member Directory and check your entry, paying particular attention to the e-mail address. Make any necessary changes.

2. If you do not use the Internet, go to page 2 of this newsletter, fill in the form and fax or mail it immediately to Gloria Parsley at the BEMS office.

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EUROPEAN UNION ADOPTS EMF OCCUPATIONAL RULES

The Council of Ministers of the European Union in Brussels have adopted the Directive on Physical Agents—minimum health and safety requirement regarding the exposure of workers to electromagnetic fields—with amendments proposed by the European Parliament.

The Directive will complement Directive 89/391/EEC on the safety and health of workers, laying down minimum requirements and allowing the Member States to adopt more protective provisions. It gives priority to reducing exposure at source, through preventive measures related to work station design, work equipment design, procedure and method.

The Directive establishes “exposure limit-values” and “action-values” based on recommendation drawn up by the International Commission on Non-Ionising Radiation Protection (ICNIRP). It attributes responsibility to employers for assessing exposure levels, adopting preventive measures and arranging for information and training for their workers. Because for the moment there is insufficient scientific evidence of possible long-term effects, the Directive is limited to the short-term effects of exposure to EMF.

—from an EU Council of Ministers' press release

PRAGUE WILL HOST CONFERENCE ON ELECTROSENSITIVITY

The World Health Organization (WHO) International EMF Project has scheduled a Seminar and Working Group Meeting on EMF Hypersensitivity on October 25–27 at the Hotel ILF in Prague, Czech Republic. The first two days are open to all.

Sensitivity to EMF has been given the general name ‘Electromagnetic Hypersensitivity’ or EHS. It may include nervous system symptoms such as headache, fatigue, stress and sleep disturbance, skin symptoms or other problems. EHS is a real and sometimes disabling problem, WHO points out, even though EMF exposure at home for affected people is often several orders of magnitude lower than international standards and not different from that of neighbors. The aim of the WHO conference is to review the current state of knowledge and opinion and propose ways to move forward on this issue. A closed working group meeting by invitation only will result in a WHO report summarizing current scientific understanding of the EMF hypersensitivity syndrome and discussion at the international meeting.

More information and registration materials are available on line at www.who.int/peh-emf/meetings/hypersensitivity_prague2004/en/ and at: www.hygp Praha.cz/emf-hypersens.htm

WHAT TO SEE — A SHORT GUIDE FOR VISITORS TO WASHINGTON, D.C.

A stop at the city's official Visitors Center, 1300 Pennsylvania Ave NW, Tel. (202) 328-4748, can help choose what to see. The U.S. National Air and Space Museum's new exhibit, “The Wright Brothers and The Invention of the Aerial Age,” is now open. Also, the Museum of Natural History and other Smithsonian Institution museums—free of charge—offer a variety of exhibits. The Internet can help to plan activities, as well:

National Building Museum: www.nbm.org/

National Aquarium: www.nationalaquarium.com/

National Gallery of Art: www.nga.gov/

District of Columbia Brew Pubs—www.beerme.com/breweries/us/dc/index.shtml

Washington, D.C. bus, boat and trolley tours: www.dcvisit.com/tours.html

Walking tours: www.washingtonwalks.com

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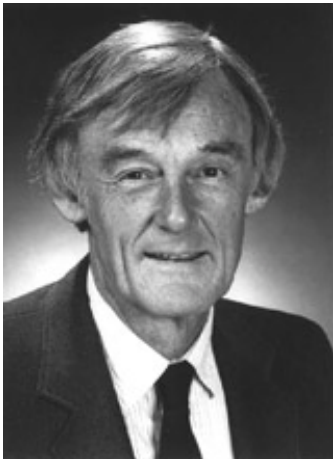
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IN MEMORY OF W. ROSS ADEY

31 January 1922 – 20 May 2004



William Ross Adey

As a youth in the Adelaide, Australia, of his birth, William Ross Adey, known universally to his many friends and colleagues as “Ross,” had the advantages of supportive parents and the freedom to indulge the natural instincts of youth at the seashore, observing marine life in tidal pools, reading books, and building radios in the family basement. A precocious child, he graduated from high school at age 14, and by 21 had received degrees in medicine (M.B.) and

surgery (B.S.) from the University of Adelaide.

Recalling his early years in a June 2002 interview, Adey said, “I was absolutely fascinated by radio. I started building crystal sets as most kids did at that age. It grew beyond that, and by the time I was 13 and 14, I had built quite a number of very large vacuum tube sets, valves as we called them. I got an amateur radio license when I was 17 years old.” Throughout his life, radio framed his professional and social activities far more than any ordinary hobby.

After his first clinical position at Royal Adelaide Hospital in 1944, he soon was aboard the cruiser *Shropshire* as a Surgeon Lieutenant in the Royal Australian Navy (1945–1946), where he first encountered the new technology of radar. Years later, Adey reminisced, “In rough seas on cold nights, we would go into the radar hut and warm ourselves with the stray emissions that drove the radar antennas.”

His first publication, based on research conducted for his M.D. degree (1949, the University of Adelaide) was an electromyographic study of a type of chronic myopathy. The blending of electronics and scientific research that would mark his career gave other early fruit with construction of the first Australian six-channel recorder of brain electrical signals, which was put to use for clinical research on epileptic children and for laboratory studies. His second publication, on the motor mechanisms in the brain of anurans, was followed by a stream of neuroanatomical studies in species ranging from earthworms to Australian marsupials and monkeys.

Upon receiving the prestigious Nuffield Foundation Fellowship in Medicine in 1950, Adey traveled to the University of Oxford for postgraduate research on limbic system structural anatomy and its pathways to the diencephalon. The return trip from England to Adelaide included a stopover in Los Angeles, which led, three years later, to the start of a 23-year-long association with UCLA Medical School, where he was Pro-

fessor of Anatomy and Physiology for 20 years. Even today, former students, now senior practitioners and researchers, reflect with awe on the clarity and comprehension evident in Adey’s lectures in neuroanatomy. His lectures showed mastery of neuroanatomical detail and complexity, neuroembryology, and higher brain functions—all securely held in memory and delivered in sculpted flowing prose.

