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BEMS BOARD TAKES STEPS TO AVERT PROJECTED SHORTFALL, APPROVES 2004—2005 BUDGET

As they worked together to develop the budget for the upcoming fiscal year, Treasurer Marvin Ziskin, Treasurer-Elect Robert Cleveland and Executive Director Gloria Parsley faced a possible deficit of as much as \$50,000. When a proposed budget was presented to the Society's Board of Directors at their February 7 meeting in Washington, D.C., Cleveland expressed concern about the projected shortfall for 2004–2005 and over the next several years. In response, the Board made several decisions.

First and foremost, the Board decided to take several steps toward reducing costs while retaining quality. Among the costs within the Board's control that lend themselves to change are the costs of printing and mailing. According to Parsley and Cleveland, the Society could save as much as \$15,000 per year by producing 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 the Call for Nominations, the Call for d'Arsonval Award, the Call for Papers and by conducting electronic elections for officers and board members.

Noting the constant troubles members experience with postal system delays and lost mail, Parsley also recommended that the Board consider transitioning from mass mailings of printed copy to distributing digital materials to members who accept e-mail notification. Members will receive an inquiry from the BEMS office asking whether they prefer to receive electronic versions of newsletters, informational mailings and ballots, or if they prefer to receive paper copy via the postal service. Those who do not have an e-mail address or access to the Web may choose to continue to receive traditional mailings on paper.

Under the able guidance of Secretary Stefan Engström last year, an electronic election was conducted. His "rescue mission" ensured that all voters who wished to participate could cast a ballot when the paper ballots were delayed or never received through the postal system. A change in the by-laws to allow electronic voting for Society officers passed comfortably with 182 in favor, 8 opposed, 4 abstaining. The result, according to Engström, was "an expression that many members are now comfortable with delegating important tasks such as elections to Web-based tools."

Also at the February meeting, the Board expanded the Development Committee and asked for increased efforts to make the 26th Annual Meeting profitable in June. All Society members are urged to help Development Chair Richard Nuccitelli and Com-

mittee members identify sources of support—not only for annual meeting expenses, but also for special projects like the production of the History Booklet.

Finally, the Board approved an increase in 2005 membership dues to:

| | |
|--------------------------|--------|
| Full/Charter Members | US\$80 |
| Associate Members | US\$65 |
| Student/Emeritus Members | US\$25 |

Membership dues had not been raised since 1997 when only US members were charged an additional \$10 to cover the additional postage expense of distributing the Newsletter via first class mail, according to Parsley. The last dues increase before that was a \$5 increase in 1990.

Before the BEMS 26th Annual Meeting in June, every BEMS member 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. Watch your in-basket for any e-mail from BEMSoffice@aol.com. If you have any problems with BEMS e-mail, please call +1 301 663 4252 or FAX +1 301 694 4948.

2005 Joint EBEA-BEMS Meeting To Be in Dublin

In addition to financial matters, Board members also heard from Yngve Hamnerius, who is the liaison from the European Bioelectromagnetics Association (EBEA) to BEMS, and from Ben Greenebaum of the BEMS Inter-Society Affairs Committee, who reported that the EBEA Council in November approved Dublin as

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IEEE RECOGNIZES FOUR FOR OUTSTANDING CONTRIBUTIONS

At a meeting of the Institute of Electrical and Electronics Engineers' (IEEE) International Committee on Electromagnetic Safety (ICES) in San Antonio in December 2003, four men who have made important contributions to the Institute were honored for their dedication and hard work. Ron Petersen, retired from Bell



Ron Petersen

Laboratories, Murray Hill, N.J., who has taken over as chair of ICES from Eleanor Adair, was awarded the IEEE Standards Association International Award for his "extraordinary contributions to the advancement of the international goals" of the organization, including "great advances in the international recognition and acceptance of IEEE standards in the area of safe use of electromagnetic energy."

A Fellow of IEEE and member of the Standards Board, ICES SCC 28 and 34, and the International Electrotechnical Commission (IEC) Technical Committee 106, he served as a bridge for communications between ICES and non-U.S. standards developing organizations. In particular, the award citation mentions that Petersen helped to effect the international harmonization of certification procedures for wireless handsets between IEEE ICES and the IEC.

Also in December, IEEE's Standards Medallion was awarded to Kent Jaffa, PacificCorp, for his leadership of subcommittee (SC3) through several years of standard development, culminating in the adoption in September 2002 of IEEE's first standard governing exposure in the 0-3 kHz range, C95.6. Petersen saluted Jaffa for his hard work and dedication and said the new standard "will serve us well in the years to come."

In the award citation for Jaffa, he is commended for "outstanding leadership in shepherding the IEEE C95.6 Standard through to completion." A power engineer, Jaffa has been active in IEEE since 1980. In 1998, he agreed to assume chairmanship of subcommittee 3, charged some years earlier with developing a new standard for human exposure to electromagnetic fields in the 0-3 kHz range. Jaffa's expertise and enthusiasm rejuvenated this committee, according to the citation. The draft standard "moved steadily forward," to ballot-

ing and approval in 2002. The citation recognizing Jaffa's tenacious leadership and professional partnership with J. Patrick Reilly states that "no other standard, including that published by ICNIRP in 1998, has a completely transparent rationale and accurate limits that are fully based on science."



Michael Murphy

Also awarded the IEEE Standards Medallion in December were Michael Murphy of the U.S. Air Force Research Laboratory, Brooks City Base, Texas, and Tom McManus, who recently retired from the Irish Department of Public Enterprise, Dublin. Both have spent many years working to increase international participation in ICES. Murphy's citation praises his efforts in recruiting key people from outside the U.S. for membership in ICES and for his scientific contributions in working groups, including several with the laser standards community worldwide.

Murphy was also recognized for publicizing ICES scientific achievements, for representing ICES at many meetings throughout the world, and for organizing key meetings in Italy and Slovenia for discussion of ICES standards.

Similarly, McManus was cited for his leadership in making the ICES "a truly international organization," and for playing a key role in organizing several ICES meetings.



