

KYUDAI

News



Topic

KYUSHU SUMMIT

-A number of prominent University Presidents gathered

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Architect Cesar Pelli discussed the New Campus Design

Research

Discovery of a Gene that Regulates High-Temperature Tolerance Plants

Letter

from a Researcher of Crested Ibis

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Architect Cesar Pelli discussed Kyushu University's New Campus Design

by **Atsushi Deguchi** : Associate Professor,
Department of Architecture and Urban Design,
Faculty of Human-Environment Studies

On the 27th of April, Mr Cesar Pelli visited Kyushu University with his partner, Mr Fred Clarke.

Born in Argentina, Mr Cesar Pelli is a world famous architect working mainly in the USA. His famous works include the Kuala Lumpur City Center, Campus Master Plan of the University of Texas at Austin, Washington DC National Airport, the American Embassy in Japan, and the Sea Hawk Hotel & Resort (Fukuoka, Japan). He is a member of the planning and design consultant organization called MCM which is working for the master planning of Kyushu University's new campus.

Pointing to the geographical scale model of the new campus site after the meeting with President Sugioka of Kyushu University, Mr. Pelli said, 'It is a very beautiful natural site, so it is my great honor to join this great project and

we have to try to integrate the natural landscape and the new buildings.

The environmental conditions of the site are tough but it must be a great

challenge for us.'

After the discussion, he had slide presentation at the Memorial Auditorium of Kyushu University entitled 'From Campus Design toward Urban Design'. Showing the drawings and pictures about his works, he talked about his unique and comprehensive desing theory created through his rich experience. This presentation was open to the public. Over 600 people participated from in Kyushu University and out. MCM and the Kyushu University campus planning team are now in the process of master planning for the new campus site.



President Dr. Sugioka(left), Mr. Pelli(center) and Assoc. Prof. Deguchi(right)



the Kuala Lumpur City Center

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PHOTO

Front : All participants in the Kyushu Summit after the discussion
Back : Stained glass, main building of the Faculty of Engineering



Autumn leaves in Hakozaki Campus



Ropponmatsu Campus
This campus will be relocated to the Motooka area

Moving to the

New Campus

① Construction Started

On the 2nd of June, construction started on Kyushu University's new campus in the Nishiward of the Fukuoka City. About 200 people gathered for the ceremony including local government officials and residents of Fukuoka prefecture, Fukuoka city, Maebaru city and Shima town, and construction companies.

In his speech President Sugioka of Kyushu University said: "About 100 years ago, Kyushu University was established in Fukuoka in compliance with the wishes of the government of Fukuoka city. Now Kyushu University is moving to this place in the west part of Fukuoka to become a new center of education and academic research once again in compliance with the earnest wishes of Fukuoka city government. Today is the starting point and I hope everything progresses smoothly." Vice-President Yada said "I am delighted that, eight years since the relocation of our campus was planned in October 1991 and after all the various stages of preparation, construction has begun at last."

On the 23rd of May, Kyushu University decided to preserve and display a scale replica of the 7th and 8th century remains which have been found on the site of the new campus.

② Promotion of an Academic Research Metropolis

On the 1st of June, the 3rd general meeting of "Kyushu University's Conference for the Promotion of an Academic Research Metropolis" was held. The Conference (President: Shigeru Ohno, the President of Kyushu-Yamaguchi Economic Federation, Main members: Wataru Aso, Governor of Fukuoka prefecture; Kotaro Yamasaki, Fukuoka city mayor; and Yoichi Sugioka, President of

Kyushu University) was organized in cooperation with the local governments of Fukuoka prefecture, Fukuoka city, Maebaru city and Shima town, and other economic parties in order to develop the new campus into an 'Academic Research Metropolis' serving as a center for the economy, technology and culture in Asia.

The plan for the Human-Science and Technology Station (HST) has been proposed by the Professor Shigeru Itoh of the Keio University (chairman of the Kyushu University's new campus committee) so that the new campus will expand to include the Hospital Campus and Chikushi Campus of Kyushu University.

After the general meeting, a symposium on the "Dream of a new campus town" was held (Coordinator: Toshifumi Yada, Vice-President of Kyushu University, Panelists:

Sadao Watanabe, Professor Emeritus of the University of Tokyo; Yoshihide Haruta, Maebaru city mayor; Takamichi Tamakawa, managing editor of the Nishinippon Newspaper Co.; Koichi Sakaguchi, Associate Professor of the Kyushu University). The panelists and the audience had an animated discussion about the expansion of the new campus.



