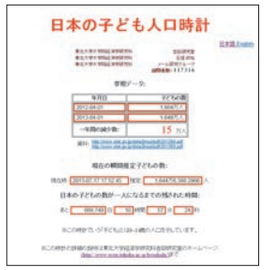
Forefront of Economics of Aging

Considering the Issues of Population Aging and Low Fertility with Economics



"Web Clock of Child Population in Japan"
'Time remaining to when the number of children in Japan will be zero' is being counted down.

"Strategies for Economics, Management and Regional Vitalization in Japanese Society by Equal Participation of Men and Women" led by Professor Yoshida as its project manager.

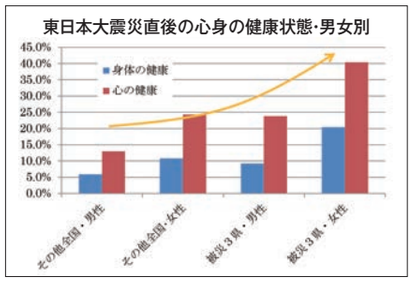
Economics of aging is a field of study and a profession that involves understanding issues such as population aging from a perspective of economics. Professor Yoshida specializes in economics of aging and he is analyzing the influence of the aging society combined with a low fertility on economics and the effect of our current society and economics on human lifestyle.

Professor Yoshida says, "The countermeasure to an aging society is to reverse the falling birthrate, and the countermeasure to the falling birthrate is the women's issue." Today's women are playing an important role that is indispensable in maintaining society, specifically, they bear and raise children and take care of elderly family members, even while many of them work outside of their homes. However, when comparing the men's and women's social activities in Japan, women's social activities are at a very low level compared to other developed countries. Professor Yoshida hopes that his research efforts will be able to support and encourage those who are promoting the equal participation of men and women in society.

Is Japan's current declining birth rate very serious? Professor Yoshida's laboratory is releasing a website called "Web Clock of Child Population in Japan" where the "Estimated number of children at the current time" is updated every second. Based on the current birth rate, the population of Japanese children up to age 14 will be "zero" in 1,800 years. Indicators using numeric numbers allow us to have a concrete image of future Japan. "As an example, one of my duties is to act like a speedometer of a car. The speedometer entreats drivers to control their speed based on the amount of gasoline left in their tank and the remaining distance to the destination," says Professor Yoshida.

He encourages students to actively attend meetings of debate and discussion with students of other seminar classes who are studying different economic policies as well as to exchange opinions at meetings with people of practical experience in society. Students are required to study both theory and practical knowledge in order to become such human resources that can manage society with warm hearts and cool heads.

It is often difficult to obtain understanding and sympathy from people when we refer to welfare and the number of children from the viewpoint of economics that is considered to be in line with profitable economic growth. However, it will be impossible to provide medical service and education to more and more people without such an approach in economics. Professor Yoshida's unique approach to economics attracts students.



A questionnaire survey was conducted to understand the health of the residents in the disaster-stricken areas. Survey results indicate that women are more stressed than men in the disaster areas.

Professor Yoshida and his seminar class students collecting and analyzing statistics data.

Professor Yoshida's seminar class is vivid and active.

Economics of Aging and Public Finance,
Graduate School of Economics and Management

Professor

Hiroshi Yoshida

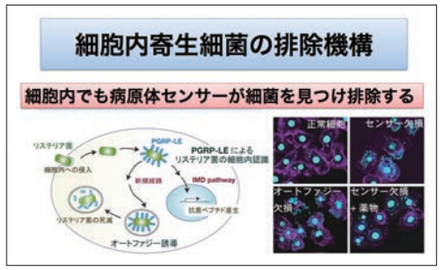
Born in 1964 in Tokyo. He graduated from Hitotsubashi University Graduate School of Economics (both master's and doctoral course). He has been specializing in the economics of aging and public finance. After serving as lecturer at Meikai University and as associate professor at Tohoku University Graduate School of Economics, Professor Yoshida has been at his present post since 2006.

http://www.bureau.tohoku.ac.jp/manabi/manabi30/mm30-2.html

Elucidation of the Immune System

World's First Identification of Drosophila melanogaster's Pathogen Recognition Sensor PGRP-LE

Fruit flies that are made to nap by CO_2 are classified into lines using genetic markers.