Tom McManus



Eleanor Adair, left, the outgoing chair of ICES, presented Kent Jaffa, right, with an IEEE Standards Medallion and Citation in December 2003 for his work shepherding the IEEE Standard C95.6 to approval in 2002. (Photo by Mays Swicord)

BEMS MEMORIAL COMMITTEE REPORTS RECENT ACTIVITIES

At the February 2004, BEMS Winter Board Meeting, Memorial Committee Chair Gabi Nindl reported that the committee has met its goal of creating a Memorial Web page linked to the BEMS homepage. With the help of Webmaster Stefan Engström, the *In Memoriam* Web page is now available at www.bioelectromagnetics.org

“As chair of the committee, so far I have only received positive comments about these pages, although feedback has been minimal,” Nindl told the Board. Current members of the Memorial Committee are Igor Y. Belyaev, Carl F. Blackman, Deborah M. Ciombor, Guglielmo D’Inzeo, Arthur A. Pilla, James R. Ryaby, Betty F. Sisken, President Shoogo Ueno, President-Elect Bruce McLeod, Past President Frank Prato, Treasurer Marvin Ziskin and Treasurer-Elect Robert Cleveland.

As a next step the Memorial Committee would like to make people more aware of the *In Memoriam* pages so that they are recognized as an opportunity for Society members to share news of their losses and thoughts of colleagues and friends, as well as to connect that loss with the future of the Society by supporting student awards with donations in memory of deceased Society members. Nindl wrote, “The Society has an existing Memorial Fund to help students with travel awards which fosters their professional development through the presentation of research at the annual BEMS meeting. We hope you will consider sending a contribution to this fund when you receive our appeal in a future BEMS mailing.”

“Our goal is to provide a place where people who have been members of BEMS at some time in their lives are recognized and honored. To achieve it, we need your help. We rely on you to keep us informed of the death of BEMS members, and to help us create and expand memorials by sharing your thoughts about your colleagues and friends.”

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RESEARCH FUNDING OPPORTUNITY

IT Specialist Marcia Rawlings at the National Science Foundation (NSF) announced recently that research proposals will be received until 5 p.m. EDT, May 11, 2004 for a program, “Technological Challenges in Organic Electronics, Photonics and Magnetics,” NSF 04-554. Details are available at www.nsf.gov/pubs/2004/nsf04554/nsf04554.htm

NSF said this interdisciplinary research will foster interactions among disciplines in organic electronics, photonics and magnetics to create devices or integrated to intrinsic and hybridized systems, which represent a highly promising area of technology to provide increased functionality and the potential to meet future challenges of scalability, flexibility, low power consump-

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MEMBER NEWS AND NOTES

From **Ben Greenebaum**, Editor in Chief of Bioelectromagnetics, comes word that after consultation with appropriate committees and considering members' comments and recommendations, the BEMS Board of Directors named **Andrei G. Pakhomov**, a senior research physiologist at McKesson BioServices, Brooks City-Base, San Antonio, Texas, as an Associate Editor of the journal. He replaces **Ann Henderson**, who will continue on the Editorial Board. Board members also passed a resolution thanking Henderson for her service as an Associate Editor. “In addition, I regret to announce that **Walter Rogers** has resigned from the Editorial Board, citing a change in his professional direction,” Greenebaum wrote. Rogers had been a senior research scientist at General Dynamics and the Radio Frequency Radiation Branch, AFRL/HEDR, Brooks City-Base, Texas.

Also, 2003 d’Arsonval Award winner **James Lin** of the University of Illinois-Chicago, who proposed and first used microwave energy as an ablative energy source for the experimental treatment of cardiac arrhythmias in a canine model in 1987, and who has made major contributions in advancing the concept since, notes that a Hong Kong firm now plans to move the technology forward toward human clinical use. AFx was acquired by Guidant Corp. in late January for US\$45 million, and plans to further develop its Microwave Surgical Ablation System allowing surgeons to safely ablate cardiac tissue. Another company in San Diego announced it will develop and produce a microwave, catheter-based cardiac ablation system for arterial fibrillation throughout Asia from a new base in Hong Kong.

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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OPINION

Editors' Note: The editors encourage contributions that will further a discussion of important issues to the Society and assist in scientific progress in our area of interest. We appreciate the remarks below submitted by former BEMS President Martin Blank, who raises such issues for consideration by the Society. Ben Greenbaum, Editor in Chief of Bioelectromagnetics, and Newsletter Editor Mays Swicord have responded in letters following Blank's. We hope these will initiate a discussion and an exchange of ideas on these topics and welcome readers' further comment and response.

Dear Editor:

As a past President of BEMS (1997–1998) I addressed the BEMS Board on Feb. 7, 2004, because I believed it was urgent to review policy on publications and to repair damage to our reputation. The following is a summary of my remarks.

We need to restore our scientific integrity and insure unbiased scientific coverage. The scientific world has been grappling with 'conflicts of interest' in research, in an effort to make sure that groups paying for research do not exert unfair influence on the scientific process. The following excerpt from the *Journal of the American Medical Association* reflects the concern regarding pharmaceuticals and medical research:

"There is a growing body of literature showing that faculty who have industry ties are more likely to report results that are favorable to a corporate sponsor, are more likely to conduct research that is of lower quality, and are less likely to disseminate their results to the scientific community." (*JAMA* 284:2203–2208, 2000).

Publication of the ICES Supplement in our Journal shows that we have similar problems. The Supplement gave the *imprimatur* of the Society to a set of papers that are one-sided and do not represent the diversity of scientific views in the BEMS community on non-thermal effects. The Journal should have avoided the appearance of supporting one side of an ongoing controversy. It took a political position at the expense of our scientific credibility. ***I requested the Board to undo the apparent endorsement with a statement in the Journal to reassert our scientific objectivity on this issue.***

Regarding our main function, fundamental research, the Journal has not performed well. In recent years, many exciting new developments in bioelectromagnetics have ***not*** appeared there, e.g., promotion of lymphoma in mice exposed to RF fields, stimulation of stress proteins following exposure to ELF and RF fields, use of a non-thermal signaling pathway in the response to EM fields, changes in protein folding by non-thermal microwaves, and EM field acceleration of electron transfer reactions.

