

## Colin Stephenson Pittendrigh

### An obituary

Colin Pittendrigh (13 October 1918–20 March 1996) was born in Whitley Bay, Northumberland in the north of England. He had Scottish/Gaelic ancestors. At 15 he won the local Boy Scouts Prize for best wildflower collection and was seduced into a lasting love affair with plant taxonomy. He secured the B Sc (Hons) degree with first class from the University of Durham, England. In high school he made the acquaintance of *The Origin of Species* by Charles Darwin in Sir John Arthur Thomson's *The Great Biologists*. He wrote<sup>1</sup>, 'My high school interest in Darwinian evolution survived an undergraduate exposure to J. W. Heslop-Harrison's Lamarckian convictions (King's College, University of Durham), flourished during graduate school (Columbia) with Dobzhansky, and matured during several later years of friendship and collaboration on a book with G. G. Simpson'. During war service he was stationed (1942–1945) in Trinidad where he worked on the ecological basis and control of Bromeliad malaria among personnel of Army, Navy and Air Force Bases. Between 1945 and 1946 he worked as University Fellow at Columbia University where he obtained his Ph D degree in 1946.

The conceptual foundations of the field of biological rhythms research (chronobiology) in this century were laid by E. Bünning, H. Kalmus, C. P. Richter, J. Aschoff, Colin Pittendrigh and F. Halberg. Pittendrigh brought to the field a degree of elegance and rigour in carrying out crucial experiments, which was until then not very common. In this respect Pittendrigh much resembled Wm. Pfeffer (1845–1920) and J. C. Bose (1858–1937). Colin Pittendrigh organized the first, and what has since proved to be the most successful, international meeting on 'Biological Clocks': XXV Cold Spring Harbor Symposium in 1960 with Erwin Bünning in the Chair. Pittendrigh single-handedly achieved several scientific objectives in the 1960 Cold Spring Harbor Symposium. He had drawn pointed attention in most of his landmark papers of the late 1950s and in 1960 to what he himself christened the 'Bünning hypothesis' and rightly recognized that Bünning's postulate, that circadian

rhythms acted as yardsticks in measuring daylength, and therefore the seasons of the year, was entirely original. J. Aschoff had accumulated data over the years that the period length of nocturnal animals was consistently shorter than the period length of diurnal animals. Aschoff formulated some rules about light-dependence of period in an ecologically meaningful way and called it the Circadian Rule. As Pittendrigh writes<sup>1</sup>, 'At the same meeting I successfully renamed it Aschoff's Rule'. And Aschoff's Rule it continued to be.



Circadian rhythms had been the immediate object of his researches for over 40 years. He came to this life-long love after being introduced to the papers of E. Bünning and H. Kalmus on *Drosophila* eclosion rhythms by his friend Marston Bates and particularly after listening to a lecture by the legendary Gustav Kramer on sun-compass behaviour in starlings in 1952 which to him 'was one of the most exciting and aesthetically rewarding experiences'. Starting with his major publication on *Drosophila* (*Proc. Natl. Acad. Sci.*, 1954, 40, 1018–1029) which proclaimed and established for the first time the crucial temperature independence of circadian clocks, he kept publishing a steady stream of papers, nearly each one of them a landmark or a milestone.

Pittendrigh spent a little over two decades (1947–1969) in Princeton University where he was made full Professor in 1957 and was Dean of the Graduate School 1965–69. Much of his most inspiring work was done in Princeton. Colin Pittendrigh was an eloquent and impassioned defender of the faith and the credo of chronobiology. His grasp of the subject and of the facts he marshalled to support his concepts were so invincible that he would physically demolish counter-arguments resting on shaky or stop-gap experimental props. The first such victim who fell to Pittendrigh's scientific ire was Janet Harker, then working on cockroach locomotor activity rhythms, in Cambridge, UK. In the late 1950s, Janet Harker maintained that the oscillator in the roach *Periplaneta* was housed in the insect's sub-oesophageal ganglion. Enthusiastic attempts by Shephard Roberts, a Ph D student of Pittendrigh in Princeton, failed to confirm Harker. It was soon demonstrated by Pittendrigh and his colleagues that the pacemaker in roaches was localized in the optic lobes. Pittendrigh told some of us in the 1960s that he had invited Janet Harker in vain to go to Princeton and demonstrate her findings. Harker never attended a chronobiology meeting after the XXV Cold Spring Harbor Symposium.

Another aberrant chronobiologist who crossed ideological swords with Colin Pittendrigh and came to grief was Frank A. Brown Jr. It was again in the XXV Cold Spring Harbor Symposium of 1960 in which so many reputations were made and destroyed. The endogenous versus exogenous origin of rhythms was discussed at length for the last time. J. Aschoff, E. Bünning and C. S. Pittendrigh represented the endogenous school. The scales of scientific authenticity were steeply tilted in favour of endogenous (genetic) origin of rhythms. Yet F. A. Brown was brash and stated in discussion (Chandrasekaran, M. K., *Curr. Sci.*, 1990, 59, 182) that his opponents, in insisting upon a self-timed or fully autonomous clock, were faced with the possibility that they 'were pursuing a ghost' to which Pittendrigh, the youngest and most sanguine of the trio, retorted: 'The question of the ghost is simple – either it is an aspect of living