President Dr. Sugioka (left) at the ceremony



the 3rd general meeting panel discussion

KYUSHU SUMMIT

Two themes that emerged as being of central interest to all participants were the challenges of globalization and the information revolution.

On May 13th, a number of prominent University Presidents, Vice-Presidents and Professors from all over the world gathered in Fukuoka to participate in the Kyushu University Summit. The intention of President Sugioka in playing host to such an event was to foster transnational dialogue and to encourage the development of workable strategies to the myriad challenges confronting universities as they enter the new millennium. Over the two days of the Summit, a wide range of ideas and topics were discussed, culminating in the release of the Kyushu University Declaration 2000.

The question of how best to respond to the opportunities presented by globalization was an issue that recurred throughout the two-day event. Increased internationalization poses a number of challenges to the university, not least in the provision of undergraduate education. The task of constructing an diversified, internationalized educational program, whilst at the same time maintaining the highest of standards was discussed. Particular attention was given to the importance of developing mechanisms designed to facilitate student exchange programs and the importance of language acquisition. The benefits of international cooperation in research were also stressed. Agreements of co-operation between institutions were also perceived to be of great value and all participating institutions agreed that deepening their ties was crucial. A central part of the Declaration was a commitment to endeavor to further deepen cooperative projects. Without such international cooperation, the full benefits of internationalization cannot be experienced.

As to the challenge of the information revolution, all participants agreed that the proliferation of new technologies has profound implications for every sphere of the modern universities activity, namely in research, education and management. The key role that the Internet will play in both education and research was identified as being of crucial importance. Universities will be forced to re-think how they deliver the educational experience and new tech-



nology will revolutionize the way academics perform both their research and managerial functions. It was agreed that those institutions, which grasped the opportunities offered by these new technologies would be best placed to reap the rewards.



And yet, in responding to the challenges of globalization and information revolution, it was clear from the discussion that the participants strongly believed that the university should not lose sight of its traditional role and function and that the tendency to "commercialize" higher education should be cautiously resisted. In a powerful and eloquent defense of the traditional ethos of the university, one of the keynote speakers, Professor Heldrich (Rector of Munich University), argued that although there is clearly a need for quality control mechanisms and rewards for those who excel in their academic performance, corporate management styles should not be incorporated adhoc into the university. It was suggested by Professor Heldrich that if adopted without due care and attention managerialism may very well undermine the core functions of the university. The university must continue to provide a diversified educational and research environment that encourages a well-rounded educational experience, as well as fundamental and applied research. Moreover, the university must continue to play an important role in public life, developing relationships with the local as well as the international community. The University must never lose sight of its responsibility to both society and the environment. In pursuit of these goals, maintaining a distinctive identity was seen as imperative.

The importance of these words was brought home to all attendees when on the second day of the Summit a more informal meeting was organized with the delegates and local High School students. The students raised a number of important questions many of which echoed the themes of the earlier



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discussion. In particular, students inquired about the possibility of study abroad, the structure of higher education in different countries, as well as about the various career opportunities available to them. In their advice to the students, the participants emphasized the importance of taking full advantage of the educational opportunities, whilst at the same time remembering that over the course of a life, one's career can take many unpredictable turns. For their part, the students appeared to be greatly enthused by the words of the delegates.

Although it is clear that different universities face different, local challenges, and that sensitivity to these cultural difficulties is of crucial importance, the success of the Summit illustrated the value of such an international approach. The sharing of experiences, the forging of partnerships with institutions from abroad and the formulation of common strategies were some of the many benefits of the Summit.



(List of Invited Participants)

*China

Tsinghua University

Prof. Dr. Zhicheng Guan (Vice President)

Dr. Yunzhong Jiang

(Vice Director, the Office of International Cooperation and Exchange)

*France

Universite Robert Schuman

Prof. Dr. Daniele Alexandre (Vice President)

*Germany

Ludwig Maximilians Universitat Munchen

Prof. Dr. Andreas Heldrich (Rector)

Prof. Dr. Axel Schenzle (Deputy Rector)

*Korea

Seoul National University

Prof. Dr. Jong-Chun Woo (Dean of the Graduate School)

Prof. Dr. Jong Keun Park

(Member of Advisory Committee for the President)

Pusan National University

Prof. Dr. Jae-Yoon Park (President)

Prof. Dr. Dae-Sik Lee (Professor)

*Thailand

Thammasat University

Prof. Dr. Naris Chaiyasoot (Rector)

Ms. Wanida Phankaeo (Vice Rector, General Administration)

*United Kingdom

The University of Glasgow

Prof. Sir Graeme Davies (Principal and Vice Chancellor)

