Jürgen Aschoff – An obituary

Jürgen Walther Ludwig Aschoff, the last of the triumvirate of chronobiology (Aschoff–Bünning–Pittendrigh) passed away, after a brief illness, on 11 October 1998 at the age of 85. He was born on 25 January 1913 at Freiburg in Breisgau, Germany as the fifth child of the pathologist Ludwig Aschoff and his wife Clara. Both his parents were Prussians, and Jürgen Aschoff visibly bore traces of prussianness. He went to humanistic gymnasium and studied Latin and mathematics. He wrote '... for want of an inclination to any specific profession, he began studying medicine in 1931 in Bonn and obtained his MD in Freiburg in 1937'. He did his Dr. Habil in 1944 and became a Professor of Physiology in 1949 at the University of Göttingen. His early publications were in the area of homeothermy and temperature regulation. Aschoff inevitably found daily rhythms (called *circadian* rhythms now) in the basal metabolic rate and body temperature of humans. But Aschoff being 'a lone wolf', did not have any contacts with other rhythms researchers and acquiantance of the considerable data on freerunning rhythms in plants. Aschoff once wrote that the botanists were 103 years ahead of the zoologists, in the discovery of circadian rhythms. He met Ermin Bünning, the first chronicler of chronobiology, in 1953. The relationship between them had been very cordial. Aschoff and Pittendrigh, however, beginning with their first meeting in 1958 remained very close friends till the end. Aschoff, Bünning and Pittendrigh were the mainstay of the famous Cold Spring Harbour Symposium on 'Biological Clocks' in 1960 and in close coordination they virtually laid the conceptual foundations of the field of biological rhythms research in this century.

In 1954, Aschoff came in close contact with Gustav Kramer, who had earlier discovered the sun compass orientation in birds, and with the brilliant Erich von Holst (1908–1962) from whom he learnt about the coupling of oscillators and about the phenomenon of relative coordination. Owing to the interest that G. Kramer and Erich von Holst took in Aschoff's work; he became a member of the Max Planck Institut für Verhaltensphysiologie in 1958, which had just got new buildings at Seewiesen and Andechs in Bavaria. For Aschoff, it was an exhilarating experience to turn from medically-oriented physiology to biology at large with its wider horizons. Just 5 km away from Aschoff's Institute was the MPI of Konrad Lorenz with whom he struck up a friendship.

Soon after Aschoff's appointment as the Director of the MPIV at Andechs, R. Wever, K. Hoffmann, Ursula von St. Paul, Hermann Pohl, Peter Berthold, G. Heldmaier and Eberhard Gwinner (the present Director) joined him and Andechs became the Mecca of chronobiologists. Many scientists came to

Aschoff's laboratory, prominent among them were J. W. Hastings (Harvard), Colin Pittendrigh (then in Princeton), M. Menaker, Patricia DeCoursey, J. T. Enright, M. Ather Ali (from Montreal), H. Underwood and F. W. Turek, Serge Daan from Groningen and Ken-ichi and Sato Honma from Sapporo, Japan. Jürgen Aschoff had the *first isolation facility for the study of human circadian rhythms* built for him with the support of NATO in the early 1960s. I first set eyes, in the company of W. Engelmann and Colin Pittendrigh, on this exalted bunker in the course of 1965, little knowing at that time that I would construct one myself twenty years later at the Madurai Kamaraj University.

Jürgen Aschoff was a scientist of many parts. There was a time when his rich and bold voice, which was surprising coming from a rather small built person, would scare timid younger scientists like me. He held his pipe aloft and appeared to pontificate. Years later he told me that people held him as being arrogant just because he spoke in a loud voice; he thought people who spoke in a whisper may not be sincere. For all his airs of being cock-sure on clock matters he was, now and then, given to soul-searching and doubts about his own work. In April 1967, at Gottingen, Aschoff told Engelmann and me, if after all, he were not playing the 'glass bead game' as in Hermann Hesse's *Magister Ludi*. The reference obviously was to his various tenets and models such as the *Aschoff's rule, Aschoff–Wever model* and his other predictions. Aschoff lived another three decades to see that his hypotheses not only stood the test of time but stimulated many younger scientists to make newer discoveries. He kept publishing papers until the very last. When I met him last in the autumn of 1996 at Andechs, he had carried with him a lot of data on human circadian rhythms and short interval time estimation in humans which he wanted to discuss with me. During that meeting he said he has data which showed that time passed for humans much faster in brighter light.

Aschoff brought much of the terminology in rhythms research within a well-defined framework. The glossary of technical terms proposed by him in 1965, is still the one being used. Aschoff coined the term *zeitgebers* for time cues that entrain circadian rhythms, which is now widely used like an English word. At a conference in Basel in 1953, Aschoff spelt out the details of a rule which was christened by Colin Pittendrigh in 1960 as *Aschoff's rule*. He wrote, 'I was also saucy enough to conclude from my few observations that in night active animals, the period is longer in LL (continuous light) than in DD (continuous darkness) while the opposite occurs in day active animals'. This

is the Aschoff's rule in his own words. Aschoff also experimentally demonstrated 'internal desynchronization' of circadian rhythms in sleep–wake rhythms on the one hand, and rectal temperature rhythms, on the other, in humans held in prolonged social isolation.

Aschoff was Fellow of the Deutsche Akademie der Naturforscher Leopoldina, and the Bavarian Academy of Sciences. The Universities of Umea (Sweden), Giessen and Hokkaido University (Sapporo, Japan) had awarded him DSc *honoris causa*. Aschoff genuinely liked to interact with other scientists and seemed to have a soft corner for young scientists. He was gregarious and drew out the bashful into conversation.

Aschoff spotted me with a few other Indian scientists in Germany, during the IX Meeting of the International Society for Chronobiology and asked aloud 'Does this mean that the future of chronobiology will be in India?'. I would like to call this as *Aschoff's prophecy* and hope that like many of his postulates this one also comes true. Jürgen Aschoff will be sorely missed by all of us chronobiologists who had come to admire the man and his science.

M. K. CHANDRASHEKARAN

Evolutionary and Organismal Biology Unit,
Jawaharlal Nehru Centre for Advanced Scientific Research,
Jakkur P.O., Bangalore 560 064, India

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