Why has our Journal failed to be on the cutting edge in our own field? Today, all biology is awash with DNA, but the Journal is reluctant to encourage relevant papers in this area. The Journal could do much more to promote fundamental research. ***The Board should appoint a committee to recommend how to reinvigorate our Journal.***

It is embarrassing that the Newsletter editor, in an interview with a leading science magazine, *New Scientist*, (September 13, 2003)

advised "We should stop spending money [on research]", a position in clear violation of our By-Laws. He also helped organize a symposium on 'plausible mechanisms' that omitted important published mechanisms that industry has ignored. How can one determine if a mechanism is plausible if one does not even consider it? ***It would be reassuring if our Newsletter Editor favored research across the EM spectrum, as well as an unbiased search for mechanisms.***

I was gratified that the Board appointed a committee of three to review the requests (shown in bold face italics), and make recommendations.

– Martin Blank, BEMS President 1997–1998

Swicord Replies

Dr. Blank has raised two issues concerning research needs and funding. The first relates to my statement in an interview in the *New Scientist* (13 September 2003 Issue) concerning the need for further research related to RF hazards. This is a subject critical to the future of the Society and needs careful and extensive consideration by all involved.

This issue has two sub-questions or issues. The first, a public health question, is how much research is adequate to determine whether an agent is harmful (e.g., is carcinogenic). There have been numerous reviews on this subject by health authorities or "independent" panels including:

- World Health Organization
- International Commission on Non-Ionizing Radiation Protection
- European Commission Expert Group
- U.K. Independent Expert Group on Mobile Phones
- Royal Society of Canada Expert Panel
- U.S. Food and Drug Administration
- Australian Committee on EM Energy Public Health Issues
- Japanese Ministry of Post and Telecommunications
- Korean Ministry of Communications
- New Zealand Ministry of Health and Ministry of Environment
- Austria Ministry for Health and Consumer Protection
- German Federal Office for Radiation Protection
- France's Commission for Consumer Safety
- Netherlands Ministry of Health and Well-Being
- U.K. National Radiological Protection Board
- U.K. Advisory Group of Non Ionizing Radiation
- Swedish State Radiation Protection Authority

All reach the common conclusion that there is no credible evidence that RF exposures within limits accepted by the majority of countries around the world cause any adverse health effects.

However, all, or most, of the panels go on to make the motherhood statement that more research is needed. The question is how much and what research is needed?

I believe that one must consider the possibility of dealing with the null hypothesis. We could spend all the money in the world and never prove that there are no adverse health consequences of RF exposure or, as some one recently pointed out, there are no alligators in Greenland.

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OPINION, continued

A great deal of research has been done on RF exposure (1330 peer reviewed primary publications on biological effects of RF and more than 200 unpublished or ongoing studies). From a public health perspective, when do we say enough is enough? I advocate the following positions.

The WHO Research Agenda defines the additional hazard assessment research that is needed and, if no repeatable finding comes forth from the ongoing research projects and from other studies defined in the WHO Agenda, the RF database is sufficient for evaluation the human health risk of RF exposure. There are items in the long term objectives list of the WHO Research Agenda which, I would suggest, respond to researcher interest and not to public health interest, but by and large this is a confined set of research requirements for hazard assessment. This is the issue that was being addressed in the *New Scientist* interview.

The second sub-question concerning research is more critical to BEMS, and relates to the general pursuit of low-level or non-thermal RF effects. My remarks in the *New Scientist* did not attempt to address this issue but they are related. The BEMS research community has not been able to find a repeatable non-thermal RF effect. Most of the results in the literature show no effect. Those studies that report effects have not been able to be replicated. Many reasons have been offered for the inability to replicate, such as poor techniques or lack of understanding of the original experiment, different exposure systems or protocols and, from Dr. Blank's letter one may suggest, sponsor bias. For whatever reason replication does not occur and for our Society to pursue this line of research as its major objective is a very high risk. Will NIH-type panels consider this an area of fruitful research or will our researchers starve to death trying to convince funders that this is a cause worth pursuing? Do we bring young scientists into areas which have an extremely low probability of producing a repeatable positive finding?

At some point the Society must become pragmatic or realistic about its future. It must also face the reality that we, again, may be pursuing the null hypothesis.

Yes, I am very much in favor of research. I am in favor of research that will make BEMS grow, research that contributes to the general knowledge of science, and research that excites young scientists rather than just keeping some of us old guys employed. It is time to identify and pursue research other than hazard research, if BEMS is to remain a viable scientific Society.

Dr. Blank's suggestion that industry funding may be biasing the outcome needs to be taken seriously. The industry I work for has recognized this potential criticism and has sought ways to avoid even the appearance of such a bias by, for example, jointly supporting research with government entities. It may be more appropriate for research (or a better word is testing) to determine whether an agent will cause some adverse health outcome to be conducted in an independent commercial or government facility. Such institutions may have less to gain by any particular outcome or result of the test. At the least, any academic researcher should seek to have only a small portion of his/her research support come from regulated industries.

To my knowledge, the BEMS scientists conducting contract research funded by industry are of high integrity and would not sell their souls for a few years of support. In addition, the article that Dr. Blank uses from *JAMA* seems to be making the opposite argument. That is, researchers may be inclined to provide information (positive results) that supports the development of a product which would generate income for the researcher and also provide additional research. In the end, incorrect findings serve neither the researcher nor the sponsor well and could have devastating economic impact on the sponsor.

Finally, Dr. Blank has raised the issue of some mechanisms work that has been pursued by me and others. The objective of several meetings with experts has been to review all possible mechanisms of RF interactions with biological systems. It would be most appreciated if Dr. Blank would point out any RF related mechanisms that we have missed.

– Mays Swicord, Editor, BEMS Newsletter

Greenebaum Replies

Dr. Blank's first two points concern *Bioelectromagnetics*, the Society's journal. Both raise questions that are worth considering, though, in both cases, the questions should be considered in a wider context than he presents.