Adey and his colleagues at UCLA and the UCLA Brain Research Institute made pioneering advances in the neuroanatomy of the limbic system and its behavioral and pathological correlates, measurements of the electrical properties of brain tissue, spectral analysis of EEG, and the mechanisms of memory.

Driven by the need to obtain the physiological knowledge required to fulfill President Kennedy’s commitment to put a man on the moon in the 1960s, Adey, as Director of the Space Biology Laboratory (1961 to 1974) at the UCLA Brain Research Institute, conducted animal and human research. His laboratory developed the technology for biotelemetry from space that allowed EEG recordings from astronauts Lovell and Borman showing the effects of weightlessness on brain function.

Driven by the idea that higher brain functions needed a distributed information system that might be carried by the brain’s own electrical activity, Adey and colleagues at the UCLA Laboratory of Environmental Neurobiology, including Suzanne Bawin, and Rochelle Gavalas-Medici, began to study whether it might be possible to use modulated radio-

See In Memory of W. Ross Adey continued, p 10

The Bioelectromagnetics Society newsletter is published and distributed to all members of the Society. Institutions and libraries may subscribe to the newsletter at an annual cost of \$58.50 (\$67.50 for overseas subscriptions). The newsletter serves the membership and subscribers in part as a forum of ideas and issues related to bioelectromagnetics research. All submission to the newsletter must be signed. It is understood that they reflect the views of individual authors and not those of the Society or the institutions with which the author may be affiliated. The editors welcome contributions to the newsletter from members and others in the scientific and engineering communities. News items as well as short research notes and book reviews are appreciated. Advertisements inserted or distributed with the newsletter are not to be considered endorsements.

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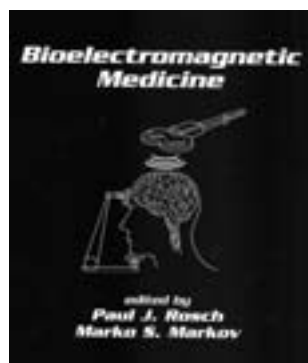
BOOK NOTICE

“Permanent magnet and electromagnetic therapies are now riding the crest of a tidal wave of interest in ‘alternative’ and ‘complementary’ medicine,” even though “charlatans” and “misguided zealots” with worthless devices and unfounded claims continue to mislead the public, according to a new book, *Bioelectromagnetic Medicine*, co-edited by Paul J. Rosch and Marko S. Markov, a member of the BEMS Board.

The editors intend their book to help readers distinguish between authentic scientific approaches or products and “quackery” by restricting contributions to evidence-based medicine supported by references in peer-reviewed publications and providing “tools and skills for evaluating the legitimacy of devices and claims.”

The 850-page volume contains 49 invited papers plus a 50th by co-editors Markov and Rosch, which offers late-breaking developments and their speculation on future directions.

An impediment to wide acceptance of bioelectromagnetic approaches to medicine has been “the inability to identify the mechanisms of action responsible for any benefits,” Rosch acknowledges in the preface. He and Markov therefore try “to identify concepts and theories that attempt to explain the mechanisms responsible for mediating the diverse effects of bioelectromagnetic therapies, and, in some instances, how they may relate to ancient concepts of subtle energies in the body that are also found in nature.”



Bioelectromagnetic Medicine attempts to reveal “an emerging paradigm of cellular communication at a physical / atomic level that may provide some answers and also provide insights into widely acknowledged but poorly understood phenomena such as the placebo effect, the power of prayer and a firm faith, telepathic communication, the benefits of acupuncture, homeopathy, therapeutic touch, various bodywork and massage therapies and Kirlian and other low-level imaging procedures.”

The editors say they have tried not only to “separate the wheat from the chaff” in bioelectromagnetics medicine, but to offer a history of therapies investigated by pioneers in the field. “We have made a concerted effort to include prominent scientists whose research may not be well known in the United States,” Rosch and Markov add. Thus the book is in part a tribute to “trailblazers” in their eyes—figures such as Andy Bassett, Robert Becker, Abe Liboff, Björn Nordenström and Ross Adey. They, according to *Bioelectromagnetic Medicine*, have “recognized the vast potential of bioelectromagnetic medicine and have helped to put it on a solid scientific footing.”

Contributors to *Bioelectromagnetic Medicine* who will be familiar to BEMS newsletter readers include not only Adey, Liboff and Markov, but Stefan Engström writing on “Magnetic Field Generation and Dosimetry,” Frank S. Prato on “Image-Guided Electromagnetic Theory,” Gabi Nindl and colleagues on “Low-Frequency Electromagnetic Field Effects on Lymphocytes: Po-

tential for Treatment of Inflammatory Diseases,” and Ruggero Cadossi and colleagues on “Orthopedic Clinical Applications of Biophysical Stimulation in Europe.”

Other contributors familiar to the BEMS community are James Ryaby with a chapter on “Electromagnetic Stimulation in Orthopedics: Biochemical Mechanisms and Clinical Applications,” Joseph Salvatore and Markov on “Electromagnetic Fields as an Adjuvant Therapy to Antineoplastic Chemotherapy,” Damjan Miklavcic and colleagues on “Electroporation for Electrochemotherapy and Gene Therapy,” and Chiyoji Ohkubo and colleagues on “Static Magnetic Fields and Microcirculation.”

In their final chapter on late-breaking developments, Rosch and Markov discuss new magnetic guidance systems for diagnosis and treatment of abnormal cardiac rhythms unresponsive to drugs, and treatment of cerebral artery aneurysms and other brain lesions via a guidewire with magnetic tip, which can be imaged to aid passage through cranial blood vessels. They also touch on techniques of radio-frequency ablation for malignancies, endometriosis, fibroids, snoring and esophageal reflux; implants for vagal nerve stimulation in treatment of panic attacks, seizures or headache; vibrating platforms to prevent osteoporosis and the need for caution regarding new findings on blood flow effects and treatment of diabetic neuropathy with a permanent magnet.

This last chapter also addresses a persistent conspiracy theory related to the “nonthermal vs thermal effects of EMF” question. Although the co-editors initially state their wish to refrain from taking sides, in the last chapter they repeat the view that “important information has been deliberately suppressed by powerful political and financial vested interests” in a “well orchestrated and financed” campaign to deny that “ELF and microwave radiation can have significant nonthermal biological consequences.”