Conceptual diagram of the mechanism of the pathogen recognition sensor inside a cell that is working to induce the discovered bacteria to be removed.

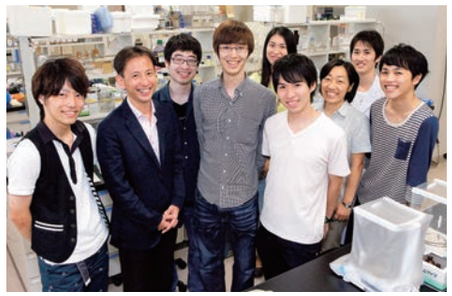
When humans get infectious diseases caused by pathogens such as virus and bacteria, they produce immunities in their bodies, and consequently subsequent infections will not be as serious or may not even cause diseases. This defense mechanism is called acquired immunity and is obtained by the development of antibodies resulting from an attack of infectious disease. Only vertebrate animals, which correspond to only 4% of all animal species, have this mechanism of acquired immunity. However, all multicellular animals have an infection preventive mechanism in their bodies. How then do these animals recognize pathogens entering their bodies and remove them? This infection preventive mechanism has not been well known before.

Professor Kurata is the first person who has identified the peptidoglycan recognition protein (PGRP)-LE which is the pathogen recognition sensor of the Drosophila melanogaster (fruit fly). Furthermore, based on the results he obtained, he elucidated the mechanism of PGRP-LE that produces antimicrobial peptides, induces autophagy and removes the bacteria that entered the cells.

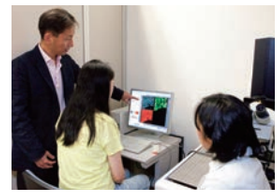
There are 13 types of PGRP in the Drosophila melanogaster and 4 types in humans. The PGRP-LE molecule interacts with gram-negative bacteria, activating the IMD pathway to the gram negative bacteria and releasing antimicrobial peptides. Professor Kurata published his results in an article in 2002, but almost at the same time a group in France discovered the PGRP-SA interacts with gram-positive bacteria. This was a discovery of two separate pathways.

The finding of the protein that recognizes the pathogen using the Drosophila melanogaster has led to elucidation of the immune system. This protein exists not only in the fruit fly but also in humans, and will be a target of pharmaceutical development. Using this achievement, diseases caused by virus will be medicated by inducing autophagy, Professor Kurata says.

Tohoku University is implementing the "Science Angels" aimed at attracting female senior high school and university students to develop an interest in science and research. Science Angels are women PhD students, and Professor Kurata is responsible for the program. The "Science Angels Program" is steadily working to foster the next generation of motivated researchers.



"Audience attending lecture meetings are likely to feel close to young researchers, so I encourage my students to take a role in academic activities."



Specimen observation is indispensable for confirming the changes progressing inside a cell.

People may think, "Why are they doing fruit fly research?" Professor Kurata is researching the immune system of multicellular organisms and the fruit fly is used as a model organism.

Molecular Genetics Laboratory,
Department of Molecular Biopharmacy and Genetics,
Life Sciences Major,
Graduate School of Pharmaceutical Sciences

Professor

Shoichiro Kurata

Born in1963 in Yamagata Prefecture. After finishing his doctoral course at the University of Tokyo Graduate School of Pharmaceutical Sciences, he was an assistant professor at the Faculty of Pharmaceutical Sciences of the same university. He studied the research method of the Drosophila melanogaster as postdoctoral fellow at the University of Basel in Switzerland from 1995-1998. Professor Kurata moved to Tohoku University Graduate School of Pharmaceutical Sciences in 1998 as associate professor and has been in his current position since 2007.

http://www.pharm.tohoku.ac.jp/~seimei/seimei_original.html