His underlying concern, that sponsorship can either overtly or subtly affect research findings, interpretation of data, or what is published, is increasingly voiced. Indeed, some prominent bad examples have led to increasing efforts by most scientific publications, including *Bioelectromagnetics*, to take prudent steps to have authors disclose sponsorship and personal interests. If one carries this concern to its logical limit, as some (especially some non-scientists) do, no author's work can be considered without suspicion. Some balance is needed to maintain the underlying trust inherent in the process of science, which requires that a variety of results and interpretations be arrived at in good faith and presented to the community of scientists and assumes that over time the sound ones will be sorted out from the unsound. Indeed, some of the papers that Dr. Blank believes were not properly considered by the reviews, as well as some that he believes were over-weighted, were published in *Bioelectromagnetics*. The time-honored process of peer and editorial review of articles seeks to screen out, admittedly imperfectly, problems with methodology, data analysis, or conclusions or speculation that go well beyond the results; but this review has never been thought reliable enough to separate "right" from "wrong." In essence, by accepting an article, the editors tell readers that the article is worth their consideration.

Dr. Blank's first concern is that publication of the reviews by *Bioelectromagnetics* is taken to be endorsement, either by the journal or the Society. This is a departure from the general understanding that a signed article presents the work and the thought of its authors, not that of the Editor (except for an Editorial), the journal, the publisher, or the sponsoring Society. In the Editorial that begins the Supplement containing the ICES-commissioned reviews, I noted that peer and editorial review of these papers sought to ensure that the reviews covered the literature fully, that

See *OPINION continued*, p6

OPINION, continued

misrepresent it, but I also noted that the assessments were the authors'. Peer reviewers were drawn both from participants and non-participants in the ICES. I would hope that the committee established at Dr. Blank's suggestion would arrive at a statement which addresses the broader issue, not just the conclusion by some that publication meant that the Society had endorsed the ICES reviews.

As my Editorial also noted, the Society's Board of Directors accepted the rationale behind the recommendation from the Editorial Board and myself to undertake this Supplement; by Society policy, the Directors must approve undertaking any supplement or special issue. The discussion included Dr. Blank's issue of whether publication would be taken as an endorsement, but Directors agreed that this possibility was outweighed by the rationale, also presented in the Editorial, that publication would open to the scientific community at large (and to the public), in an unprecedented way, some of the basic inputs to its deliberations of a group formulating recommendations for standards, while the deliberations were under way.

The Editorial stated my hope, which I believe was also the hope of the Editorial Board and the Society's Directors, that publication would begin a wider discussion of what were likely to be contentious issues. I welcomed Letters or Comments to the Journal as part of that discussion. I am pleased that we have begun to receive Letters that concerning the substance of the review papers, in addition to this letter from Dr. Blank concerning process.

Finally, I would note that authors use two main sets of criteria that cannot be set strictly through science, when reviewing the literature for exposure standards. My Editorial in the Supplement and the Introductory Note by Lin and D'Andrea discuss these in part; so do most reviews. Dr. Blank's criteria clearly, though tacitly, differ from those stated by the authors of the reviews. The first has to do with deciding when an "effect" becomes "established." One extreme argument says that a single experiment is enough; since biological and even exposure conditions are inherently variable, replication attempts are never true replicates. The other extreme argues that this same variability requires similar results from experiments with very well defined exposure conditions in several labs.

The second has to do with deciding when a "biological effect," a change in a biological system, becomes an "adverse health effect" in humans, since the latter is what exposure guidelines are to guard against. One extreme argues that any change has the potential to upset the body's normal functions, especially if it persists for a long time or if the functions are under other stresses.

The other requires clear, replicated experimental or epidemiological evidence for actual health problems in humans or live mammals. Groups like the ICES should attempt to strike a balance between these extremes through a process that requires realistically identifying where the limits of scientific knowledge lie, using criteria that are as clearly stated as possible. Then, in what is more a combination of a "best guess" and a socio-political-economic judgment, they apply a "safety factor" or "precautionary factor" to allow for what is not known.

Governmental regulatory bodies sometimes apply additional safety or precautionary factors. The limits of scientific knowledge then show where future research is needed; the argument

for or against funding is a combination of making the scientific case and a socio-political-economic judgment of the importance of that case, compared to others.

Dr. Blank's second point calls attention to the number of interesting results that have been published in journals other than *Bioelectromagnetics*, specifically mentioning papers on DNA, and calls for a study to reinvigorate the Journal. I have also noted in my reports to the Society that increasing numbers of bioelectromagnetics papers are being accepted by journals that never used to consider them; for that, the continuing work of our members as reported at the Annual Meeting—and in *Bioelectromagnetics* as well as in other journals—might take some credit.

I have also reported on our continuing problems with review cycles, the editors' various efforts notwithstanding, and on the Society's allocation of funds to expand the number of pages in the Journal when the number of papers awaiting publication became too large. I should also note that, though we have rejected papers that have appeared elsewhere, including some on DNA that concern Dr. Blank, we have published others, often from the same groups. I will generally stand behind our editorial judgment, while readily admitting that it is sometimes wrong, both in what we accept and in what we reject.

I certainly would welcome practical suggestions on how to make our Journal more attractive to authors, whether from a special committee or from people who communicate directly to me, an Associate Editor, or a member of the Editorial Board.

– Ben Greenebaum, Editor in Chief, *Bioelectromagnetics*

BEMS Board Decisions, continued

an acceptable site for the BEMS-EBEA Joint Meeting in 2005. BEMS Board members agreed with that decision at the February 7th meeting and discussed plans for moving forward. Co-chairs of the EBEA-BEMS collaborative meeting will be Asher Sheppard from BEMS and Kjell Hansson Mild representing the EBEA. Other members of EBEA's Joint Meeting Committee are Bernard Veyret, Damijan Miklavcic and Guglielmo D'Inzeo; BEMS will be represented on that committee by President Bruce McLeod and Frank Prato, plus the 2005 Technical Program Chair to be determined in this year's election.

Also at the Nov. 15 EBEA Council meeting according to Hamnerius and Greenebaum, a major topic of discussion concerned the conditions under which EBEA would lend its name and support to meetings organized by others. After discussion, it was agreed that EBEA will insist on playing a significant role in planning the program for any international conference to which the EBEA name is attached.

Finally, Hamnerius and Greenebaum reported that EBEA Council member Birgitta Floderus has resigned and was replaced by Peter Gajsek of Ljubljana, Slovenia, on a vote of Council members.

The next EBEA Council meeting will be in association with the ICNIRP meeting in Seville, Spain, on May 20–24.

