Ⅱ. INTERNATIONAL ACTIVITIES

International Academic Exchange and Cooperation of the Faculty of Agriculture, Kyoto University

Collaboration with Foreign Guest Professors

Collaboration with foreign guest professors during April, 2005 and March, 2006 is shown in Table 1. The collaboration reports written by guest professors were attached at the end of this section.

International Cooperation and Overseas Activities

In recent years, international cooperation and overseas activities are actively carried out and many professors and students make research works abroad with many visiting foreign researchers. Please refer to "A-4. International cooperation and overseas activities" in each laboratory in "III. Research and educational activities" for the detail.

International student exchange program

We cooperated to organize one of the subjects of liberal arts education, "International Exchange Program", in which first or second grade students in various faculties are dispatched to a foreign country for about 2 weeks and experience student exchange activities. We supported one of the subjects, "Transfiguring Southeast Asia –Environment, Life activity and Society–". In this year, 13 students, including 5 from Faculty of Agriculture, participated in this program and were dispatched to Thailand (host university: Kasetsart University). Next year, we will accept students from Kasetsart University in this program.

International Office and its activities in 2005

The International Office was established in June 1985 as an office to handle wide-ranged issues related to foreign students and research fellows at the Faculty. The number of foreign students by country in 2005 is shown in Table 2.

Major activities of the Office besides its regular tasks are as follows.:

a) Orientation and welcome party

On the 8th of April the orientation and acquaintance session was held for newly enrolled foreign students. Associate Professor Nawata, a member of the University Committee for International Academic Exchange, administrative staff of the Faculty, and an executive of the Kyoto University Cooperative gave guidance to the new comers on various aspects of the campus life. A welcome party was held thereafter at the Main Council Room of the Faculty, in which about 100 students and staff participated.

b) One-day study bus tour

The one-day study bus tour was organized using the school bus of Kyoto University. We visited Instant ramen museum on May 19th. This year we also had an autumn bus tour. We visit Kayabuki-no-sato in Nantan city, Kyoto prefecture on October 20th. About 30 students participated and studied Japanese rural life.

c) Summer study trip

The study trip was organized to visit Ishikawa Prefecture on July 25 - 27. Total 26 students and staffs participated in this trip. We visited Kenroku-park, Buke-yashiki and Noto peninsula. Students were interested in beautiful rice fields and a country life. Unfortunately, The scheduled

salt making cannot have been done because of the rainy weather. We stayed at Noto National Youth House and there we communicated with elementary school and junior high school students who stayed at the House.

d) Newsletter

Since 1988 the office has been publishing the newsletter biannually. This year, the 35th and 36th issues were published in May and October. In addition, as the memory of 10th anniversary for starting the visiting research scholars (guest professors), we published the special 37th issue. About 3,000 copies each were delivered to all the students and staffs of the Faculty, visiting research scholars, foreign alumni residing in different countries (see Table 3), the members of the Supporters' Association for International Academic Exchange of the Faculty of Agriculture, and various Faculties, institutes, centers and other offices in the campus.

e) Newspapers, periodicals and books purchased

Three newspapers (one English, one Chinese and one Korean) and several periodicals (three in foreign language and 20 in Japanese) are subscribed. This year we purchased a lot of books for foreign students by a special budget, and some of them (concerning sightseeing, Japanese culture and Japanese language) were set in the International Office in Agriculture. The other books were set in the library, Faculty of Agriculture.

f) Japanese language class

The Japanese language class (beginner's, intermediate and advanced courses) was started in April, 1996. About 30 foreign students and researchers attended the class this year.

g) World cooking class

Since 2004 the office has held World cooking class once a month except holiday seasons. This year we had 8 cooking classes; Ghana (April 22nd), Brazil (May 27th), Spain (July 1st), Korea (Sept. 3), Argentine (October 21st), Turkey (Dec. 2nd), Mexico (Jan. 20th), Italy (Feb 17th). About 20 – 30 researchers and students participated in each class. They enjoyed tasting of each country food.

h) Pre-counseling room

We started a pre-counseling room once a week from October, 2002. The object of our pre-counseling room is to release pressures of foreign students and to reduce their loneliness before they have serious problems. We were consulted about some problems for studying and Japanese daily life of foreign students.

i) Football game & Barbecue party

We had 4th World friendly Football game & Barbecue Party on July 16th. About 60 students and researchers enjoyed playing football. This year the Asian selective team got a trophy. After football games we had a Barbecue party and foreign and Japanese students enjoyed the party with together.

j) Correspondence to inquiries

The Office answered to a number of inquiries for admission from different countries.

