Hirosi Kuriyama

1928 - 2003

Hirosi Kuriyama made immense contributions to our knowledge of the electrical activity of smooth muscles. For 30 years in Fukuoka until the 1990s he and members of his group produced over 500 papers on smooth muscle physiology, the responses to nerve stimulation, and the effects of new drugs on a wide variety of mammalian smooth muscles, making it the most prolific and significant smooth muscle group of that era in the world. Kuriyama published over 60 of these in *The Journal of Physiology* and was an Editor of *The Journal* from 1992 to 1999.

Young scientists from his group were visiting workers in most of the significant smooth muscle groups around the world, creating lasting links with Britain, the United States and Germany; in return there were visiting workers to the Fukuoka laboratory which included those from Slovakia (Bauer), Britain (Creed, Weston), Korea (Kim) and Germany (Isenberg, Nilius), among others. These exchanges cemented relationships among the smooth muscle fraternity and enhanced the international reputation of Kuriyama's laboratory.

Hirosi Kuriyama was born on 23 November, 1928 in Saga Prefecture, Kyushu Island of Japan, and went to university in Fukuoka where he studied medicine, obtaining his licence to practice in June 1951. After graduating he took an Assistant Professorship in the Department of Physiology, Faculty of Medicine, Kyushu University which was led by Naoki Toida. In 1956 he moved to an Associate Professorship in the Department of Physiology, Faculty of Medicine, Kagoshima University. His position there continued to 1962, although for much of the time he was abroad. Having published papers in Japanese on smooth muscle physiology in the late 1950s, he conceived the idea of working abroad to gain experience with other smooth muscle physiologists and, as he was interested in uterine smooth muscle, he first went to work in New York with Csapo in February 1959 for 15 months.

This was the era of microelectrode recording which had been used to record from the much larger skeletal muscle fibres by Ling & Gerard and others in the early 1950s, and Kuriyama and others, who were interested in smooth muscle physiology, were eager to apply the technique to that tissue. Csapo had published prolifically on the effects of oestrogen and progesterone on the mechanical and biochemical activity of uterine smooth muscle, and Kuriyama provided the electrophysiological data. The central problem which fascinated Csapo was the changes in uterine smooth muscle size and activity such that during pregnancy there were mild contractions culminating in the strong but intermittent contractions of parturition that not only expelled the fetus but also dislodged the placenta which had remained attached and functional until that time; he related these changes to the effects of the two steroids on the electrical and mechanical activity of the myometrium.

Kuriyama moved to join Edith Bülbring in Oxford in June 1960. He was to stay in Oxford until July 1964. He was a member of Lincoln College and completed a DPhil degree there. Edith Bülbring's Oxford group was at that time the Mecca of smooth muscle researchers. Previous visitors and visitors contemporary with Kuriyama in Bülbring's lab included Gustav Born, Mollie Holman, Betty Twarog, Heinz Lüllmann, Robert Lin, Richard Straub, Geoffrey Burnstock, A Crema, Johann Axelsson, C Lee, K Hermansen, Peter Goodford and Ernest Bueding – a truly international group. Kuriyama continued to publish from the Department of Pharmacology in Oxford, with Edith Bülbring until 1964, although he maintained close links after returning to Japan and made frequent visits to Britain, publishing papers with Bülbring and Tadao Tomita who joined the Oxford laboratory a little later.

While in Oxford, Kuriyama was greatly influenced by Bülbring and worked on the electrical activity of the taenia of guinea-pig caecum (called taenia coli at that time); his major contributions were the effects of changes in the ionic composition of the bathing solution, and of adrenaline and acetylcholine, on the electrical activity of taenia smooth muscle. He published with two other visitors to the Oxford laboratory, Mollie Holman (from Australia) and Rik Casteels (from Belgium); Casteels provided data on ion distributions in smooth muscle while Kuriyama recorded the electrical activity. With Holman began his interest in the responses to nerve stimulation, done at that time on the hypogastric nerve/vas deferens preparation. Later he developed an interest in the electrical syncytial nature of smooth muscle with Tadao Tomita (from Japan) who made insightful observations on the cable properties of smooth muscles independently of Mykhailo Shuba who had described them in the early 1960s in Kiev.

Kuriyama returned to Japan in July 1964 and immediately moved to the Department of Physiology at Kyushu University in Fukuoka. He was promoted to full Professor and Head of the Department of Oral Physiology, Faculty of Dentistry in 1968, transferring to become head of the Department of Pharmacology, Faculty of Medicine in 1976. He retired in 1992 from Kyushu University and, after 2 years with Chugai Pharmaceutical Company, he joined Seinan Jo Gakuin University first as Professor, then as Dean of the Faculty, and finally as President until 2003 when he was 75 years old.