Avoiding outright support of the conspiracy view, Rosch and Markov state that nonthermal interactions “have been clearly demonstrated in research ranging from cognitive performance and polysomnography studies to effects on gene expression, enzyme activity and blood-brain barrier permeability.” Markov’s short review of the literature suggests that readers keep in mind Adey’s position—that nonlinear thermodynamics and physics may apply to such interactions, and “nonthermal” EMF effects may occur even if physics cannot explain such a response.

Rosch and Markov also salute the formation of the International Commission for Electromagnetic Safety (ICEMS) a group of scientists who take a precautionary approach to EMF. As announced in Poster P218 at the BEMS Annual Meeting in Maui, ICEMS members formed the group to respond to “the unsatisfactory state of deliberations, evaluation of scientific evidence and proposed guidelines presented by ICNIRP, IEEE and other international and national organizations.”

The cost of *Bioelectromagnetic Medicine* is US\$195. More information including ordering details are available on line at: www.dekker.com/servlet/product/productid/4700-3. The ISBN number of the book is 0-8247-4700-3.

– Janet Lathrop

ICNIRP WORKSHOP DRAWS A RECORD TURNOUT IN SEVILLA

Alastair McKinlay, outgoing chair of the International Commission on Non Ionizing Radiation Protection (ICNIRP), gracefully handed over leadership of the commission at the IRPA meeting in Madrid, Spain, following many salutes and expressions of hope for the success of chairman-elect Paolo Vecchia of Italy's National Institute of Health. McKinlay's remarks came during the old commission's last Symposium & Workshop held in Sevilla, Spain, on May 17–22.

The Sevilla meeting attracted over 250 participants, record attendance for an ICNIRP workshop, McKinlay said. The number “almost overwhelmed” the organizers, but high turnout “testifies to the interest in non-ionizing radiation around the world,” he added.

The new ICNIRP, with five fresh members, will not hold its first formal meeting until September in Munich, and Vecchia said in Sevilla that it is therefore too early to expect big news from the new group. Setting priorities and directions for ICNIRP will come in due time as the new commissioners begin to discuss the issues, he said.

Nevertheless, Vecchia did offer some observations of interest to the ELF EMF community. He said ICNIRP does plan to carefully look at the scientific basis for exposure limits in its ELF guidelines and compare with those used in the Institute of Electrical and Electronics Engineers' (IEEE) International Committee on Electromagnetic Safety (ICES) C95.6 standard. ICNIRP members are likely to discuss whether to continue using induced current density as the most meaningful dosimetric quantity as the scientific basis for setting exposure limits to avoid nervous system stimulation, or to use the in situ electric field as ICES has done. Vecchia would like to see “convergence” in future between ICES and ICNIRP on this point, he added.

ICNIRP members are well aware of C95.6, and this year's U.K. National Radiological Protection Board's (NRPB) recommendations on ELF exposure guidelines, Vecchia said. NRPB proposes using the retina as a model for possible EMF physiological effects on the human central nervous system, according to former NRPB staff scientist Rick Saunders, who is now working with the World Health Organization's (WHO) International EMF Project. Saunders feels the retina model offers improvements even beyond the ICES approach to nervous system effects.

Vecchia said that after September, ICNIRP may appoint a task group to study both the ICES and NRPB rationales in detail. He hopes communication will take place between ICNIRP, ICES and members of NRPB's expert advisory group on non-ionizing radiation.

The new ICNIRP also plans further study of the reduction factors now built into its exposure guidelines, along with discussion of possible harmonization of reference levels in its standard with



Alastair McKinlay

guidelines in the IEEE ICES standard in the intermediate frequency range between about 20 and 1000 Hz. The ICES standard permits increasing exposure over this range while the ICNIRP basic restriction is fixed. Vecchia hopes that a meaningful relationship between known effects and exposure limits—one closer to the actual response of the human body—can be recommended in that range. But much more research is needed, he noted.

During the last talk of the ICNIRP workshop in Sevilla, Vecchia said that ICNIRP members plan to consider some new methods of communicating their ideas to the ELF EMF community between meetings, as well. An exposure standard is always a “work in progress” and under constant review, Vecchia remarked. It would be useful, then, if national health and safety authorities, other decision makers, the public and industry would not have to wait long to hear ICNIRP members' opinion on certain important topics. Thus, ICNIRP may hold more public meetings and scientific symposia, or issue reports, statements and perhaps fact sheets to express the commission's views as they evolve.

Generic Research Can Handle New Frequencies

Jørgen Bach Andersen of Aalborg University, Denmark, after outlining some differences between current and future wireless communication technologies at the ICNIRP Workshop in Sevilla, recommended that biologists who plan to investigate possible health effects should not launch a new research program for each new frequency as it comes along. Instead, he feels “we need more generic studies that will cover all these things... at one blow.”

Andersen compared data transfer rates and fairly constant power use patterns in GSM-type systems with those of CDMA, UMTS, EDGE and other new technologies. The 3G and 4G systems have “an entirely new relationship between power use and time,” Bach Andersen said. Using data on estimated SAR from a GSM base station and a handset compared to CDMA, he said health effects scares from the new systems are “largely exaggerated.”

Since it is impossible to study all the variations of new technologies coming, biological experiments to investigate possible health effects should focus on “basic, generic studies,” he added.

Bach Andersen's paper concluded that new systems do not seem to pose a threat to human health in the sense that critical SAR levels will be approached. Most systems will have sub-Watt transmit power and carrier frequencies below 6 GHz, he added.

Another speaker in the RF dosimetry session was Rüdiger Matthes of Germany's Bundesamt für Strahlenschutz (BfS—the Federal Office of Radiation Protection), who has served as scientific secretary of ICNIRP since its founding in 1992 and will now join the commission as a full member.



Jørgen Bach Andersen

See ICNIRP Workshop Continued, p 11

DE POMERAI OFFERS CAUTIONARY TALE AT FGF/COST281 WORKSHOP

David de Pomerai of Nottingham University, U.K., surprised many participants with his remarks at a workshop on “The Influence of RF Fields on the Expression of Stress Proteins,” sponsored by the European Union’s COST281 and the Forschungsgemeinschaft Funk e.V. (FGF)—Germany’s Research Association for Radio Applications.

