

Obituary

Author: Midori Nishioka

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OBITUARY**Toshijiro Kawamura
(1906–2003)**

Dr. Toshijiro Kawamura, Professor Emeritus of Hiroshima University, passed away with chronic bronchitis on January 27, 2003.

Dr. Kawamura was born in Shiga Prefecture on March 7, 1906. Upon graduation from Hiroshima Higher Normal School in March 1928, he entered the teaching profession at Nagano Normal School. After 2 years of teaching at Nagano, he returned to Hiroshima in April 1930 to enter the Faculty of Biology, Hiroshima University of Literature and Science and following graduation in March 1933, Dr. Kawamura's long and illustrious academic career started with appointment as assistant at the same university. This was followed by appointment as lecturer in April 1937 at the same university, lecturer at Kyoto Imperial University in January 1945; assistant professor of Hiroshima University of Literature and Science in August 1946, professor of Hiroshima University in April 1951; director of Hiroshima University Library in April 1963, dean of the Faculty of Science in June 1966, and lastly president of Hiroshima University in July 1966. In February 1969, Dr. Kawamura retired from Hiroshima University and in March of the same year, he was conferred the title of professor emeritus of Hiroshima University. For about 20 years following his retirement and the relocation of Hiroshima University from Hiroshima to Higashihiroshima, Dr. Kawamura devoted his time and effort to research and guidance of students at the Institute for Amphibian Biology that was affiliated with Hiroshima University Faculty of Science.

For many years, Dr. Kawamura devoted his efforts in education of students, research, and guidance of young researchers in their respective fields, management of affiliated organizations, and made notable contributions to the development of various scientific disciplines. During the 22 years between 1933 and 1955, he served as a driving force in research, training, and restoration of laboratories which had been completely destroyed by the atomic bomb in 1945. In July 1941, Dr. Kawamura was awarded the degree of Doctor of Science from Hiroshima University of Literature and Science for his study entitled the "Study on artificial parthenogenesis in the frog". This study was truly outstanding and even today it is highly evaluated and praised by scholars throughout the world.

His academic work and scientific achievements as a leader of this field are remarkable and known throughout the world. As early as 1935, Dr. Kawamura recognized the fact that amphibians are suitable for experimentation in explaining and elucidating many important phenomena. He conducted a number of studies overcoming various difficulties, and published many original works by applying the methods of experimental embryology. A few of his outstanding works are cited below:

(1) Study on artificial parthenogenesis of unfertilized egg: Dr. Kawamura discovered that ten types of embryos or larvae of differing chromosomes may be generated by applying stimuli in the form of needle puncture to the unfertilized eggs of frogs. Through detailed observations, he calculated the rates of their generation, viability, and mechanism of development, these were

published in a series of three doctoral theses. This study dramatically advanced our knowledge concerning artificially induced asexual reproduction that had been attempted by many of his predecessors. Furthermore, his study was regarded to be a pioneering work in the hitherto unknown area related to the polyploidy of vertebrates. Thus, it was highly evaluated in the academic and scientific world, being often cited in both domestic and foreign textbooks and in many treatises as a classic in this field.

(2) Study on the production of allopolyploids and autopolyploids: Through such treatments, as low or high temperature processing, ultrasonic stimulation, and nuclear transfer, Dr. Kawamura was successful in producing autopolyploids and allopolyploids in fertilized frog eggs. In particular, amphidiploids (=allotetraploids) was the first of its type to be introduced in the animal kingdom and was highly significant in its application has immense value.

(3) Study on interspecific hybrids: Dr. Kawamura collected many types of salamanders and frogs not only in Japan and but abroad, conducted a large-scale crossing experiment, and based on hybrid viability and the mechanism of reproductive isolation, he established taxonomic positions for many of the amphibians that were used as experimental animals.

(4) Study on nucleo-cytoplasmic hybrids: This is a kind of interspecific hybrid in which each cell is constructed of a nucleus of one species and cytoplasm of the other species. Dr. Kawamura succeeded in this experiment for the first time in the field by enucleation of the unfertilized eggs of *Rana ornatinventris* and by transferring the blastula nucleus of *Rana japonica*. His work made a significant contribution to the study by elucidating the role of the cytoplasm in embryology and genetics, and the functional interrelationship between the two.

(5) Study on the development of diploid gynogenetic frogs: By employing a method that had been designed for homogamy by doubling the genes from unfertilized eggs, Dr. Kawamura discovered many type of recessive mutation in natural populations or experimental species. His research made it possible to elucidate the mechanism of sex determination in amphibians which sex chromosomes were not yet distinguished.

(6) Study on the effects of irradiation of eggs or sperm on the offspring: Dr. Kawamura confirmed that X-rays or neutrons at a low dosage cause abnormalities in external characters, the number and shape of chromosomes, reproductive capacity, and sex ratios up to the third generation. This discovery contributed immensely not only to morphology, but also to a number of areas in biology, such as genetics, evolution, cytology, physiology, and taxonomy.