– by M. Swicord, J. Lathrop, G. Parsley, R. Cleveland, with reports from Y. Hamnerius and B. Greenebaum

MORE ON EUROPE'S EMF-NET COMMUNICATION PROGRAM

The European Commission (EC) gave the green light last December to a new, four-year research coordination action, "Effects of the Exposure to Electromagnetic Fields: From Science to Public Health and Safer Workplace," or EMF NET. Part of the Sixth Framework Program, it is intended to provide accurate, balanced information on EMF research to decision makers in the European Union, said coordinator Paolo Ravazzani of the Istituto di Ingegneria Biomedica, Milan.

Ravazzani introduced EMF NET during special sessions at the COST281 meeting and the EBEA Congress in Budapest. He said the EU action will communicate about EMF research through Fact Sheets, Technical Reports, in communication workshops and public seminars to interpret scientific results. EMF NET will provide the public, health authorities, stakeholders and others with information they need to make decisions on EMF matters.

COST281 is also "fully involved" in EMF NET as participant, said Ravazzani. COST281 Chair Norbert Lietgeb of the University of Graz, Austria, manages the related COST281 work package known as "Monitoring EMF and Health: Emerging Needs."

EMF NET is guided by an 11-member advisory board, plus a larger steering committee representing every EU country, with other advisors. Ravazzani hopes that EMF NET will be taking its "first concrete steps" in early 2004 and that a progress report might be offered at the 26th annual BEMS meeting in June 2004 in Washington, D.C. In the interim, interested observers can watch the COST281 Web site www.cost281.org/index.php for more information.

DETAILS OF THE "ALESSANDRO CHIABRERA" SCHOOL IN ERICE

Directors of the Ettore Majorana Centre International School of Bioelectromagnetics, "Alessandro Chiabrera"—who was considered by many a master scientist in bioelectromagnetics—have announced details of the course, "Methodology in Bioelectromagnetic Experimental Investigations," to be held in Erice, Sicily, Italy, from April 21–28.

Directors Ferdinando Bersani of the University of Bologna and Bernard Veyret of the Laboratoire PIOM CNRS /EPHE at the Université de Bordeaux, said that the course will be devoted to the methodology for designing and performing experimental bioelectromagnetics studies. Cost is 1200 € including food and lodging. Interested candidates should send an e-mail to the Directors of the Course at EBEA-ICEmBSchool@ICEmB.it with the following:

- A short Curriculum Vitae
- Statement of scientific interest of the candidate
- For young researchers, a letter of recommendation of a Senior Scientist by e-mail (attached Word or PDF file)

In case of acceptance the candidate will be informed by e-mail. Also see www.csem.infn.it and www.ebea.org

NEW ROLE FOR CENELEC WOULD FOLLOW ADOPTION OF EU OCCUPATIONAL EMF RULES

A possible new role in EMF exposure assessment and regulation for CENELEC—the Comité Européen de Normalisation Electrotechnique [European Committee for Electrotechnical Standardization], Brussels—may emerge if the European Parliament adopts a new directive on occupational health and safety this year, according to Philip Chadwick of Microwave Consultants, Ltd. (MCL), London, U.K., speaking at the Asia-Pacific EMF Conference in Bangkok, January 26–30.

Chadwick is chair of CENELEC's Technical Committee 106X on EMF compatibility and emission standards, assessment and measurement for electrical and electronics products made, used and sold in the European Union. He said that the European Parliament is expected to act on the proposed new occupational guidelines by April 1, before an influx of new member states on May 1 adds to the complexity of conducting EU business.

The guidelines were proposed by the Social Questions Working Group of the Council of the European Union, and would set minimum health and safety requirements for the exposure of workers to electromagnetic fields.

The potentially burdensome new rules would require assessment of all significant sources of exposure to EMF across the frequency spectrum throughout Europe, "from neighborhood car garages to huge manufacturing facilities," Chadwick pointed out. The rules would have the added effect of making CENELEC standards for the first time play a role in controlling EMF exposure for people and environments rather than just for products.

The directive would require employers to assess their employees' exposure to EMF from 50-Hz electricity generation, radio and TV broadcasting antennae, mobile phone masts, anti-theft devices, radar installations and large furnaces such as those used in metal industries. It also would require attention to potential interference with medical equipment and devices such as pacemakers, for example, as part of each exposure assessment. Employers would also be required to provide information and training for certain highly exposed workers.

Chadwick said that the proposed EU occupational directive introduces exposure limit values and action values based on the recommendations drawn up by the International Commission on Non-Ionising Radiation Protection (ICNIRP). The Social Questions Working Group pointed out in a press release in late 2003 that because there is insufficient scientific evidence on possible long-term effects of EMF exposure, the proposed EU occupational directive is limited to addressing possible short-term, acute exposure effects.

Observers interested in the proposed directive on EMF can find more at http://agency.osha.eu.int/more_news/index.htm

BEMS MID-WINTER WORKSHOP TOPIC WAS APPLICATIONS OF EMF IN HEALTH AND MEDICINE

A successful scientific workshop offering data and discussion on applications of electric and/or magnetic fields in health and medicine was held in Bethesda, Md., on February 6 prior to the winter BEMS board meeting. Organized annually by Ewa Czerska of the U.S. Food and Drug Administration and Lee Rosen of the U.S. National Cancer Institute, the workshop this year featured seven speakers addressing potential uses of electric, magnetic or electromagnetic fields for pain therapy, inflammatory disease treatment, hyperthermia, wound healing and as a possible adjunct to chemotherapy.

The first talk, "Effects of Static Magnetic Fields in Experimental Models of Epilepsy" was given by Stefan Engström of Vanderbilt University, who works with Michael McLean on this subject. Epilepsy of various types affects about 0.8 percent of the population, Engström said. Pretreatment with static magnetic fields (~5 mT, 0.25 T/m fields for 30 minutes) has shown an anticonvulsant effect in animals given an auditory stimulus. Results also suggest that pretreatment with magnetic fields greatly reduced the required amount of phenytoin, a drug that can completely suppress seizure manifestations. Thus, Engström said that magnetic field application could perhaps be used to greatly reduce the amount of a required drug without sacrificing efficacy.

