The Fish Biology Journal MEDAKA, 5: 1–3 (1993)

Scientist, H. Uwa passed away at 53; a taxonomist of the medaka

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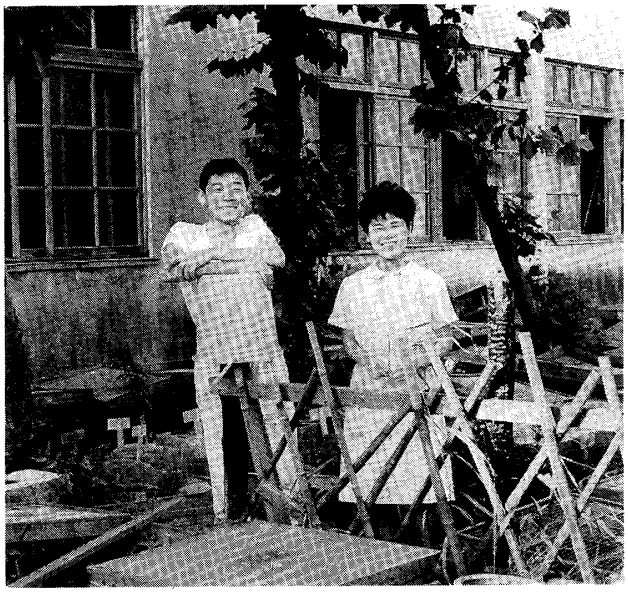
Dr. Hiroshi Uwa, a well-known scientist in the field of phylogeny who had been studying the species differentiation of the genus *Oryzias*, died shortly after noon on Saturday, 19th of June, 1993. He was 53 years old and lived in Motomachi, Matsumoto-city, Nagano Prefecture. He died of heart failure while playing tennis with his wife. In addition to his career as a scientist, he was a sportsman. He used to play tennis regularly during the noon recess, so that he could maintain the health and vitality necessary to strenuously pursue his investigations. Therefore, it is natural that no one could accept his death.

I met him first on a day in April of 1962 when he was 22 years old, if I remember rightly. He was born on January 2, 1940 in Matsuyama-city, Ehime Prefecture. He had graduated Zoology Department, Faculty of Science, Hiroshima University, and was a new masters student under Professor Toki-o Yamamoto, Nagoya University. His smile, as seen in the photograph (upper right), impressed me. At that time, I started a research project on the acquisition of fertilizability of oocytes, and this took place at night. My experiments began in the evening, ended in the morning, then I went back home every day. Therefore, I could hardly get a chance to meet him and to discuss his research with him. He might have been studying fertilization and gynogenesis using medaka eggs from 1962 to 1967. It was only when his articles were published in the journal "Embryologia" by the Japanese Society of Developmental Biologists and the Journal of Faculty of Science, Shinshu University, that I could first understand his research in detail.

He was engaged as an assistant in Faculty of Science, Shinshu University in 1967. He earned the Doctor of Science degree from Nagoya University in 1969. Thereafter, he turned his attention to the study of the mechanism for formation of papilla process on the anal fin ray of the medaka. His studies on this phenomenon continued until 1981. In 1976, he was appointed Assistant Professor. The following year, he joined me in studies to clarify the origin of the medaka. He then learned the "air dry method" for examination of fish chromosomes from Professor Yoshio Ojima, Department of Biology, Faculty of Science, Kwansei Gakuin University, from whom I had previously learned it in 1975. We then teamed with Professor Nobuo Egami (Dept. Zool., Fac, Sci., Tokyo Univ.), who had been researching reproductive physiology and developmental biology of the medaka. In 1981, the karyotype analyses began with *Oryzias javanicus*. In 1985, studies on the karyotypes of several species of the genus *Oryzias* were summarized and reported as an excellent review in journal "Iden" (in Japanese). He proposed that the species could be divided into three groups according to the chromosomal forms. Subsequently in 1987, he also co-authored with L.R. Parenti in Jap. Jour. Ichthyol., an article entitled "Morphometric and meristic variation in ricefishes", which compared these characteristics with cytogenetic data. The following year he became full professor.



Dr. H. Uwa with Dr. N. Matsuda-Ogawa (right) in summer, 1962.

