

# CONGRUENCE OF CIRCACEPTAN RHYTHMS IN BIOSPHERIC AND HELIOGEOPHYSICAL PROCESSES

F. Halberg<sup>1</sup>, G. Cornélissen<sup>1</sup>, L.A. Beaty<sup>1</sup>, K. Otsuka<sup>2</sup>, Y. Watanabe<sup>2</sup>,  
R.B. Sothorn<sup>1</sup>, G.S. Katinas<sup>1</sup>, J. Czaplicki<sup>3</sup>, S. Sanchez de la Peña<sup>4</sup>, W. Ulmer<sup>5</sup>,  
M. Revilla<sup>6</sup>, M. Zeman<sup>7</sup>, O. Schwartzkopff<sup>1</sup>, R.B. Singh<sup>8</sup>,  
the Phoenix Study Group, the BIOCOS Project Working Group

<sup>1</sup> Halberg Chronobiology Center, University of Minnesota, Minneapolis, Minnesota, USA

<sup>2</sup> Tokyo Women's Medical University, Medical Center East, Tokyo, Japan

<sup>3</sup> Institute of Pharmacology and Structural Biology, Toulouse, France

<sup>4</sup> Chronomic Research Center, Escuela Nacional de Medicina y Homeopatía-IPN, Mexico City, Mexico

<sup>5</sup> Gelnhausen, Germany

<sup>6</sup> University of Valladolid, Spain

<sup>7</sup> Comenius University, Bratislava, Slovakia

<sup>8</sup> Halberg Hospital and Research Institute, Moradabad, India

**Abstract.** In the paper circaseptan rhythms are considered. In spite of a popular opinion about societal cause of occurring these rhythm in the biosphere, it is shown that a free-running about-weekly schedule resides in living matter. A dominant weekly pattern, much more prominent than the also-present circadian component in the same data, was seen in a survey of more than 181 profiles of blood pressure, each profile on a separate baby, each measured every 30 minutes for 48 hours on different 2 consecutive days of the first week of life, and in several hundred additional longitudinal monitorings for several weeks during the first months of life. The circaseptans regain relative prominence with elderly age, concurrently with a circadian decrease in amplitude. The circaseptans are also revealed in time series of geomagnetic indexes  $K_p$ ,  $A_p$ ,  $aa$ . From observations, it appears that  $B_z$  may pull heart rate, and that there is occasional phase locking as well as frequency-locking between these two variables. It should be noted further that the phase difference between heart rate and  $B_z$  at the beginning of the series is about  $90^\circ$ , whereas in the second half of the series the phase difference is much smaller. This means that when there is frequency-locking between the two variables, this may occur with a different phase difference.

**Keywords:** chronomics, circaseptans, the biosphere, heliogeophysical processes, congruent rhythms.