It was held on April 28 and 29 in Helsinki, at Finland’s Radiation and Nuclear Safety Authority (STUK).

de Pomerai reported that his previous findings of stress in transgenic nematode worms (*Caenorhabditis elegans*) with exposure to a weak radio-frequency signal (1.0 GHz, 0.5 W, continuous wave with estimated SAR 5 to 40 mW per kg) have disappeared after engineers from the U.K. National Physical Laboratory made the exposure system more precise, while de Pomerai and colleagues Adam Dawe, Nebojsa Vasic and David Thomas further standardized some of their animal handling techniques.



David de Pomerai

The U.K.’s Mobile Telecommunications Health Research (MTHR) program noticed de Pomerai’s RF experiments when he reported that exposure to the RF signal produced in a TEM cell in his Nottingham laboratory induced the expression of reporter genes regulated by the HSP16-1 promoter protein, de Pomerai recalled. MTHR asked him and colleagues to repeat and extend their experiments in the nematode worm *Caenorhabditis elegans* after fully characterizing the exposure and experimental systems.

They were right to insist on the system investigation, de Pomerai said at the FGF-COST281 workshop in Helsinki. An aggressive program to rule out thermal mechanisms of HSP induction in the TEM cell, incubator and other exposure apparatus found that animal exposure (estimated SAR) was five times higher at the edges of the wells inside the incubator than at the center. The engineers also observed an eight percent power loss in the system, a likely source of heating. By removing polystyrene packing from under the septum in the TEM, replacing connectors, lengthening cables and replacing copper sheathing inside with silver, power loss was reduced to 1.5 percent, de Pomerai reported, while heating was cut in half. They further addressed the thermal question with a series of sham-sham studies, and through another series of experiments comparing results in the silver-plated TEM with those from the copper-line TEM, which turned out to be different.

On the animal handling and experimental procedure side, de Pomerai and colleagues took steps to standardize their worm culture procedures more than they had before, to synchronize

experimental groups by the animals’ developmental level, to use exactly the same number of worms per experiment and standardize washing temperature and techniques. Examination of animal handling techniques suggested, for example, that a 20-hour exposure period might be starving some worms, while wash-water temperature and low oxygen levels in the soil may have been startling them.

de Pomerai reported that using a fully controlled exposure setup, handling techniques and with exposure time reduced to two hours, there is no longer any difference between RF-exposed and sham-exposed animals in his group’s HSP experiments.

“This may be a warning story for others.... a sort of cautionary tale,” de Pomerai told workshop participants in Helsinki. He found that a temperature rise of 0.06 percent generated by the exposure setup, not RF exposure, may have been enough to elicit a stress response in the nematodes. “Most people dismiss such small temperature increases,” de Pomerai remarked, “but I no longer do.”

The Nottingham researchers plan more exploration of an apparent stimulation of feeding with RF exposure in these worms, de Pomerai said. Since RF-worms feed more rapidly and run out of bacterial food during prolonged exposures, it is possible that heat-shock reporter responses during 20-hour exposures may result from starvation stress, and he and colleagues plan more study of the possible RF stimulation of feeding. de Pomerai and colleagues plan to submit a paper for publication in the peer-reviewed literature outlining these developments and emphasizing the importance of controlling all experimental parameters tightly in RF exposure systems, he said.

Issues in Heat Shock Protein Assay Methods

Another presenter at the Helsinki workshop was Reba Goodman of Columbia University, New York, who described experiments in *Drosophila*, raised in vials near the antenna of a mobile phone receiving music for one hour, two times per day for 10 days. She estimated the SAR at 1.4 W/kg. However, Joe Wiart of COST281, an expert in RF dosimetry and exposure systems, told Goodman that the exposure system was not well controlled and the signal could have been many times weaker than reported. It was thus



Reba Goodman and Joe Wiart discuss RF exposure in Helsinki

noted in a Draft Workshop Summary compiled by Blair Henderson of Innsbruck University, Austria, and Martin Meltz of the University of Texas Health Science Center, San Antonio, that the Columbia exposure system was not well characterized.

Goodman said exposure was associated with increased HSP and other protein expression levels in 50 experiments and changes were not due to heating. She concluded that in establishing realistic



Matthias Gaestle

safety standards, attention must now be paid to relevant biological responses. The old safety standards based on thermal responses alone make no biological sense, in her opinion.

Matthias Gaestle of the Institute of Biochemistry at the University of Hannover, Germany, reviewed some of the cellular stresses which can lead to expression of heat shock proteins—lack of oxygen, neuronal injury, starvation, aging, heavy metal exposure, heat, virus or bacterial infection—detectable with correct use of assays. He said small heat shock proteins (HSP16 or 27) can be markers of low-level stress, while expression of the larger molecules (HSP 60 and 70) may indicate more severe stress.

Gaestle said various methods are available for detecting a stress response in vitro at different points along the protein phosphorylation cascade. Western blot provides a visual display of genes expressed while other assays can detect individual proteins. Gaestle said that it appears from some articles describing experiments on RF and HSP expression, researchers may have used the wrong assay to detect HSP changes. Gaestle urged the bioelectromagnetics researchers present at the workshop to test for all transcription stages to avoid false positive results. He added that activation of the HSP system in humans is a common and normal response to rather routine cell damage, for example from sunlight, heat in a sauna session or exercise.

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Overall, Gaestle said he would prefer to ask not whether RF EMF stimulates the HSP and protein transcription system, but instead whether RF exposure can lead to apoptosis, for example. It is not clear what phosphorylation of small heat shock proteins really means to the organism, he added. HSP experiments which do not show at least a three-fold increase in gene or protein expression or evidence of phosphorylation at more than one level in the cascade of three transcription factors may not be worth pursuing, he suggested.

In his own HSP research, a 100-fold stimulation of these endpoints at all three levels of the cascade is near the minimum considered to be significant, and still the organism may show no physiological effect of the exposure, Gaestle added.