In earlier years he lectured on "Embryology", "Cell Biology", "Cytogenetics" and "Morphology". Over a period of ten years, he repeatedly visited Philippines, Thailand, Singapore, China, Korea, and Indonesia and collected live medakas from the rivers, lakes and rice fields. He brought them to his laboratory and conducted cell culture

and chromosome analyses. He found a new species of the medaka which was collected in the Mekong of Thailand, and named it *O. mekongensis*. It is a small, beautiful medaka with two orange-colored lines at the ventral and dorsal margins of the caudal fin. This finding is one of his great contributions.

He recently investigated basic problems of species differentiation by analysing the nuclear types (genomes) and wrote more than 36 scientific studies. He was a member of seven professional organizations, including the Zoological Society of Japan, the Japanese Society of Developmental Biologists, the Ichthyological Society of Japan, the Chromosomal Society of Japan, the Comparative Endocrinology Society of Japan, the American Society of Ichthyologists and Herpetologists, and the Society for the Study of Evolution (USA).

A memorial medaka symposium was held on November 20, 1993 in Okinawa during the period of the 67th meeting of Zoological Society of Japan. The contents of the symposium were the results of survey of Sulawesi island under the leadership of Dr. H. Uwa. The last time I saw his smiling face of Dr. Hiroshi Uwa at Jakarta, and I see it again now in my mind.

Papers of H. Uwa

Dr. Uwa investigated on his main three subjects, i.e., (1) Development of the medaka egg, (2) Anal fin process formation of the medaka, (3) Karyotype and species differentiation.

1. 1965 Gynogenetic haploid embryos of the medaka (*Oryzias latipes*). *Embryologia*, **9**: 40-48.
2. 1967 A study on relationship between sperm penetration and egg activation in the medaka, *Oryzias latipes*. *J. Fac. Sci., Shinshu Univ.*, **2**: 87–94.
3. 1968 Hormonal inhibitions of ethisterone-induced process formation in adult females of the medaka, *Oryzias latipes*. *Embryologia*, **10**: 173–180.
4. 1969 Changes in RNA-, DNA- and protein-synthetic activity during the formation of anal-fin processes in ethisterone-treated females of *Oryzias latipes*. *Develop. Growth & Differ.*, **11**: 77–87.
5. 1971 Maintenance of capacity for formation of the horny processes of aged medaka females. (with R. Kuribayashi) *Zool. Mag.*, **80**: 170–171. (in Japanese)
6. 1971 The synthesis of collagen during the development of anal-fin processes in ethisterone-treated females of *Oryzias latipes*. *Develop. Growth & Differ.*, **13**: 119–124.
7. 1974 Ultrastructural study on the scleroblast during ethisterone-induced anal-fin process formation. *Develop. Growth & Differ.*, **16**: 41–53.
8. 1975 Capacity for formation of the horny processes of the anterior region of the anal-fin of medaka females. *Zool. Mag.*, **84**: 161–165.
9. 1976 Cell population kinetics of the scleroblast during ethisterone-induced anal-fin process formation in adult females of the medaka *Oryzias latipes*. (with T. Nagata) *Develop. Growth & Differ.*, **18**: 279–288.
10. 1980 Study on ovipositional behavior of bull frogs (*Bufo bufo formosus*) in Misuzu lake. I. Effect of soil temperature on the initiation period of ovipositional behavior. (with M. Aoyagi *et al.*) *J. Fac. Sci., Shinshu Univ.*, **12**: 65–77.
11. 1981 An estimate of ovipositional behavior of bull frogs by soil temperature. (with Y. Watanabe *et al.*) *Zool. Mag.*, **90**: 157–163.
12. Maintenance and growth of the horny processes of the medaka, *Oryzias latipes in vitro*. (with A. Iwata) *Develop. Growth & Differ.*, **23**: 245–248.
13. Karyotype and cellular DNA content of *Oryzias javanicus* (Pisces). (with A. Iwata) *CIS*, **31**: 24–26.
14. Karyotype and binding analyses of *Oryzias celebensis* (Oryziatidae, Pisces) in cultured cells. (with Y. Ojima *et al.*) *Proc. Japan Acad.*, **57**B: 95–99.
15. Detailed karyotype and banding analyses of the medaka, *Oryzias latipes*, in cultured cells. (with Y. Ojima) *Proc. Japan Acad.*, **57**B: 39–43.