Prof. Dr. Richard H. Trainor (Vice Principal)

*United States

The University of Michigan

Prof. Dr. Michael D. Kennedy (Vice Provost, International Affairs)

Prof. Dr. Steven Moore Whiting

(Director, Center for European Studies)

Discovery of a Gene that Regulates High-Temperature Tolerance in Plants

by Koh IBA : Professor,
Department of Biology, Faculty of Sciences

Climate changes on a global scale have been predicted for the 21st century as the mean air temperature rises as a result of increasing concentrations of carbon dioxide and other trace greenhouse-effect gases in the atmosphere. Since agriculture and forestry are industries that are engaged in production through the utilization of the natural environment, productivity is highly susceptible to climate changes. Consequently, there are concerns over the effects of climate changes brought about by greenhouse effects. Although considerable research has been conducted to evaluate the effects of global warming on agriculture, further efforts are thus being made to search for specific and practical approaches to enhance plants' tolerance to high-temperature environments. This report provides an introduction to a novel genetic engineering approach that we have recently developed for imparting high-temperature tolerance to plants (Murakami, et al., 2000). The technique introduced here generates an efficacy that is not transient, but rather persists during plant growth. This efficacy is achieved through the direct control of intrinsic gene expression without introducing bacterial or other extrinsic genes. From these advantages, the techniques described here have the potential to evolve into a practical technology (Sharkey, 2000).

Cloning of the *w-3* Fatty Acid Desaturase Gene

The biomembrane of plant cells contains a high content of highly unsaturated fatty acids (polyunsaturated fatty acids) referred to as trienoic fatty acids. Although the amount of trienoic fatty acids varies according to the living environment of the plant, plants with high tolerance to low temperatures, such as wheat, increase the amount of trienoic fatty acids to account for more than 80% of all fatty acids contained in the biomembrane when acclimated to low temperatures. On the other hand, some plants that thrive in deserts and other hot, dry regions demonstrate a remarkable decrease in the amount of trienoic fatty acids in high-temperature environments. On the basis of these findings, trienoic fatty acids are considered to be intimately involved in plant temperature tolerance. Trienoic fatty acids are formed from dienoic fatty acids (having two double bonds) through the activity of *w-3* fatty acid desaturase. Due to the difficulty of characterization by conventional biochemical methods, the cloning of the *w-3* fatty acid desaturase gene (*FAD*) has been performed by genetic techniques, namely by map-based cloning methods, using a mutant strain of *Arabidopsis* (Iba, et al., 1993).

Trienoic Fatty Acids and Plant Low-Temperature Tolerance

During the initial cloning of the *FAD* gene, our objective was to develop a plant exhibiting a high tolerance to low temperatures. Previous reports had speculated that increasing the degree of fatty acid unsaturation in biomembrane lipids was important in developing tolerance to low temperatures. When the *FAD* gene was expressed by *their* insertion into tobacco plants, the content of trienoic fatty acids increased in leaf, and low temperature tolerance was observed to be improved (Kodama, et al., 1994). This improvement of low temperature tolerance, however, was only observed under specific and limited conditions. For example, subjecting a wild-type tobacco plant that thrives at 25°C to low temperature treatment for 7 days at 1°C without going through an acclimation process, and subsequently returning the plant to the original temperature environment, leads to growth inhibition and chlorosis in young leaves prior to beginning development. This reaction to the exposure to low temperature was not observed in the transgenic tobacco plants carrying the *FAD* gene. Although this result suggests that trienoic fatty acids enhance tolerance to low temperatures, the effect may be limited to specific plant tissues or growth processes.

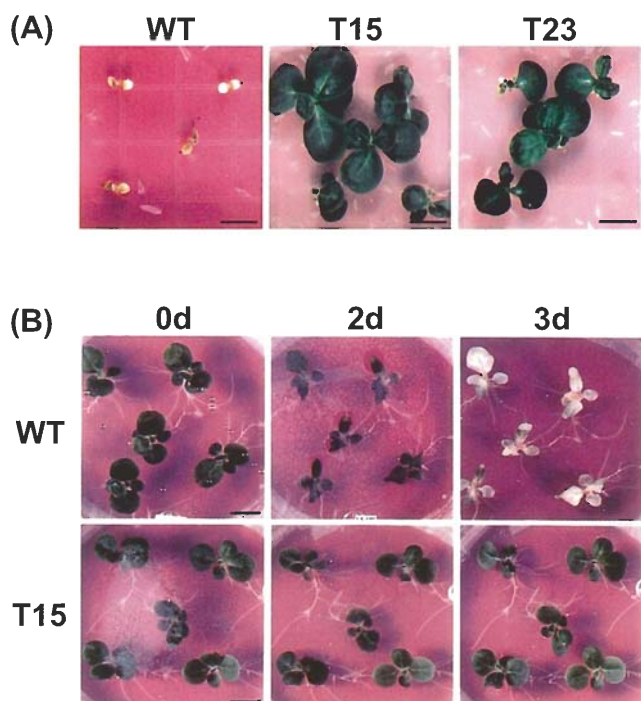
Trienoic Fatty Acids and Plant High-Temperature Tolerance