Next, Marko Markov discussed "Magnetic field therapy of pain," where low frequency and pulsed fields have been used in the treatment of several pain-associated conditions. Dr. Markov reported that a 120 pps semi-sine wave magnetic field was successfully used to treat low back pain with a field strength of 15 mT providing an apparent optimum condition. There was a 22–34 percent reduction observed in pain compared to baseline studies. Markov also reviewed the work of others using various treatment modalities indicating successful pain therapy using EMF.

Gabi Nindl of the Indiana School of Medicine presented results suggesting that EMF may influence apoptosis and IL-2 production of activated T-lymphocytes. Dr. Nindl further hypothesized that these changes occur through enhancement of T-cell receptor signaling. Such responses could play a role in several treatment areas. Her talk raised the issue of the placebo effect and its possible role in human studies and the necessity for addressing such issues. She stated the importance of exploring the use of EMF therapy as an alternative to drug treatment.

Ellen Jones of Duke University Medical center discussed Duke's program in treating cervical cancer with microwave hyperthermia combined with radio therapy and/or chemotherapy. Dr. Jones emphasized the necessity of achieving an elevated temperature of 40 to 43° C. She reported that clinical trials in the U.S. and in The Netherlands have demonstrated a considerable increase in survival with combined treatments. In the Dutch hyperthermia trial, a 30–50 percent reduction in the death rate was demonstrated. Efforts are underway to initiate a multi-center Phase III trial.

A novel use of short (10–300 ns) high field strength pulses (NsPEF)

See BEMS Mid-Winter Scientific Workshop continued, p10

IMPROVEMENT IS THE GOAL OF MEETING QUALITY COMMITTEE

Vijayalaxmi, chair of the BEMS Meeting Quality Committee, offered the committee's recommendations for continued quality improvement at future Annual Meetings when the Board met on Feb. 7 in Washington, D.C.

The committee's recommendations include a suggestion that a statement on the criteria for abstract evaluation, with guidelines for decisions to Accept or Reject, should be sent with the evaluation form to all members of the technical program committee (TPC). In addition to Chair Vijayalaxmi, members of the committee are President-Elect Bruce McLeod, Gabi Nindl and Alfonsina Ramundo-Orlando.

They also suggested that TPC reviewers use a different and larger font, in bold, for their comments, so that their evaluations can be seen clearly. Even if reviews are submitted on the Web, it would be good to have this formatting option available, according to Vijayalaxmi and committee members. Third, the committee recommended that authors should be notified sooner whether their abstract has been accepted per their request to make an oral or poster presentation. That is, if the author submitted an abstract for "oral only" or "poster only," and the TPC's decision is otherwise, the author should be informed and asked to accept or reject the TPC recommendation. The current system requires authors to accept or withdraw by a preset deadline, the committee notes.

Further, the Meeting Quality Committee recommends that there should be only one oral presentation accepted from any one author.

To avoid delays during platform sessions at the annual meeting, the committee recommends that all speakers should be informed in the acceptance letter that their slides on a diskette/CD must be given to BEMS at the registration desk. Necessary equipment for transparencies and Power Point presentations will be available in lecture rooms, as well. Similarly, to avoid mixups, speakers who need special software for their presentation should inform the BEMS office as soon as their abstracts are accepted for oral presentation. With this possible exception (special software requirement), speakers should not be allowed to use their own computers for presentation, because time delays can cause serious disruption for the rest of the meeting.

Finally, the Meeting Quality Committee recommends that before the start of each platform or plenary session, to save time and confusion the Chair should become familiar with the microphone, slides, overhead projector, laser pointer and other equipment. If possible, session chairs might even wish to arrange to project the first slide before the session opens. A timer should be available in each lecture room, and chairs must remind all speakers of the time allotted for their presentation and for discussion. "Chairs MUST interrupt the speaker after their allotted time," the committee stressed.

Because of the parallel sessions, if any speaker is not available to give his/her presentation, the session chairs should not continue with the next presentation, but should open the floor to questions, to preserve synchronicity with the other concurrent session.

PROFESSIONAL INTEREST VERY HIGH AT ASIA-PACIFIC EMF CONFERENCE IN BANGKOK

More than 140 scientists and government officials from 24 countries met at the Asia-Pacific EMF Conference on research, health effects, and standards in Bangkok, Thailand, on January 27–30.

In addition, a tutorial session held the day before the full conference began was so well attended by local scientists, government



Dr. Somsong Rugpoa, Director-General of the Department of Medical Sciences, Thailand Ministry of Public Health, at left, in conversation with Art Thansandote of Health Canada, center, and Michael Repacholi of the World Health Organization's International EMF Project, right. All three organizations helped to host the Asia-Pacific EMF Conference in Bangkok in January.

public health workers and others that there was standing room only, according to Art Thansandote of Health Canada, one of the organizers. "There was no single seat left in the tutorial meeting room at the Ministry of Public Health, which can accommodate up to 200 people," Thansandote pointed out. "This reflected the interest of local Thais in the EMF-health subjects." He provided translation during the tutorial into the Thai language to help participants benefit fully from the discussion.

Dr. Boonchai Somboonsook, Deputy Director General of the Department of Medical Sciences, who delivered opening remarks at the tutorial and who remained as part of the audience throughout technical presentations over the next few days, told organizers that he learned a great deal, and he very much appreciated that the international conference had come to Bangkok.

As the conference statement points out, lectures and discussions were held on international and national standards and the World Health Organization (WHO) framework for standards development and harmonization. Participants heard about the latest research and planned experiments on biological effects of EMF exposures, dosimetry in adults and children, electromagnetic compatibility as applied to medical devices, power line exposure assessments, and gaps in knowledge in need of further research.

The Conference recommended that national authorities in the Asia-Pacific region:

- Protect their citizens and workers by adopting international guidelines or use the WHO framework for developing EMF standards for limiting exposure from EMF sources and encouraging compliance with these standards.
- Encourage communication between EMF-emitting device manufactures and the medical community regarding potential electromagnetic interference with medical devices.
- Provide information to their population about the use of EMF, and convey that research is ongoing to determine if there are any health effects from EMF exposure, but that no adverse health effects have been confirmed with exposure below international guideline levels.

Thansandote adds that, "The local audience I talked to said they learned a lot from the technical presentations, and the information was helpful. Some scientists from the Southeast Asian Region felt that their countries are well behind in this subject area and that a national program should be established to deal with EMF-health issues."