16. 1982 Chromosomal study of three species of the medaka, genus *Oryzias*. (with Y. Ojima *et al.*) *Medaka*, **1**: 11.
17. Karyotype and banding analyses of the Hainan medaka, *Oryzias curvinotus* (Pisces). (with M.J. Formacion *et al.*) *CIS*, **33**: 15–17.
18. 1983 Karyotype and cellular DNA content of the Indian ricefish, *Oryzias melastigma*. (with O.P. Saxena *et al.*) *Proc. Japan Acad.* **59**B: 43–47.
19. 1984 Experiments on interspecific hybridization between *Oryzias latipes* and *Oryzias celebensis*. (with T. Iwamatsu *et al.*) *Zool. Sci.* **1**: 653–663.
20. 1985 Species and strains of the genus *Oryzias*. *Iden*, **39** (8): 6–11. (in Japanese)
21. Study of chromosomes in the medaka. *Mar. Sci.*, **17** (2): 82–88. (in Japanese)
22. Sexual dimorphism in *Oryzias melastigma* (McClelland). (with T. Iwamatsu *et al.*) *Curr. Sci.*, **54**: 754–755.
23. Cytogenetic studies on the origin and species differentiation of the Philippine medaka, *Oryzias luzonensis*. (with M.J. Formacion) *J. Fish Biol.*, **27**: 285–291.
24. 1986 Karyotype evolution and relationship of a small ricefish, *Oryzias minutillus*, from Thailand. (with W. Magtoon) *Copeia*, **1986** (2): 473–478.
25. Karyotype evolution and geographical distribution in the ricefish, genus *Oryzias* (Oryziidae). In "*Indo-Pacific Fish Biology*" (eds. T. Uyeno, R. Arai, T. Taniuchi and K. Matsuura), Indo-Pacific Fish Biology Proc. Sec. Intern. Confer., pp. 867–876. Ichtyol. Soc. Japan.
26. 1987 Growth and maintenance of ethisterone-induced anal-fin processes of a ricefish *Oryzias latipes, in vitro*. In "*Invertebrate and Fish Tissue Culture*" (eds. Y. Kuroda, Y. Kurstak and K. Maramorosch). Japan Sci. Press, Tokyo/Springer-Verlag., Berlin, pp. 203–206. (with A. Iwata)
27. 1988 Morphometric and meristic variation in ricefishes, genus *Oryzias*: A comparison with a cytogenetic data. (with L.R. Palenti) *Jap. J. Ichthyol.*, **35** (2): 159–166.
28. Karyotypes and geographical distribution of ricefishes from Yunnan, southwestern China. (with R.-F. Wang *et al.*) *Jap. J. Ichthyol.*, **35** (3): 332–340.
29. 1989 Taxonmy and distribution of the genus *Oryzias* in Yunnan, China. (with Y.-R. Chen and X.-L. Chu) *Acta Zootax. Sinica*, **14**: 239–246. (in Chinese with English Summary)
30. 1990 Effects of thyrotropin, thyroxin, and thiourea on *Hynobius nigrescens* larvae at low temperature. (with Yamashita *et al.*) *Sci. Rep. Niigata Univ., Ser. D (Biol.)*, **27**: 11–19.
31. Karyotype and evolution. In "*Biology of the Medaka*" (eds. N. Egami, K. Yamagami and A. Shima), pp. 162–182. Tokyo Univ. Press (Tokyo). (in Japanese)
32. 1991 Root of the medaka. *Anima*, No. 229, 25–27. (in Japanese)
33. 1992 Karyotype evolution and geographical distribution of the Thai-medaka, *Oryzias minutillus*, in Thailand. (with W. Magtoon *et al.*) *J. Fish Biol.*, **41**: 489–497.
34. Live specimens of ricefishes and relatives suborder Adrianichthyoidei maintained in Shinshu University: A list with karyotypic data. *Fish Biol. J. MEDAKA*, **4**: 41–44.
35. A Rice plant and the medaka. In "*Rivers, Lakes and Living Beings*" (eds. H. Hayashi, H. Uwa and T. Okino), pp. 95–112. Shinano Mainich-shinbunsha. (in Japanese)
36. 1993 Genetic differentiation of *Oryzias minutillus* in Thailand. (with K. Takata *et al.*) *Jap. J. Ichthyol.*, **39** (4): 319–327.