Scraping the cells from a petri dish into a flask could cause such a small change, for example. "I would not make theory on a 30 percent increase in mRNA," he said. Gaestle praised HSP experiments by Joseph Roti Roti and colleagues at Washington University in St. Louis for a thorough evaluation at all three levels of the HSP expression-transcription cascade. He called their finding of no RF effect on HSP expression very convincing.

Roland Glaser of Humboldt University, Berlin, suggested that one accomplishment of the Helsinki workshop had been to define requirements for a clear indication of HSP expression to recommend to bioelectromagnetics researchers. After Gaestle, Glaser

The FGF/COST281 HSP Workshop Included a Tour of Finland's STUK Laboratories

The Radiation and Nuclear Safety Authority of Finland (STUK) launched a survey on radiation of mobile phones in spring 2003, testing 12 mobile phone models that year with plans to test about 20 more during 2004. After this year, STUK plans to test the most popular mobile phone models used in Finland.



Tim Toivo of STUK gave tours of the Authority's laboratory facilities to visitors who attended the recent FGF/COST281 sponsored workshop on heat shock proteins in Helsinki.

In the survey, a Specific Absorption Rate (SAR) value was determined for each phone. STUK's tests assure that the maximum limit set by the Finnish Ministry of Health and Social Affairs, two watts of radiation per kilogram (2W/kg), is not exceeded.

"None of the phones I tested came even close to the limit value," said Tim Toivo, of STUK's Non-Ionizing Radiation Laboratory, who with STUK senior scientist Kari Jokela performed the tests. SAR is measured according to a European EN 50361 standard, using equipment fulfilling the EU requirements.

Measured SAR values were quite close to those announced by phone manufacturers. SAR values ranged from 0.45 to 1.12 W/kg, Toivo and Jokela announced. STUK wants to give people reliable and comparable information on radiation characteristics of mobile phones on sale, the Authority explained. More information is available at www.stuk.fi

— adapted from STUK press releases

proposed that to be considered meaningful an RF effect on HSP must show at least a three-fold increase, with phosphorylation cascade analyzed at three data points, plus evaluation of mRNA changes if phosphorylation is seen at all three points.

A Consensus Statement from the Workshop, "Influence of RF fields on the expression of stress proteins," is being prepared. In the meantime, presentations are available at: www.cost281.org/documents.php?node=71&dir_session=

MANY BEMS MEMBERS TO OFFER EXPERTISE AT WHO'S ISTANBUL WORKSHOP ON EMF AND CHILDREN

Staff of the World Health Organization's International EMF Project have announced speakers and a tentative agenda for the two public days of the "Workshop on Sensitivity of Children to EMF" on June 9–10 at the Crowne Plaza Istanbul, Turkey.

Chair of the morning session on Wednesday, June 9 will be Agneta Peralta of ICNIRP, who is also director of the Bureau of Health Devices and Technology of the Department of Health for the Republic of the Philippines, and a lecturer in the Medical Physics program at the University of Santo Tomas, Manila. Speakers in that session and their topics are expected to include:

- Michael Repacholi—EMF: A potential environmental risk for children?
- Robert Brent of the Alfredi Du Pont Hospital for Children, USA—Tutorial: Sensitivity of developing organisms to exposure of environmental toxicants
- John Scholes, University College, London—Development of the CNS in childhood
- John Reigart, Medical University of South Carolina, USA—Could EMF influence children's development?
- Tracy Lightfoot, University of York, U.K.—The etiology of childhood leukemia

Colin McCaig of the University of Aberdeen, U.K., will serve as moderator for a panel discussion, "Children's sensitivity to EMF: Is it plausible?"

Speakers on Dosimetry and Dielectric Properties are expected to include:

- Camelia Gabriel, MCL, London—Age-related dielectric properties
- Philip Chadwick, MCL, London—Modeling of ELF exposure in children
- Joe Wiart, COST281 and France Telecom—Modeling of RF exposure in children

Speakers on EMF Exposure:

- John Swanson of National Grid, U.K.—Patterns of exposure of children to ELF and RF
- Joachim Schüz, University of Mainz, Germany—Mobile phone exposure in children

Speakers on Epidemiological Studies of Childhood Cancer

- Leeka Kheifets, UCLA, USA—Childhood leukemia and EMF
- Tricia McKinney, University of Leeds, U.K.—Childhood brain tumors: Epidemiology and risk factors
- Maria Feychting, Karolinska Institute, Sweden—Non-cancer EMF effects related to children

Chair of the morning session on Thursday June 10 will be Gerd Friedrich of Forschungsgemeinschaft Funk e.V. (FGF), Germany's Research Association for Radio Applications. Speakers on Hypotheses and Possible Mechanisms on the second day of the public sessions are expected to include:

- Rob Kavet, EPRI, USA—Contact current hypothesis: Summary of results to date

- Denis Henshaw, University of Bristol, U.K.—Do magnetic fields cause increased risk of childhood leukemia via melatonin disruption?
- Lawrence Challis, U.K. MTHR—RF interaction mechanisms

Speakers on Laboratory Studies for ELF and RF:

- Isabelle LaGroye, PIOM Lab, France—Immune system, hematopoietic system, cancer
- Jukka Juutilainen, University of Kuopio, Finland—Developmental effects
- Zenon Sienkiewicz, NRPB, U.K.—Neurobehavioral effects

In addition, Rick Saunders, on sabbatical from the U.K. National Radiological Protection Board (NRPB) and working with the WHO EMF Project in Geneva during 2004, will offer a summary of the NRPB's 2003 workshop on Weak ELF EMF and Thermal Effects.

And, Christol Olivier of the University of Ghent, Belgium, (for Luc Martens) will describe progress of the COST281 Short Term Mission, "Mobile Communication and Children," while Gerd Friedrich will summarize the COST281 2003 workshop, "Mobile Telecommunications and the Brain."

The last public session on Thursday afternoon will feature presentations and discussion on developing EMF policy, the use or not of precaution, research recommendations and related topics. Short statements from the audience will also be heard. Chairing this session will be Paolo Ravazzani of the Institute of Engineering and Biomedicine, Milan.