Among meeting accomplishments are the fact that the conference set a high standard for quality in science, and organizers met the objectives to serve as a forum where scientists from the region could discuss research activities and EMF issues in their countries, and provide input to the WHO International EMF Project.

Thansandote feels that other highlights of the Asia-Pacific EMF Conference in Bangkok were a full-day tour of temple ruins in the ancient city of Ayudhaya plus a visit to a Thai culture village, and later a half-day tour of the Grand Palace and the Emerald Buddha Temple in Bangkok. At another social function, he notes, "a number of conference participants gained experience in Thai dancing," and some conference attendees were able to take an elephant ride.

As a Health Canada scientist with Thai

background, Thansandote helped to organize the conference, which had been postponed twice—first after the terrorist attacks of September 11, 2001, and next because of the war in Iraq and the outbreak of SARS in 2003.

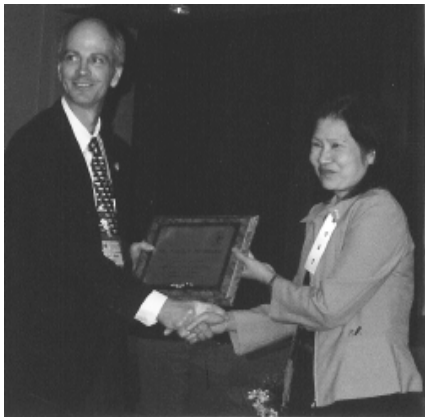


The adventurous Jean-Claude Bouillet of Bouyges Telecom, and Isabelle LaGroye of the ENSCPB Laboratory, took an elephant ride at the Rose Garden Thai Culture Village during one of the excellent day tours offered by the Asia-Pacific EMF Conference in January.

See Asia-Pacific Conference continued, p10

Asia-Pacific EMF Conference, continued

“As a member of the organizing committee and a Health Canada scientist with Thai background, I feel proud of being part of this



Patrick Mason of the U.S. Air Force Research Laboratory, left, presented a certificate of appreciation to Nisakorn Manatrakul of Thailand's Ministry of Public Health, for her valuable contributions to organizing the Asia-Pacific EMF Conference in Bangkok.



One of the sacred stupas, or burial chambers, at the ancient city of Ayudhaya, Thailand.

EMF Project website with links to related information at www.who.int/peh-emf/meetings/archive/en/bangkok04_proceedings.pdf and www.who.int/peh-emf/meetings/thailand2003/en/

– Art Thansandote and Janet Lathrop

BEMS Mid-Winter Scientific Workshop continued

to differentially modulate cell functions was discussed by Stephen Beebe of the Eastern Virginia Medical School. Dr. Beebe observed that NsPEF under certain conditions apparently affected the plasma membrane resulting in apoptosis, but other field or pulse length conditions could result in a slower apoptosis progression. NsPEF are below plasma membrane electroporation conditions and induce intercellular calcium release in a manner that mimics physiologic ligand effects on IP3-dependent intracellular calcium channels. Beebe hypothesized that this method of activation of intercellular signaling mechanisms could provide a new tool to perturb cell structure and function for probing signal transduction mechanisms and possible therapeutic and diagnostic applications.

Also at the workshop, a preliminary study to determine whether a static magnetic field might assist in chemotherapy was described by Joe Salvatore of the Hayden VA Medical Center in Phoenix. This Phase I study used a total of 18 patients starting chemotherapy by placing a permanent magnetic over the liver for 0, 15 or 30 minutes after completion of the chemotherapy. The field strength at the liver was approximately 10 mT. The purpose of the study was to test the safety and toxicity profile of this potential therapy. Dr. Salvatore reported that the treatment appears safe, and it further provided an apparent protective effect for the liver with the length of treatment and indicating that further studies are warranted.

For many years Richard Nuccitelli (of RBN Research) has been studying endogenous electric fields. He, along with L. F. Jaffe, is noted for developing the self-referencing vibrating probe capable of measuring transcellular currents in liquid media. Dr. Nuccitelli reported at the BEMS workshop on the development of a similar technique for measuring eclectic fields in skin.

This method uses a vibrating capacitor where the skin is one plate of the capacitor. This device (Non-invasive BioElectric Field Imager) has been used to measure fields near wounds in mice, on the order of 200 mV/mm. Nuccitelli et al. observe that fields are generated immediately upon wounding and are present until the wound is healed. Currents are observed to flow both toward and away from wound depending on depth in skin. Keratinocytes are the skin cells responsible for closing the wound. Collaborative work with Rivkah Isseroff of the University of California-Davis indicates that the keratinocytes are quite sensitive to imposed electric fields *in vivo*. It appears that the endogenous electric field exhibits the optimal amplitude and directions for attracting keratinocytes into the wound region.

– by Mays Swicord, Newsletter Editor

Research Funding Opportunity, continued

tion, light weight, and reduced cost.” This focused initiative seeks high-risk/high-return research proposals, and emphasis will be placed on enabling technologies critical to their continued growth.

Proposals may be submitted by U.S academic institutions and nonprofit research organizations in support of single or small interdisciplinary groups of investigators. See the NSF Website for more rules on principal investigator eligibility, number of proposals, award information, number of awards anticipated, funding amounts and so on.

MOBILE COMMUNICATIONS AND HEALTH WILL BE TOPIC OF MOSCOW 2004 CONFERENCE

The deadline for abstract submission is May 15, 2004, to participate in an international conference, "Mobile Communication and Health: Medical, Biological and Social Problems," to be held in Moscow, Russia, from September 20–23, 2004.

Organizers announced that the main aim of the meeting is to provide an international forum for presentations and discussion of topics related to "mobile phones, to create public awareness on possible EMF bioeffects," and to allow scientists, the public and businessmen to join in "rational regulation of [the] mobile phones problem," according to the meeting promotional brochure.

