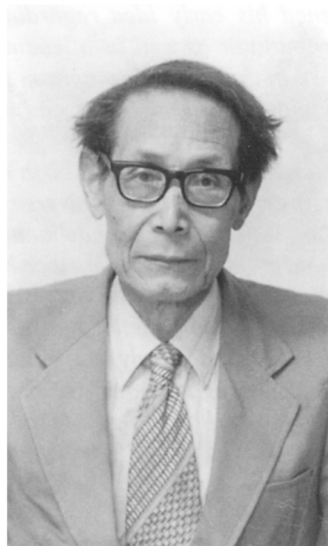


## Singo Nakazawa

† 4<sup>th</sup> May 2002



*It is with great sorrow that we report the death of Prof. Emeritus Singo Nakazawa, Dr.Sc., a former member of the editorial board of *Biologia Plantarum*, who deceased at his age of 83 on May 4, 2002. We have lost a pioneer researcher in the field of plant morphogenesis, especially polarity in plant morphogenesis.*

*Singo Nakazawa was born in Niigata Prefecture in 1918 and graduated from Tohoku University in Sendai in 1943. After military service from 1943 to 1945, he returned to Tohoku University, and then from 1945 to 1951 worked under the supervision of Prof. Masato Tahara (1884-1969) who was one of the pioneer researchers in the field of algology in Japan. Singo Nakazawa was then seated at Yamagata University until he retired from the University in 1984, receiving the title Prof. Emeritus of Yamagata University.*

*Professor Nakazawa's academic interest in morphogenesis started when the theme was first articulated by Prof. Tahara. This was how the polarity axis along which a rhizoid formed at one side is determined in an egg of *Fucales* (brown algae). He clearly indicated that polar axes in the fertilized eggs of *Sargassum confusum* and *Coccophora langsdorfii* along which rhizoids were formed on the convexed sides of the ovate eggs were unchanged, even when these eggs were subjected to artificial centrifugation that stratified their cellular inclusions (1950). This suggested that the polarity of fertilized eggs of these fucoid species is innately determined by the innate ovate shape of the egg with its one side pointed.*

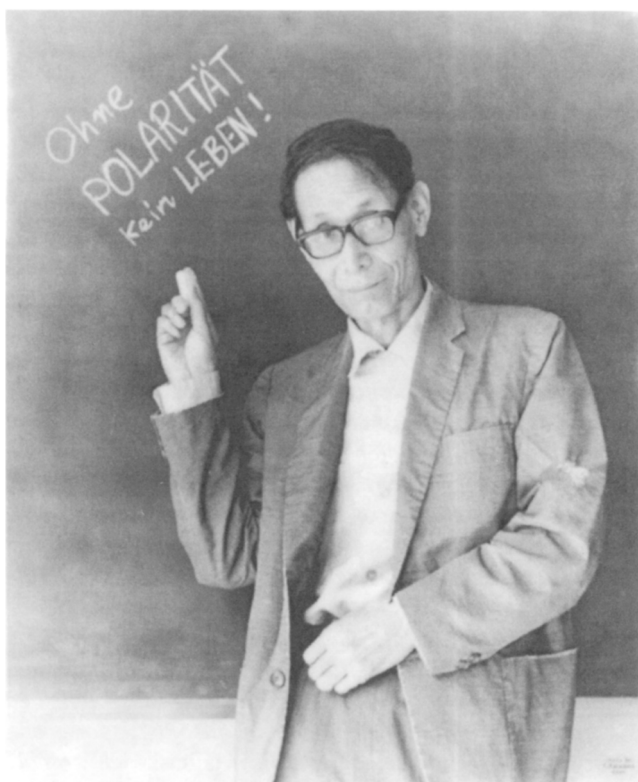
*On the other hand, Prof. Nakazawa intended to use fertilized eggs of genus *Fucus* as experimental materials because a *Fucus* egg is completely spherical and the formation of its axis of polarity can be later determined by environmental and artificially-external factors. In the egg of *Fucus evanescens*, plastids and a nucleus as well a transparent part of the cytoplasm can be successively rearranged by artificial centrifugation from the centrifugal toward the centripetal end. Using such centrifuged eggs, he clearly indicated that a rhizoid was formed at a centrifugal end of the egg, suggesting that in these eggs whose polarity axes could be easily artificially changed, the orientation of the axes of the supposed molecules determining polarity could also be easily changed (1962). He also indicated that in *Fucus* eggs, polarity was not determined under uniform external conditions around the eggs because of the uniform internal state within an egg, and that, when the eggs were placed under non-uniform conditions, rhizoid formation could start. If no external conditions necessary to break such a uniform internal state is especially given, no polar axis (rhizoid axis) is originated. Once the polar axis was determined, the axis cannot be changed by any factors (1969). Based on his early experiments, Prof. Nakazawa already came to a general conclusion regarding determination of polarity in these fucoid eggs, concluding that polarity must be attributed to some structure in the cortical part of an egg cell rather than being controlled by the arrangement of the intracellular inclusions; in the *Fucus* egg the cortical layer is supposed to be labile with centrifugation, but in *Sargassum* etc. it is stable against centrifugal force (1957).*