Speakers on EMF Policy are expected to include:

- Christopher Portier of the U.S. National Toxicology Program—Science, policy and children's health: Where are we going?
- Hilary Walker, the U.K. Department of Health—Developing EMF policy for children
- Paolo Vecchia, Chair of ICNIRP—Approach to standards for children

Michael Repacholi, head of the WHO International EMF Project, will moderate the final session on conclusions and recommendations of the workshop. Repacholi will also lead members of the Project's Advisory Group in a closed meeting (by invitation) on June 11 to end the workshop.

FGF '03 ANNUAL REPORT IS OUT

The 2003 Annual Report of Germany's Research Association for Radio Applications, Forschungsgemeinschaft Funk e.V. (FGF), is now available on line. FGF brings industry, government and academic institutions together to address the question, "Do low-energy electromagnetic fields affect biological systems?"

Its 34-page report summarizes the 19 research projects, literature studies and workshops managed by FGF or conducted in cooperation with other institutions in 2003. It offers details of FGF's initiative to improve knowledge dissemination and scientific discussion in this field. These include a description of several public information efforts and improvements to the FGF Knowledge-Based Literature Database. The FGF Annual Report 2003 may be downloaded at: www.fgf.de/english/index.html

HEALTH CANADA'S PORTABLE MOBILE PHONE BASE STATION MEASUREMENT DATA AND SPECIFICATIONS AVAILABLE ON LINE

Art Thansandote and colleagues at Health Canada's Consumer and Clinical Radiation Protection Bureau recently posted their report, "Measurement of Cellular Base-Station Emissions Using a Newly Developed RF Field Mapping System" on the Health Canada website: www.hc-sc.gc.ca/hecs-sesc/ccrpb/electro.htm

Thansandote and colleagues G. B. Gajda, E.P. Lemay, P. Lemyre and James McNamee designed the portable system to acquire data on base station RF emissions and results from real time surveys to provide timely, local information to the Canadian public.

Custom built at Health Canada, the instrument can measure the combined power density in all bands of frequencies used by mobile phone service providers, and it identifies GPS-derived coordinates of the location, say Thansandote and colleagues. "With lightweight and portable features, the instrument can be mounted on a vehicle and measurements taken while driving. Results show that worst-case exposure levels are typically thousands of times below the recommended exposure limits in Health Canada's Safety Code 6," they state.

"We have presented this work at two scientific meetings, but have yet to submit a manuscript for journal publication. We will do so in the near future," Thansandote explained. Asked how much the system costs, Thansandote replies that he can arrange to have it built by a contractor for US\$5000. per unit.

In tests conducted in Ottawa, the device which is about the size of a suitcase was powered by an automobile battery, Thansandote said. A laptop computer stores data and the setup includes two complementary antenna/receivers, a dipole and a spiral. It pro-

vides results within a few hours. One reason the instrument is needed, Thansandote is that in a few Canadian cities, citizens were asking their governments to adopt sometimes drastic new low ex-



posure limits out of concern over base station signals. For example, without scientific justification Toronto had considered setting exposure limits 100 times below Canadian guidelines set in Safety Code 6. To date, results of measurements using the new instrument are reassuring—they show that "worst case" exposure levels are typically thousands of times below Health Canada's recommended limits, Thansandote concluded.

EU, FINNISH HEALTH INSTITUTE OFFER A PRACTICAL EMF OCCUPATIONAL GUIDEBOOK

Electromagnetic Fields in the Work Environment — Guidance for occupational exposure assessment by Maila Hietanen, Anna-Maija Hämäläinen and Patrick von Nandelstadh of the Finnish Institute of Occupational Health (FIOH), Helsinki, was recently published in English and copies may be obtained from Hietanen by request.

Prepared by the FIOH staff with support from the European Commission's Directorate General EMPL, the 48-page booklet offers practical advice to health authorities, labor inspectors and others who "need to have a general understanding of exposure levels associated with various sources at workplaces."



Maila Hietanen

The easy-to-use book features several graphs and photographs illustrating points made in the text, plus 12 very useful tables for quick reference of such things as symbols used for quantities and units of EMF, typical field strengths under different trans-

mission lines, frequency ranges and peak magnetic field levels encountered in electronic article surveillance systems, frequency bands and power levels for radio, television and common mobile phone systems, and the International Commission on Non Ionizing Radiation Protection's (ICNIRP) basic restrictions and reference levels calculated for 24 specific frequencies.

There are discussions of output power ranges and exposure evaluation for electric appliances, radio-frequency dielectric heaters and sealers, naval and air traffic radars, microwave dryers, electric trains, magnetic resonance imaging equipment, induction heaters and welding devices in addition to mobile phone base station antennas. The booklet explains basic concepts in exposure measurement and assessment, and outlines ICNIRP's basic restrictions and reference levels for occupational exposure.

The booklet also contains a list of authoritative references for those who wish to consult the standards-relevant EMF literature. To request a copy of the guidebook, contact Dr. Maila Hietanen at the Finnish Institute of Occupational Health, Topeliuksenkatu 41 a A, FIN-00250, Helsinki, FINLAND. Her e-mail address is maila.hietanen@tti.fi

— *Janet Lathrop*

In Memory of W. Ross Adey, continued

frequency fields as a means to probe brain function. In his 2002 interview, Adey recalled the question that led to the first studies with amplitude-modulated radio-frequency fields. "If we made a radio signal look like a brain wave, would it influence behavior? We showed in cats very clearly, and monkeys to some extent, that you could make the brain wave pattern follow the modulation on the radio signal."

Drawing on the nonthermal nature of behavioral, *in vivo*, and *in vitro* studies on the nervous system that sprang from his laboratory, Adey took his quest beyond the fabric of chemical reactions to delve into the physical organization of biological tissue that could underpin responses to very low energy levels. In this phase, conducted over a period of more than 25 years at the Jerry L. Pettis Memorial Veterans Medical Center (Loma Linda, California), Loma Linda University, and the University of California, Riverside, he and his colleagues addressed the effects of extremely low frequency electric and magnetic fields, and radio waves of the type used for mobile telephony. Forward-looking and excited by science until his last days, he took delight in the recent discovery by European researchers of tunneling nanotubules because they made manifest at the ultrastructural level further evidence for a general physical plan for varieties of intercellular communication.