Early work after returning to Japan involved studies on earthworm muscle. By the 1970s he had moved to mammalian smooth muscle, mainly

from the guinea-pig. He had many co-workers as assistants in his laboratory, many of whom are now heads of departments in Japanese universities: these included Takuro Osa (Yamaguchi, now retired), Yasuji Sakamoto (Fukuoka, retired), Hikaru Suzuki (Nagoya City) Yoshi Ito (Kyushu) Takeo Itoh (Nagoya City) and Kenji Kitamura (Fukuoka Dental College), among others. A massive number of medically qualified students passed through his laboratory over the nearly 30 years in Fukuoka, producing papers on a wide variety of aspects of smooth muscle electrophysiology, and later biochemistry and contractile processes using skinned fibres.

In his heyday between 1970 and 1990 Kuriyama's group produced the majority of electrophysiological and physiological studies which were published on smooth muscle in the era. The membrane properties of trachea, intestine, stomach, rectum, bladder, vas deferens, uterus, portal vein, and arteries such as the mesenteric, coronary, pulmonary, aorta and basilar, previously unknown, were investigated and characterised; rabbit, dog and pig tissues were investigated, in addition to guinea-pig, rat and mouse.

These studies laid the foundation for our present knowledge of smooth muscle electrophysiology upon which later voltage-clamp studies of membrane currents were able to be developed. His career spanned the period when microelectrode technique was in vogue and later tight-seal patch clamp which began in smooth muscle in the early 1980s and largely superseded it.

Studies by Kuriyama's group, and from other laboratories around the world at that time, established the basic similarities and differences of smooth muscles: voltage-dependent calcium and potassium currents acting in concert with calcium store release, complete with different combinations of receptors and innervations but with exquisite variations on a theme fitting them to perform their physiological functions in a wide variety of different situations in the body.

When invited to speak at international meetings Hirosi Kuriyama would produce copious numbers of slides, solid with membrane potential recordings or other data. During the talks he would sometimes retire to smoke his pipe outside the hall where he could be engaged in conversation. While a stern taskmaster in the laboratory, at meetings he was always relaxed, affable and approachable.

He was a council member of the Japanese Physiological Society, the Japanese Pharmacological Society, the Japan Society of Smooth Muscle Research and the Japanese Circulation Research Society. He was a member of the Physiological Society and the American Physiological Society. He was a Senator of Kyushu University and, later, of Seinan Jo Gakuin University.

Hirosi Kuriyama leaves a massive legacy of smooth muscle research, mainly electrophysiological. In his early days he was an arch exponent of microelectrode technique; he would sit by the preparation smoking his pipe, lowering the microelectrode to touch the tissue and then slightly indent it so applying a little pressure; a sharp tap with his pipe and the electrode would enter a smooth muscle cell. His practical knowledge of microelectrode technique gained during his early years enabled him to direct others using the technique very effectively and productively.

His contributions to smooth muscle electrophysiology were immense, not least in the numbers of disciples he left who now lead Japanese smooth muscle research. Internationally his group was pre-eminent in smooth muscle research for two decades; his passing marked the end of an era.

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Tom Bolton
Pharmacology & Clinical Pharmacology Basic Medical Sciences, St George's Hospital Medical School, London, UK

Hikaru Suzuki
Department of Physiology, Medical School, Nagoya City University, Mizuho-ku, Nagoya, Japan

Rob Clarke

1956 - 2004

Rob Clarke made an important contribution to physiology and to the life of the Physiological Society. An active Member since 1985, he was a regular attendee at Society Meetings where he presented more than 60 communications over the years, in his inimitable laid back style. As convenor for the Somatosensory Physiology Special Interest Group he organised numerous lively symposia during his 6 year term of office, each one invariably followed by a convivial dinner at a local hostelry, one notable occasion terminating in a game of neurophysiological charades, much to the bemusement of other patrons and, indeed, some of the participants.

In 1998 he was elected to the Committee of the Society (now the Council) where his hard work, good sense and good humour were to prove invaluable assets that won him respect and many friends. He was to have become its Chairman this year if ill health had not forced him to resign prematurely. Rob met almost every project with enthusiasm. He served on the Higher Education Sub-committee and was involved in producing a benchmarking statement with David Sanders at Newcastle. This was a pro-active move on behalf of Physiological Society and required an immense amount of work. The statement was widely used, particularly by new and overseas universities in the process of starting up physiology or physiology-related degrees and it is still available on the Society website. With others, he also helped write the booklet for schools *Understanding Life*, which gets excellent feedback from teachers and school children.