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Attachment(s):

(1) "Solar Activity_Biological Variability_BARTSCH_FINAL_15_12_12",
: 302 KB pdf, 3 pages.

 : Re:
 : (1) Reminder for
 : 2013 SARA Western Conference -
 : New Mexico - 9-10 February 2013
 : (2) Link between solar activity and biology?
 :

Dear ISWI Participant:

There are two items today.

(Item 1) This text between the two rows of asterisks:

2013 SARA Western Conference – New Mexico – 9~10 February 2013

If you plan to attend the conference, please register as soon as possible to ensure we will have space for you.

Registration info and other details are here:

<http://www.radio-astronomy.org/?q=node/396>

The tentative schedule and some abstracts are here:

Schedule: <http://www.radio-astronomy.org/?q=node/401>

Abstracts: <http://www.radio-astronomy.org/?q=node/402>

We will have presentations all day on 9 February. We still have open times for presentations. If you would like to make a presentation, please contact the conference coordinator at: westernconference@radio-astronomy.org

On 10 February, we will have all-day tours at the National Radio Astronomy Observatory (NRAO) Very Large Array and Long Wavelength Array (VLA/LWA) site about 1 hour drive west of Socorro. In the morning we will tour the VLA, actually the EVLA or Expanded VLA. You can find information on the VLA/EVLA here: <http://www.vla.nrao.edu/>. In the afternoon we will tour Station 1 of the Long Wavelength Array. Info on LWA1 is here: <http://www.phys.unm.edu/~lwa/index.html>

If you plan to go on the tour, be sure to bring a wind breaker and as a contingency bring warm outer clothing. The open desert in February could be cool and windy.

See you in Socorro ~

Whit
Conference Coordinator

(Item 2)

And attached is this paper:

: "The Geomagnetic Field and Solar Activity:
: Neglected Sources of Biological Variability?"

whose first author is:

: Dr. Christian Bartsch
: Center for Research in Medical and Natural Sciences
: University of Tübingen
: Ob dem Himmelreich 7
: D-72074 Tübingen, Germany

That is all for today.

Happy holidays from Fukuoka, Japan,

: George Maeda
: The Editor
: ISWI Newsletter

The Geomagnetic Field and Solar Activity: Neglected Sources of Biological Variability ?

Christian Bartsch^{1,2}, Hella Bartsch^{1,2}, and Dieter Mecke¹

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In our experiments to define the link between the pineal gland and cancer we repeatedly faced unexpected results. Initially, we detected seasonal variations of nocturnal plasma melatonin in laboratory rats with higher concentrations in spring than in winter, same as for the *in vitro* responsiveness of immune cells to different stimuli (1, 2). During 1990-2 very high plasma melatonin concentrations were observed in male rats during summer (3) and elevated nocturnal urinary excretion of 6-sulfatoxymelatonin (aMT6s: main melatonin metabolite), in four groups of untreated female rats (4, 5). During these years mammary tumors in inbred rats, induced by the same carcinogen dose of DMBA, developed faster in animals born in summer than in autumn (3). Finally, we found that the so-called Pineal Anti-Tumor Activity (PATA, low-molecular substances different from melatonin), exhibited annual changes with a peak in summer (6).

To explain these findings in animals kept under controlled laboratory conditions (including constant lighting regimens), we hypothesized that seasonal changes of the geomagnetic field may act as an additional *Zeitgeber* apart from light (4). In later experiments during 1993-1997 we were, however, surprised to see that seasonal melatonin rhythms were less pronounced or even absent (7). Furthermore, we had to observe that during 1997-2000 DMBA-induced mammary cancers showed divergent responsiveness to a mobile phone-signal although the same dose of the carcinogen was administered on corresponding days of consecutive years (8). To resolve these controversies we performed four long-term experiments (1997-2006) with female rats kept within the same room over at least 18 months in each case to see when seasonal rhythms may be present. Seasonal aMT6s-rhythmicity was found in one experiment only during 2002-2004 (9). Interestingly, overall variations of aMT6s occurred throughout these experiments which followed the number of sunspots during the 23rd solar cycle (1996-2008) (9, 10) which were in turn abolished in animals chronically exposed to a pulsed high-frequency field (217 Hz, 900 MHz, mobile phone-like signal) (11). These observations led to a refinement of our initial hypothesis, namely that seasonal melatonin rhythms preferably develop during phases of very high solar activity (1990-2, 2002-4) which are known to profoundly affect the geomagnetic field (9, 10).

On this basis, a complete re-evaluation of our previous experiments was initiated and it is becoming apparent that even very basic physiological parameters, e.g. body weight, underlie both seasonal as well as solar cycle-related modulations (11). Furthermore, the development and responsiveness of spontaneous tumours appears to be influenced by different phases of the 11-years' sunspot cycle (3). In addition, spontaneous survival of female rats as well as the effects of chronic exposure to a weak mobile phone-related signal on survival depends on the month as well as year of birth of the animals concerned (12). This may have far-reaching implications for experimental studies dealing with possible biological effects of pulsed high-frequency fields used for mobile telecommunication. It is conceivable that the observed year-to-year variations of responsiveness of experimental animals may explain why findings in this field of research are highly contradictory and thus prevent reliable risk

assessments since the responsible mechanisms are widely unknown. Here we assume a central role of geomagnetic perceptive mechanisms which might be related to those involved in the ability of birds to orientate and navigate in the course of homing and migration (13, 14). Such perceptive mechanisms are known to be disturbed during days of high solar activity (15) and experimental studies indicate that the corresponding receptor molecules (cryptochrome, 16, and biomagnetite, 17) are affected by high frequency fields as well. Thus the presence of a complex electromagnetic perceptive system has to be postulated which responds to both static magnetic and high frequency fields. On this basis it appears plausible why both natural as well as anthropogenic electromagnetic fields of diverse types may substantially contribute to biological variability and prevent standardization of experimental studies on animals and perhaps even of diverse medical therapies in humans. There is a great need to define this electromagnetic perceptive system which could process both natural as well as anthropogenic signals in order to not only adequately estimate the risk of our man-made environment for ourselves (18, 19) but to perhaps understand why it might have been necessary for living organisms to develop such a system in the course of evolution. To answer such basic questions it will be necessary to initiate extensive multi-disciplinary research activities among life scientists and geo- as well as astrophysicists, particularly at a time when human beings are increasingly exploring outer space.

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