Adey wrote, spoke, and argued forcefully for a thorough and fair examination of public health questions that he saw conjoined with a nascent understanding of profound questions in biophysics and cell biology. In pursuit of the latter, he was determined that society not be swayed by simplistic, and even worse, politically-motivated ideas, in place of accurate and complete scientific knowledge. No one who saw him in action

will forget the vigor of his speech and the sting of his polemics.

Those who had the good fortune to be among his collaborators were struck by his depth of perception, breadth of knowledge, trust in the scientific method, inexhaustible energy, patient attention to detail, and prodigious memory.

Adey's numerous friends worldwide knew of his affection and fierce devotion to each of them; his gentlemanly grace and refined manners; his ire when provoked; his patient and deep caring for them and their family members; his love of Shakespeare—quoted fully and precisely, should the occasion arise; his love of the mountains for both wintertime skiing and summertime hiking; his pride in an accomplished family now with a seventh generation training in medicine and science; and for the numerous times he carried his tall, gaunt, frame 26 miles and 385 yards to the finish line, even into his late seventies.

His own words from a letter of June 2003 capture his vision for bioelectromagnetics and feelings about The Bioelectromagnetics Society, and recall a forward-looking life lived intensely and fully:

"It is with deep regrets that I write to inform you that I will not be attending the 25th Anniversary meeting of the Society next week.... Nevertheless, I would be grateful if you would convey my warmest wishes to my many friends and colleagues in the Society. I am ever mindful of the great honor bestowed on me by the Society in the award of the d'Arsonval Medal. I look forward to a future for the Society in which its policies and plans will be integral in defining a physical essence of living matter through use of a broad spectrum of electromagnetic tools."

— Asher Sheppard

CEMEXPO 2004 WILL BE IN NOVEMBER IN PARIS

Harbour Conferences have issued a Call for Papers for the 10th Show and Conference About Electromagnetic Compatibility and Bio-Electromagnetism, to be held on Wednesday and Thursday November 24–25, 2004 in Paris. More information in both French and English may be found at www.cemexpo.com/ The deadline for submitting a paper title and abstract is **June 15, 2004**.

Topics for Development for two parallel sessions:

- EMC in The Industry, Transportation and Telecommunications
- EMC and Radiocommunication
- Various technologies of lightning protection systems: Radio location and alarm system (materials and services)
- Material, components, test equipments and technical solutions
- Operating system (restrictive access, safety devices of methods, uninterruptable power supply)

Also, BIOxCEM, an International meeting on Radioprotection is planned, featuring discussion on "equitable balance between advantages and dangers" by representatives of five countries.

CALL FOR PAPERS—ACES

The Applied Computational Electromagnetics Society (ACES) has announced a Special Issue of the ACES Journal dedicated to the topic of Review of Computation and Modeling Techniques for Phased Array Antennas. Tentative deadline for submission papers is November 15, 2004.

Phased array antennas have unique capabilities that enhance the performance of all military, commercial and remote sensing radar systems, and some recent, innovative biomedical applications. The Guest Editors of the Special Issue solicit papers that re-evaluate the capabilities of currently commercially available, established, state-of-the-art Computer Simulation Codes, and will give special attention to application of commercially available softwares to the performance modeling of phased arrays for biomedical applications.

Potential contributors wishing to discuss the suitability of their contribution may see <http://aces.ee.olemiss.edu/> or contact either of the Guest Editors. Prof. Deb Chatterjee, CSEE Division, University of Missouri, Kansas City, Tel.: +1 (816)235-1276; e-mail: chatd@umkc.edu OR Dr. Ross A. Speciale, Research & Development, Inc., Tel.: +1 (925)335-9385; e-mail: rspeciale@comcast.net

ICNIRP Workshop, Continued

He reviewed the rather scant literature on RF exposure from mobile phone base stations, and summarized that:

- Distance of a residence from a base station is a poor surrogate for exposure in an epidemiologic study, for example, since the correlation between distance from an antenna and power density is quite low.
- Base stations contribute very little to people's overall RF exposure, and
- There is as yet no simple parameter which will provide a good exposure assessment metric for epidemiology.

Also, in a poster, Matthes and his BfS colleagues offered a list of 52 new telecommunication EMF research projects coordinated by BfS with other German federal agency and funded cooperatively by the government plus industry at an approximate cost of 17 million Euro. The studies, based on recommendations of national and international expert groups, are designed to reduce scientific uncertainty for health risk assessment in this field.

– Janet Lathrop

NOTE: UNESCO/WHO SEMINAR IN ARMENIA CHANGES DATE

The organizing committee for the UNESCO / WHO Seminar on "Molecular and Cellular Mechanisms of Biological Effects of EMF" with practical workshop on "The Mechanisms of the Biological Effect of Extra High Power Pulses (EHPP)" would like to announce the new dates of the meetings: 1-5 March 2005 (Yerevan, Armenia). More information on the meetings is available from <http://www.biophys.am>.

If you have any questions and comments, please, contact the organizing committee at: life@arminco.com or Prof. Sinerik Ayrapetyan, Chairman of International Org. Committee and President, UNESCO Chair-Life Sciences International, Post-graduate Educational Center, 31 Acharian St., Yerevan, 375040, ARMENIA. Tel: +374 1 624170; Fax: +374 1 612461. See: www.biophys.am

CALL FOR PAPERS ISSUED FOR THE 2005 EMC SYMPOSIUM IN ZÜRICH

Organizers for the Topical Meeting on Biomedical EMC on Feb. 16–17, 2005 during EMC Zürich 2005 are Michael Okoniewski and Elise Fear of the University of Calgary, Canada, and for the Topical Meeting on Reverberation Chambers, M. Hatfield of the Naval Surface Warfare Center, Dahlgren, USA, on Feb. 14–16. Authors should submit papers describing original work electronically in PDF format via the EMC Zürich website, www.emc-zurich.ch

Also, on Feb. 17 and 18, the EU COST281 will hold a meeting in Zürich, coordinating scientific sessions with EMC. Details of the COST281 workshop will be available later at its website, www.cost281.org

CALENDAR

June 16, 2004. IEEE ICES Short Course, "Safety Levels with Respect to Human Exposure to Electromagnetic Fields, 0 - 3 kHz, in C95.6." The Marriott Wardman Park Hotel, Nathan Hale Room, 2600 Woodley Road, NW, Washington, D.C. Cost is US\$395. Contact: Arthur G. Varanelli, Raytheon Company, 47 Foundry Ave., Waltham, MA 02453 USA. Tel: +1 (781) 642 2410 or Fax: +1 (781) 642 2422.

