

MARGAREETE OTTER

## THE FOUNDER OF CHRONOBIOLOGY — NIKOLAI PÄRNA

For a considerable period of time until the first decade of this century, the discovery of the rhythmical processes in the human organism – biorhythms – was attributed to the Austrian scientist K. Fleiss. At the same time or even before, Nikolai Pärna (1879–1923), an Estonian professor at the St. Petersburg University was also engaged in the study of biological rhythms. Pärna may be considered as one of the founders of present day chronobiology.

In the period N. Pärna started his academic career chronobiology was an extremely modern trend in the biological research, which used the same methods as all as biological sciences. Scientists had noticed that physiological functions of different individuals vary in a large range and these years became obvious that the factor of time plays an important role in the variations of intensity of all kinds of biological processes.

Nikolai Pärna and his twin brother Elmar were born in Rannu (county of Viljandi) into the family of the parish clerk and schoolteacher Jakob Pärna, who passed away before their birth. The family thereafter settled in Tallinn and after the second marriage of Nikolai's and Elmar's mother, they moved to St. Petersburg. (The brothers were then already seven years old.) They both studied natural sciences at the university with Nikolai graduating from the Academy of Military rmedicine (1908) and Elmar from the minig institute (1910).

Even during undergraduate studies, N. Pärna was highly successful in the field of electrophysiological research and received the highest award, a golden medal. In 1914, he completed his doctor's degree, with his opponents being prospective or renowned academicians of that time I. Pavlov, N. Kravkov and L. Orbeli. Despite all, N. Pärna was forced to serve for several years as a military surgeon during World War I. A position as a lecturer at the St. Petersburg University was awarded to him after the revolution. At the height of his career, while realising his tremendous dreams, N. Pärna died on the 28<sup>th</sup> of November 1923 from tuberculosis. In spite of his premature death, N. Pärna left behind a wealth of scientific knowledge, which became popular due to its interesting literature and philosophical manner.

For the study of human mental rhythms, N. Pärna examined himself. It was the only possibility for such kind of experiments as one can remember in Russia of these times (war, revolution, hunger, etc.).

Every day for 18 years he wrote entries into his diary using conventional signs about his feelings on health and comfort, creative ability, physical and sexual activity and other aspects. Even at those times he analysed his material using statistical methods. Pärna noticed that the conceptions of ideas and intellectual ability are connected with certain time cycles. He paid special attention to rhythms of circa seven-days or its multiple – 14-, 21- and 28-day rhythms. In his opinion, every individual has strictly unique activity cycles. Pärna's approach to the functions of the human organism was dialectic. He compiled his research data into a book called "*Das Wellenphänomen des Lebens. Periodische Schwankungen im Seelenleben des Menschen*", which was published in 1923 in Leipzig. It was also published in 1925 in Petrograd after Pärna's death and titled "*Ritm žizni i tvorčestva*" ("Ритм жизни и творчества").

Pärna's book consists of two parts. The first part is composed of two chapters called "*The rhythm of vital processes*" and "*Biorhythms*", which deal especially with the variation of physiological process as well as the rhythm of all biological phenomena.

Characterising the rhythmical variations of physiologic processes in all tissues and organs, Pärna drew the conclusion that all vital processes without exception have natural rhythmic cycles. Such a conclusion at that period of time may be considered as extremely progressive and was at least half a century ahead of its time. His view remained largely unknown to the scientific public and was of little popularity possibly due to his premature death. It was not until the 60's that the circadian rhythms of around 50 physiologic functions were discovered by new generations of scientists. During the 70's, over a 150 rhythmically changing physiological parameters were discovered. Only in the 80's have scientists reached the same point as N. Pärna and finally have accepted that all physiological processes vary rhythmically. The concept of time in biosystems is expressed as biorhythms i.e. organisms measure the flow of time *via* biological rhythms.

Proceeding further on the rhythmical variations of physiological processes, Pärna searched for a similarity in human physiological functions. The five chapters on "*Psychological periods*" form the second part of his book and are titled "*Mental rhythms*", "*The analysis of biographies of great men*", "*The rhythms of mental pathology*", "*The analysis of mental rhythms*" and "*The interpretation of physiological periods*".