Although the increase in trienoic fatty acids did not produce as great an improvement in low-temperature tolerance as was expected, we examined the reverse concept, that a decrease in the trienoic fatty acid content of the biomembrane may increase the high-temperature tolerance of plants. In the study described above, the *FAD* gene was linked to a potent expression

promoter, such as the cauliflower mosaic virus 35S promoter, to increase the amount of enzyme produced within the plant. However, transgenic lines were found in which the expression of the intrinsic *w-3* fatty acid desaturase gene was co-suppressed by gene silencing.

The correlation between the trienoic fatty acid content of the biomembrane and the ability of the plant to tolerate high temperatures was analyzed using a transgenic tobacco line, T line, in which the activity of chloroplast-localized *w-3* fatty acid desaturase was decreased by gene silencing. Although trienoic fatty acids in the chloroplast membrane lipids of this transgenic tobacco were held to an extremely low level, the level of dienoic acids increased in a manner corresponding to the amount of decrease of trienoic fatty acids. In addition, few changes were detected in the lipid molecular species of biomembranes, other than in the chloroplast membrane.

Although there was no difference observed in growth between the transgenic tobacco plant and the wild type plant over the range of low temperatures to the normal growth temperature, at high temperatures (36°C), clear differences in growth occurred (PHOTO-A). Since growth of the T line continued to be uninhibited beyond 60 days at 36°C, the observed improvement in high-temperature tolerance has been suggested to be different from that resulting from the induction of heat shock protein. When the plants were exposed to a considerably higher temperature (47°C), the leaves of the wild type withered within 2 days, and the plant bodies exhibited chlorosis after 3 days that resulted in death. In contrast, although growth of the T line plants was inhibited, damage due to high temperature was avoided by the plant body, and, when returned to a temperature suitable for growth (25°C), the plants continued to grow (PHOTO-B). Photosynthetic activity was measured to investigate the mechanism by which the improvement in high-temperature tolerance was obtained. Although photosynthetic activity in wild-type tobacco plants at high temperatures of 40°C and above decreased considerably, the decrease in photosynthetic activity were remarkably mild in transgenic tobacco plants with decreased levels of trienoic fatty acids. When these results and the various conditions of high-temperature treatment (including factors such as temperature region and treatment time) were examined comprehensively, they suggest that a decrease in the trienoic fatty acid content of chloroplast membrane lipids improves the ability to tolerate high temperatures, regardless of interspecies physiological properties.



Future Outlook

Currently, there is considerable discussion on the topic of genetically-altered crops. For example, agricultural crops containing large amounts of the product of an extrinsic gene obtained from bacteria raise questions concerning the safety of those crops when consumed as food. In this study, plants with a high tolerance to high temperatures were able to be produced by manipulating genes common to nearly all plant species. Our results suggest the ability to develop useful plants while minimizing the risk of an accompanying gene recombination by skillfully utilizing the plant's mechanism of environmental adaptation. For example, trees distributed throughout sub-tropical and temperate regions tend to decrease the amount of trienoic fatty acids during an accompanying rise in the growth temperature. On the other hand, trees that are distributed in cold regions and are unable to adapt to growth in sub-tropical and tropical regions, lack this tendency. Although the insertion of genes into trees is considered difficult, improvement in the temperature tolerance of trees by future advances in technology are possible. In addition, damage to wheat and other agricultural crops from frequent

occurrences of heat waves caused by global warming is expanding. The findings obtained in this study will be useful in the development of agricultural crops tolerant to heat.

References:

- Iba, K., et al. (1993) *J. Biol. Chem.* 268: 24099.
Kodama, H. et al. (1994) *Plant Physiol.* 105: 605.
Murakami, Y., et al. (2000) *Science* 287: 476.
Sharkey, T.D. (2000) *Science* 287: 435.