June 17, 2004. 8 a.m.–12 noon. IEEE SCC34: Product Standards Relative to the Safe Use of Electromagnetic Energy. The Marriott Wardman Park Hotel, 2600 Woodley Road, NW, Washington, D.C. Registration is required. Contact: r.c.petersen@ieee.org

1–5 p.m. ICES SC1: Measurements, Instrumentation and Computation.

7–10 p.m. ICES SC5: Safety Levels with Respect to Electro-Explosive Devices.

June 18, 2004. 8 a.m.–12 noon. ICES SC2: Terminology, Units of Measurement, and Hazard Communication.

1–5 p.m. ICES SC3: Safety Levels with Respect to Human Exposure to Electromagnetic Fields 0–3 kHz.

June 19, 2004. 8 a.m.–5 p.m. ICES SC4: Safety Levels with Respect to Human Exposure, 3 kHz–300 GHz .

7–10 p.m. Committee on Man and Radiation (COMAR)

June 20, 2004. 8 a.m.–12 noon ICES Main Committee.

June 20, 2004. 1–5 p.m. U.S. AFRL Workshop, "Measuring and Modeling Thermal Responses to Directed Energy Exposure." Contact: Patrick A. Mason, USAF/AFRL/HEDR, Brooks City-Base, TX 78235-5147. Tel: +1 (210) 536-2362, DSN +1 (210) 240-2362. FAX: (210) 536-3977, DSN FAX: +1 (210) 240-3977. E-mail: patrick.mason@brooks.af.mil

June 21–24, 2004. The Bioelectromagnetics Society 26th Annual Meeting. The Omni Shoreham Hotel, 2500 Calvert St. NW, Washington, D.C. Tel: +1 (202) 234-0700. Lodging \$150 single; \$170 double occupancy. Contact: Bruce McLeod, Technical Chair, e-mail: mcleod@montana.edu Tel: +1 (406) 994-4145, or Gloria Parsley, Executive Director, BEMS, e-mail: BEMSoffice@aol.com Tel: +1 (301) 663-4252. Further details at www.bioelectromagnetics.org

June 30, 2004. NEW Abstract deadline for Sept. 20–23, 2004, meeting, Mobile Communication and Health: Medical, Biological and Social Problems. Moscow, RUSSIA.

July 25–30, 2004. Gordon Conference on Bioelectrochemistry. Connecticut College, New London, Conn. USA. Contact: Richard Nuccitelli, Center for Bioelectrics, 830 Southampton Ave., Suite 5100, Norfolk, VA 23510 USA. Tel: +1 (757) 683-2405. Cell: +1 (860) 805-2906. E-mail: rnuccite@odu.edu

Calendar continued on p12

Sept. 20–23, 2004. Mobile Communication and Health: Medical, Biological and Social Problems. Moscow, RUSSIA. See www.pole.com.ru/news_en.htm or contact Eugenia Bichelday at 46 Zhivopisnaya St., Moscow 123182, RUSSIA. Phone/FAX: +7 095 193 0187. E-mail: RNK@pole.com.ru

September 20–21, 2004. COST281 Workshop on EMF Exposure Assessment. Watch www.COST281.org for details.

September 22–24, 2004. Joint IEEE International Committee on Electromagnetic Safety (ICES) and COST 281 Workshop on Thermophysiology. Details to be announced.

October 4–8, 2004. 3rd International Workshop on Biological Effects of EMF. Kipriotis Village Hotel, Kos, GREECE. Sponsored by The Bioelectromagnetics Society and Telecommunications System Institute of Greece. See <http://imm.demokritos.gr/bioeffects> or www.telecomlab.gr/bioeffects or contact Prof. P. Kostarakis, Electronics-Telecom Lab, Physics Department, University of Ioannina, GR-45110 GREECE. Tel: +30 (2651) 098491. E-mail: pkost@cc.uoi.gr

October 25–27, 2004. WHO EMF Project's Seminar and Working Group Meeting on EMF Hypersensitivity. Hotel ILF in Prague, Czech Republic. The first two days of this seminar are open and intended to review current state of knowledge and opinions and propose ways to move forward on this issue. A closed meeting by invitation only follows on Oct. 27. For information and registration materials see: www.who.int/peh-emf/meetings/hypersensitivity_prague2004/en/ OR www.hygpaha.cz/emf-hypersens.htm

January 12–14, 2005. The Society for Physical Regulation in Biology and Medicine 23rd Scientific Conference. Embassy Suites Resort, Lake Tahoe, CA. Contact: Christopher Jacobs, Program Chair, E-mail: chris.jacobs@stanford.edu Tel: (650) 736-0802 or Gloria Parsley, Executive Director, E-mail: gloriaparsley@aol.com Tel: 301-663-4556.

February 14–18, 2005. The 16th International Zurich Symposium on Electromagnetic Compatibility (EMC), the Technical Exhibition on EMC and RF/Microwave Measurements & Instrumentation. Zürich, Switzerland. Contact: Gregor Dürrenberger, the Swiss Federal Institute of Technology (ETH), Zürich. Tel. +41 1632 2815; Mobile: +41 78 721 7488, Fax: +41 1632 1198. E-mail: gregor@mobile-research.ethz.ch See: www.emc-zurich.ch

February 17–18, 2005. COST281 Workshop. Zürich, Switzerland. Watch www.cost281.org for details.

March 1–5, 2005. UNESCO Seminar and Practical Workshop on Molecular and Cellular Mechanisms of Biological Effects of EMF. Yerevan, ARMENIA. Sponsored by WHO and European Office of Aerospace Research and Development (EOARD). Contact: Organizing Committee: Tel: (3741) 62 4170, Fax: (3741) 61 2461. E-mail: life@arminco.com See: www.bioelectromagnetics.org/calendar.php?show=story&id=82#news82

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