*Similarly to the algal eggs, he also continued to research polarity in morphogenesis using spores and gametophytes of ferns, and coleoptiles and roots of higher plants. His academic interest had focused thoroughly on the physiological mechanism of determination of polarity axis in the early development in plants. Professor Nakazawa thus published numerous papers on cytodifferentiation and morphogenesis including egg development in fucoids, spore and gametophyte development of ferns, coleoptile gravitropism of *Oryza*, and root hair formation of *Gibasis*, all notable contributions to this field.*

*Concentrating on his experiments and using his wide and deep knowledge of and insight into morphogenesis not only in plants but also in animals, he published in 1965 a textbook called "Saibo-bunnka" (Shoka-bo Publishing Company, Tokyo) which in Japanese means "cytodifferentiation". This notable book was, to our knowledge, one of few books on the physiological mechanism of cytodifferentiation written by a single author. Regrettably, this book was not in international circulation because it was not translated from the Japanese. We are yet convinced that his book inspired many students in Japan to pursue this field. Afterwards this book was twice completely revised, the last revision of which*

remains in print. In the context of the biology at the end of 1950s to the 1960s, he intended in his book to forge a route from the central dogma (DNA to proteins) to morphogenesis. He has considered the polarity as an important intermediate between the central dogma and morphogenesis, and tried to resolve the chemical nature of polarity, although this goal has yet to be achieved. Through his own experiments involving histochemical vital staining, colchicine treatment, plasmolysis, etc. as well as centrifugation, he continually deepened his early idea regarding polarity to emphasize the concept that cell polarity is a non-specific property which is an initiator as well as a leading principle of morphogenesis (1989), and that the cell polarity is based on a certain structure in the cortical cytoplasm in the cell, today leading to our understanding of the importance of the orientated microtubules of the cell cortex and its interaction with cell wall in the cell polarity.

Professor Nakazawa's other important work concerned research on Johann Gregor Mendel himself and the birth of Genetics (Mendelism), which Prof. Nakazawa enthusiastically continued even after his retirement from the University. He visited Bohemia and Moravia almost 10 times to trace the Mendel's footsteps including visits to The Mendelianum Museum Moraviae Brno, The Augustinian Monastery in Brno and other places noted in connection with Mendel since he first stayed in Prague in 1972 as a visiting professor sponsored by the Ministry of Education, Culture and Sports in Japan. Professor Nakazawa participated several times in the international symposia on Mendel and genetics and was invited to the First and Second International Mendel Fora, both held in Brno (1992 and 1995, respectively) to present lectures based on his own research, which were afterwards published in *Folia Mendeliana*. Through his own research he came not only to respect Mendel, but also to love the land, climate, and people of Moravia that had fostered Mendel and Mendelism so that Prof. Nakazawa was inspired to write both the words and music for a song titled "The Mendel Platz" (1976) as one of his various hobbies (this song was broadcast all over Czechoslovakia at that time). He published several educative books on Mendel and the birth of Mendelism which were written in Japanese, and many related papers. Through his own such research, Prof. Nakazawa also educatively developed reputation of Jan Evangelista Purkyně, and introduced the works of several Czech persons who left their marks on history of the birth of Mendelism.



Professor Nakazawa served as an administrator of The Botanical Society of Japan and The Genetics Society of Japan. He also contributed as a member of their editorial boards to international journals such as *Biologia Plantarum* and *Cytologia* for many years. Especially in order to further enlighten and educate people on Mendel and Mendelism, he, together with the late Prof. Emeritus Yosito Sinoto of the International Christian University, who was a famous cytologist and fellow Mendel researcher, helped to establish The Japan Mendel Society in 1985. He then served as vice-president of the Society until 1999, and afterwards contributed as an adviser to the Society.

Professor Nakazawa published more than 340 publications including books, original papers, review articles, educative papers, miscellaneous notes, etc. He, however, suffered from poor health during his last years. We now again feel sincere regret at a loss of such a noble and enthusiastic botanist, Prof. Singo Nakazawa. As he stated himself in his book that he was the second Japanese biologist that was obsessed by the great Mendel after the first, Prof. Y. Sinoto. We would finally like to close the obituary for Prof. Nakazawa, a botanist fascinated both by polarity and Mendel, sharing his concluding remarks with which he finished his final lecture at his retirement from Yamagata University; *Ohne Polarität kein Leben !*

May Professor Nakazawa rest in peace !

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