PHOTO: Comparison of the high-temperature tolerance of wildtype tobacco and gene-silenced tobacco having decreased levels of trienoic fatty acids (T15, T23 lines) (reprinted with permission from *Science* 287, 476-479, 2000)
(A) Exposed to long-term growth at 36°C (60 days)
(B) Exposed to 47°C for 0, 2 and 3 days

Wonderful Visit to Kyushu University !!

by **Xi Yongmei** : Senior Researcher, Captive Feeding and Breeding Center for Crested Ibis, Yangxian, Shaanxi, P.R.China

Ms. Xi Yongmei visited Sado Toki (crested Ibis) Center, Niigata prefecture, in February 1999 with 2 birds which were donated by the Chinese Prime Minister, Mr. Jian Ze Ming, to the Emperor of Japan.

As some of you in Kyushu University has already known, I had a big chance to stay in Japan, Sado Toki (crested Ibis) Center, for around half a year, from February to July, 1999, in order to help the two birds, crested ibis (*Nipponia nippon*), in incubating, hatching and hand-rearing.

These two birds (male and female) were donated by the Chinese Prime Minister, Mr. Jian Ze Ming, to His Majesty the Emperor of Japan, and I was asked to escort these birds to Japan. The day we arrived at Sado was terribly bad weather with snowing, but we were very heartedly welcome by all the Japanese people.

After I arrived there, I spent almost everyday with high tension due to my heavy duty as a specialist for crested ibis in China. Even so, I was very happy to have many good coworkers at Sado Toki Center until the end of my stay there.



Captive Feeding and Breeding Center for Crested Ibis, Yangxian, Shaanxi, P.R.China

Some big difference in food, life style, thinking of people and many other related things was so heavy for me to live and work in Japan, but most of them were removed from me since all the people in Sado or Niigata prefecture or everywhere in Japan were so kind to me at any time and at any place wherever I go or stay. The famous proverb "Better pass a danger once, than be

always in fear", became true when I was in this country.

This is the second time for me to visit Japan, but the former visiting was very short period for stay, so that not so many things reminded in my mind. At that time, I was too young to remember or consider everything in Japan, leaving only some good experience in Tokyo and nearby.

On the contrary, this time was enough to look around and/or compare something between our two countries during my stay in Sado, though this island belongs to a part of very rural country side in this country.

Anyhow, I had a wonderfu stay in Sado, besides very hard work for the crested ibis. Even so, I think this country gave me a lot of unforgettable things other than the birds.

In addition, most wonderful time finally came to me, when I received a letter from Professor Noboru Fujihara, the President of Japan Poultry Science Association, who invited me to his university to deliver my small lecture regarding the "Living with endangered wild birds, the crested ibis in China".

Fortunately, that was just after the birth of Sado-Toki 2nd generation, named "yu yu", around the end of June, 1999, just before my leaving Japan for my country. At the same time, I was completely free for doing everything, especially released from everything about the crested ibis in Sado-Toki Center.

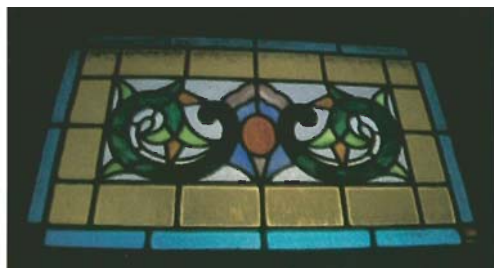
More happily, I could spend some wonderful days in Fukuoka, Kyushu University, together with some of Professor Fujihara's graduate students, visiting many places famous for their history in Japan. Some time, I had a good time to talk with some of students in Professor Fujihara's laboratory, focusing on the topic of extinct and/or endangered wild animals, including some kind of wild mammals just like giant pandas and some others.

Although the period I stayed in Kyushu University was only a couple of days, I imagined myself to study there as a graduate student in the very near future if possible, since this university has been reportedly one of the most historical and famous university in Japan. To my great surprising, Professor Fujihara has started cooperative research works with "Giant Pandas" and "Crested Ibis" between China and Japan from this year. In this respect, his final goal is to organize a wonderful facility which will be named "Research Center for Reproduction of Extinct and/or Endangered Wild Animals in Asia" on his campus in the future.

Hoping the possibility of my study in Kyushu University in the very near future, and wishing this university much more success and prosperity.



Ms. Xi Yongmei (front right) with Prof. Fujihara (front left) and students at his laboratory



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The Committee of Public Relations

Kyushu University

6-10-1 Hakozaki, Higashi-ku

Fukuoka, Japan 812-8581

E-mail: koho@jimu.kyushu-u.ac.jp

URL: <http://www.kyushu-u.ac.jp>

KYUDAI: Kyushu University is affectionately called "Kyudai". Kyu is from Kyushu, Dai is from Daigaku, the Japanese word for University.