Topics of presentations and discussion are expected to include:

- EMF bioeffects of mobile communications
- Developing EMF safety standards for mobile communications
- Practical application of standards for mobile communications
- Occupational EMF exposure in mobile communications industry
- Environmental EMF safety
- Social problems of mobile communications: Population safety and consumers' rights
- Children and mobile communications
- Public communication and relations applied to EMF

Also, a one-day scientific seminar titled, "Modification of EMF Bioeffects," will be held on September 23, 2004 in conjunction with this meeting. Topics at this one-day session will include:

- Combined effects of EMF and physical factors
- Modification of EMF bioeffects by modulation and complex exposure modes
- Dependence of EMF bioeffects from individual organism condition and age (hypersensitivity of children)
- EMF exposure effects on development of somatic diseases and organism responses to changes in the environment

Official languages of the meeting will be Russian and English. Registration will be US\$300 and US\$100 for a companion. A social program will be offered.

According to the Chair of the Organizing Committee Yuri G. Grigoriev, the meeting is sponsored by the Russian National Committee on Non-Ionizing Radiation Protection (RNCNIRP), the Russian Academy of Science, the Russian Academy of Medical Science and the World Health Organization. Grigoriev, chair of RNCNIRP, may be reached by e-mail at: O.Grigoriev@pole.com.ru

A second announcement with instructions to authors, as well as detailed information on registration, fees, hotel reservation forms, travel information, scientific and social programs will be available soon at www.pole.com.ru/news_en.htm

CALENDAR

April 14, 2004. "Biological and Medical Effects of Non-Ionizing Radiation." National School of Chemistry and Physics of Bordeaux in Pessac, FRANCE. A workshop sponsored by the Non-Ionizing Section of the French Radiation Protection Society (SFRP), to support multi-disciplinary collaborations on the biological, clinical, epidemiologic and dosimetric aspects of EMF research. Tutorials, platform talks and posters are planned on static and very low frequency fields, UV and lasers, and radio-frequency fields. Cost is 100 Euro for SFRP members, students 50 Euro and others 130 Euro. Contact: Isabelle Lagroye, EPHE-ENSCP, Laboratoire PIOM, Pessac. Tél.: 05.40.00.28.21; Fax: 05.40.00.66.31. E-mail: i.lagroye@enscpb.fr, the SFRP administrative secretariat at jacques.lombard@irsn.fr or See: www.sfrp.asso.fr

April 14–15, 2004. U.S. National Council on Radiation Protection and Measurements (NCRP) 2004 Annual Meeting. Crystal City Marriott, Arlington, Va. USA. "Radiation Protection at the Beginning of the 21st Century—A Look Forward." Current issues and future direction of radiation protection for the 21st century, plus interactive panel discussion. See: www.ncrp.com/dates.html

April 20–24, 2004. The 9th International Congress of Hyperthermic Oncology (ICHO). Adams Mark Hotel, St. Louis, Mo., USA. ICHO is the international gathering for physicists/engineers, biomedical scientists and clinicians interested in hyperthermia and thermal therapy. See <http://icho2004.org/>

May 20–22, 2004. ICNIRP / WHO 5th Non-Ionizing Radiation Workshop. Sevilla, SPAIN. Presentations on characteristics, dosimetry, interaction mechanisms, biology and health effects and standards for NIR from static fields to ultraviolet, ICNIRP's Philosophy and Medical Aspects of NIR. See: www.icnirp.org/NIRWorkshop5.htm

May 23–28, 2004. IRPA International Congress, Madrid, SPAIN. Organized by the Sociedad Española de Protección Radiológica. Contact: Secretariat, Edicomplet, Sociedad Española de Protección Radiológica, Capitán Haya, 60, 10, E-28020 Madrid, SPAIN. Tel: +34 917 499 517; FAX +34 917 499 503. E-mail: secretaria.sociedades@medynet.com See: www.sepr.es

June 9–11, 2004. Workshop on Children's Possible Sensitivity to EMF. Istanbul, TURKEY. Sponsored by the World Health Organization's International EMF Project in collaboration with Gazi University, Ankara. See www.med.gazi.edu.tr/departments/biophysisc/biophysics.htm or watch "Meetings" on the WHO EMF Project Web site: www.who.int/peh-emf/en/

June 16, 2004. IEEE ICES Short Course, "Safety Levels with Respect to Human Exposure to Electromagnetic Fields, 0 - 3 kHz," in C95.6. The Omni Shoreham Hotel, 2500 Calvert St. N.W. Washington, D.C. Tel: +1 (202) 234-0700. For environmental, health & safety and industrial hygiene professionals; bioelectromagnetic researchers; engineers and planner from electric utilities and manufacturers; regulatory staff; armed forces

Calendar continued on p12

personnel and others concerned with human safety and exposure to EMF. Speakers will include J. Patrick Reilly and Kent Jaffa. Cost is US\$395; checks payable to the IEEE. To obtain registration materials, 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 21–24, 2004. The Bioelectromagnetics Society 26th Annual Meeting. The Omni Shoreham Hotel, 2500 Calvert St. N.W. Washington, D.C. Tel: +1 (202) 234-0700. Lodging \$150 single; \$170 double. 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. Watch for program and further details at www.bioelectromagnetics.org

July 25–30, 2004. Gordon Conference on Bioelectrochemistry. Connecticut College, New London, Conn. USA. Chair: Richard Nuccitelli; Vice chair: Justin Teissié, CNRS, FRANCE. Contact: Richard Nuccitelli, rlnuccitelli@uchc.edu

Sept. 6, 2004. UNESCO SEMINAR on Molecular and Cellular Mechanisms of Biological Effects of EMF. Yerevan, ARMENIA. Includes a practical workshop on Non-thermal effect of Extra High Power Pulses (EHPP). Contact the Organizing Committee: Tel: (374) 162 4170, Fax: (374) 161 2461. E-mail: life@arminco.com Or See www.biophys.am or www.bioelectromagnetics.org/calendar.php?show=story&id=82#news82

Sept. 20–23, 2004. Mobile Communication and Health: Medical, Biological and Social Problems. Moscow, RUSSIA. Organized by the Russian National Committee on Non Ionizing Radiation Protection, the WHO EMF Project, the Russian Academy of Sciences, others. Topics include EMF bioeffects, safety standards, occupational exposure in the telecommunication industry, public safety, consumers' rights, children and mobile phones and public risk communication. 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. Details to be announced; watch www.COST281.org

September 22–24, 2004. Joint IEEE International Committee on Electromagnetic Safety (ICES)-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

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