Using amphibians as his research materials, Dr. Kawamura conducted detailed and extensive studies over the years, made unprecedented discoveries in unexplored areas and produced truly outstanding results. For this series of studies, Dr. Toshihiro Kawamura received a number of awards, including an award from the Zoological Society of Japan for "Study on the Sex of Triploid frogs of *Rana nigromaculata*" in October 1942, Chugoku Culture Prize from the Chugoku Shimbun for "Achievements contributing to advancement in animal embryology" in October 1947, an award by the Genetics Society of Japan for "Study on the Polyploidy of Amphibians" in October 1952, and an award from the Japan Academy for "Biological Studies Based on the Observation of Amphibians" in May 1962. In recognition of these studies of his, the Institute for Amphibian Biology was established in affiliation with the Faculty of Science, Hiroshima University in June 1967. The Government offered support for continued development in this area. Such an event was without precedence in Japan and will be clearly instrumental in stimulating the continued interest of young scholars in future.

Serving as the head of the Laboratory of Zoology, Hiroshima University Faculty of Science for 8 years between 1955 and 1963 and as the director of the Marine Biological Laboratory of Hiroshima University Graduate School of Science for 9 years between 1956 and 1965, Dr. Kawamura made significant contributions to the development of these organizations. For more than 3 years from April of 1963 when he served as the director of Hiroshima University Library, he modernized the facility and expanded its functions as the central library in the Chugoku-Shikoku Region. During a rather short period of 2 years and 7 months as President of Hiroshima University, he made noteworthy contributions toward the development of the university, such as creation of graduate schools for Political Science and Economics, Fisheries and Animal Husbandry, and Education at the Fukuyama Campus, establishment of the Institute of Pharmacological Sciences, and improvement of all academic faculties, as well as dispatching of academic research teams overseas several times.

During this interval, Dr. Kawamura was also a dynamic force in improving academic studies in Japan while serving as a committee member on the Council for Science and Technology of the Ministry of Education between September 1963 and March 1965 and between January 1966 and June 1967. He was elected to serve as a member of a subcommittee of the Japan Society for the Promotion of Science in 1947. During 24 years between 1951 and 1975, he played a key role in the advancement of studies by biologists in Japan as a member of a liaison committee for Zoological Research, Genetic Research, and Biological Research of the Science Council of Japan. Furthermore, as a councilor of the Zoological Society of Japan for the 25 years between 1948 and 1973 and as the manager of the Chugoku-Shikoku Area Branch of this society for the 17 years between 1955 and 1972, he made remarkable efforts in promoting the society in Japan and in the aforementioned area, and more than satisfied the expectations of those concerned. In addition, Dr. Kawamura served important assignments in organizations such as the Genetics Society of Japan, the Ecological Society of Japan, and the Japanese Society of Systematic Zoology, and he made notable contributions to the advancement in studies of each specialty. In October 1976, he became an honorary member of not only the Zoological Society of Japan but also the Genetics Society of Japan. In June 1977, he was appointed an honorary foreign

member of the American Society of Ichthyologists and Herpetologists.

Under the assumption that Dr. Kawamura would join them after his retirement from Hiroshima University, the University of Michigan in the United States established an amphibian research facility within the university in 1965. As the level of studies using amphibians was still in the primitive stage in the United States when compared to that of Japan, it had been planned that at the University of Michigan, under the guidance of Dr. Kawamura, the level of sophistication of amphibian studies would be elevated to that comparable to Japan within 3 years and that by having Dr. Kawamura as the director of the institute after his retirement from Hiroshima University, the facility would become a world-renown research center. Because Dr. Kawamura was appointed president of Hiroshima University, he was unable to assume the post created for him at the University of Michigan. Instead, during the ensuing 27 years between 1966 and 1992, Dr. Kawamura visited Michigan 4 times, 7 of his former students served at the institute for periods of one to two years, and from the University of Michigan, professor Nace visited Japan 15 times and Lecturer Christiner twice. These academic interactions produced dramatic effects on the development of the Amphibian Research Institute at Michigan and contributed significantly toward Japanese-American scientific exchange and academic advancement in Japan.

A note should be made on the relationship between the Japanese imperial family and the Japanese people, and in particular universities. In December 1947, when Emperor Showa visited the area, Dr. Kawamura presented for him a lecture on the studies being conducted in experimental embryology using amphibians. In May of 1957, he made an unofficial presentation at the Imperial Palace on the studies on amphibians and responded to many questions raised by the Emperor. On the occasion of an award presentation at the Japan Academy in May 1962, Dr. Kawamura presented two lectures before and after the award presentation and responded to a number of questions posed by the Emperor. In April 1969, he visited the new palace together with several other researchers and delivered a lecture on speciation in amphibians. In October 1968, he reported to the Crown Prince's Palace to deliver a lecture to then Crown Prince* on the experimental embryology of amphibians. In April 1970, Dr. Kawamura again visited to the Crown Prince's Palace to respond to many questions that had been raised by the Crown Prince*. For also Prince Hitachi, Dr. Kawamura presented a lecture on experimental embryology at Hiroshima University in March 1957 and another on the roles of the nucleus and cytoplasm in the development of amphibians at the Prince's suite in Hiroshima. These episodes were important in cementing a cordial relationship between the imperial family and the people, in particular the universities, and in greatly encouraging young researchers in their pursuit of research.

(*current Emperor)

Dr. Midori Nishioka
Professor Emeritus of Hiroshima University