The factual data in N. Pärna's book are not outdated even today and his discussions are logical and ingenious, although some of his conclusions are nowadays contestable. Based on self-study, N. Pärna discovered the existence of many-years cycle of creative activity. He compared this to the lives of great



Prof. N. Pärnas's book "The Rhythm of Life and Creation"

men using their biographical data and the details of analysis of their content (L. van Beethoven, R. Wagner, M. Glinka, A. Puškin, W. Goethe, N. Gogol, H. Helmholtz, I. Kant).

N. Pärna was of the opinion that certain periods of life differed in productivity as well as in the objectivity of the creative work. The nodal points of life repeat themselves every 6–7 years: at the ages of 6–7; 12–13; 18–19; 25–26; 31–32; 37–38; 43–44; around 50; 56–57 years and so on. N. Pärna regarded the nodal point at 50 years of age to be of special significance after which starts the second maturity for those, whose previous nodal points did not cause loss of mentality. From the eight nodal point, a new creative ability may be conceived, but with a new view on life.

In N. Pärna's opinion a rhythm of prolonged mental activity is found in those individuals whose activities were focused on his / her own inherent mental gifts e.g. composers, poets, philosophers and painters. For the individuals of a more practical way of life, this rhythm is more difficult to detect as clearly. This is because practical occupations demand quick and exact reactions to external impulses, which is not always possible for individuals with a clear periodicity of mental thought and creative work. Scientists are placed in between the two above-mentioned groups.

As we can see, N. Pärna was a dialectician and his concepts on biorhythms was dialectic. He thought that one must consider rhythmically varying processes as not moving along a circle, where the process returns to its exact starting point, but as moving along a spiral path, where each cycle returns to its starting point, but on a permanently new level. Pärna is not at fault that the following generations started to regard mental rhythms as having absolute periods and amplitudes of oscillation and which are switched on at birth and are unchanged until death. This flat metaphysical interpretation of measuring the characteristic of the quality of human life by biorhythms has harmed chronobiology as a science.

Many irresponsible individuals have identified scientific chronobiology as the calculable, unchanging physical, emotional and intellectual rhythms of the human organism. This deduction is clearly unfounded, but still a hasty conclusion was drawn by some that chronobiology is a pseudo-science. In 1931 the Swedish scientists A. Agren, E. Wielander and J. Georg were the first to show the rhythmicity of the concentration of glyucose in liver and muscles. Already in 1935 A. Hoogland published a book "*Pacemakers in relation to aspects of behaviour*", where he postulated the chemical nature of the biological clock. He suggested that the physiological time is dependent on course of chemical processes. In 1939 the scientists studying biological rhythms founded a society, that was in 1970 renamed to Society of chronobiology several international journals dealing with this topic, such as *The International Journal of Chronobiology*, *Chronobiology* etc.

Luckily, during the last few decades, it has become increasingly clear to scientists that all vital processes measure the course of time (bio) rhythmically. This rhythm is of endogenous nature but varies in accordance to the changes in the environment. Until 1960-s more than 50 and until 1970-s even more than 150 physiological parameters were characterised to have circadian rhythm. There are published many books on this topic and some even in Riga. Even today, most scientists are cautious and don't express their views on the biological clock as consistently and resolutely as N. Pärna did.

The whole family of Carl R. Jakobson (a well-known Estonian public figure of the 19<sup>th</sup> century and editor of the newspaper *Sakala*) was rebellious and had a broad outlook on issues. And Nikolai Pärna was from this family, being a nephew of Jakobson.

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Since 1987, when the Riga osteocephalic school of G. Jankovskis together with colleagues was organized, many years' courses for doctors in Latvia and abroad were taught in form of OSA and practice in ORT. In 1993 osteoreflexotherapists founded Latvia's Association of Osteoreflexotherapists; G. Jankovskis was elected its president, deputy president was M. Vīlona and secretary A. Čerņins. Latvian scientists have received over 30 invention certificates; 11 of these have been registered, including degrees of doctors of medicine, biology and habilitated doctors.

G. Jankovskis reports 1957, the 24<sup>th</sup> of April as the beginning day of osteoreflexotherapy, at the 1 Municipal tuberculosis hospital. He performed the first osteoreflexology on a patient with tuberculosis of the knee (a closed fracture for no pain in the knee joint syndrome, which had been forming him at the slightest movement).