Membership of the Supporters' Association for International Academic Exchange

International Academic Exchange of the Faculty of Agriculture comprises both academic and administrative staffs of the Faculty. The membership of the Association was renewed in July of this year. There are 129 individuals in the membership list at the end of December. The activities of International Office are partially supported by the fund. A part of purchase of foreign newspapers and journals for the saloon is also made by this fund.

Table 1　Collaboration with Foreign Guest Professors

Name	Nationality	Affiliation	Research Title
Manuel M. Mota	Portugal	University of Évora	Studies on the manner of the Pine Wilt Spread
Andreas Huben	Germany	Institute of Plant Genetics and Crop Plant Research (IPK)	Analysis of the structure of the functional centromere of barley chromosomes
Jonathan Laronne	Israel	Ben Gurion University of the Negev	Study on sediment yield and discharge with monitoring data
Pradaya Somboon	Thailand	Chiang Mai University	Ecological studies on the insect/mite vectors of emerging infections diseases in agro- and urban environments
Andrei Shutov	Moldova	State University of Moldova	Studies on molecular evolution of seed storage proteins
Muhammad A. Arshad	Canada	University of Alberta	Studies on land ecosystem management for sustainable rural development

Table 2 Number of foreign students by country (2005)

Country	UG	MC	DC	OT	ST	Country	UG	MC	DC	OT	ST
Argentina		1		1	2	Korea	2	2	13		17
Bangladesh		1	4		5	Kyrgyzstan			1		1
Bhutan		1			1	Laos			1		1
Brazil			3		3	Malaysia			2		2
Cambodia			1		1	Mexico			1		1
Canada		1			1	Myanmar				1	1
China	9	13	19	5	46	Nepal		2			2
Colombia			1		1	New Zealand			1		1
France				1	1	Nigeria		1			1
Ghana			1		1	Peru				1	1
Honduras			2		2	Sudan			1		1
India			1		1	Taiwan		1	1	1	3
Indonesia			9		9	Thailand		1	4		5
Iran			1		1	U.S.A.			1		1
Kenya			1		1	Vietnam		1			1
						Total	11	25	69	10	115

Note) UG:Undergraduate, MC:Master Course, DC:Doctor Course, OT:Others, ST:Sub-total

Table 3 Number of foreign alumni by country of residence

Bangladesh	6	Japan	21	Poland	1
Belgium	1	Kenya	2	Spain	1
Brazil	6	Korea	56	Sri Lanka	6
Bulgaria	3	Laos	1	Switzerland	2
Canada	1	Malaysia	3	Taiwan	18
Chili	3	Mexico	4	Tanzania	4
China	37	Myanmar	6	Thailand	52
Egypt	4	Nepal	2	Turkey	3
France	2	Netherlands	2	U.S.A.	13
Germany	1	New Zealand	1	Vietnam	2
Ghana	1	Pakistan	1	Yugoslavia	1
India	4	Paraguay	1	Zaire	1
Indonesia	47	Peru	1		
Iran	2	Philippines	9		
				Total	332

Report of a visiting professorship stay in Japan

By *Manuel Galvão de Melo e Mota, PhD*
Lab. Environmental Mycoscience, Kyoto University, Kyoto, JAPAN
NemaLab-ICAM, Dept. de Biologia, Universidade de Évora, 7002-554 Évora, PORTUGAL
mmota@uevora

Invited Period: June 15, 2005 – September 14, 2005

Div. of Environmental Science and Technology, Lab. of Environmental Mycoscience
(Host Professor: Prof. **Kazuyoshi Futai**)

Foreword : I would like to humbly thank Professor Kazuyoshi Futai and the College of Agriculture for providing this opportunity to travel to Japan and with my work, make a significant contribution not only to Science, but also to the understanding between the people of Japan and the people of Portugal, which represent 2 major cultures one from the East and one from the West.

This report should be read consulting the image file that follows, to better understand the progress of the activities.

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Background : In May 2004, during the International Plant Protection Congress (IPPC), in Beijing, PR China, I was honored with an invitation by my colleague Prof. Kazuyoshi Futai Dept. Environmental Mycoscience, College of Agriculture, Kyoto University, to teach and do joint research in his institution in 2005. It was, in fact, a "pre-invitation", since the proposal would be later submitted to the College, for approval.

Prof. Futai had participated in 2001, in Évora, in an international workshop on pinewood nematode, organized by our Nema Lab (http://www.dbio.uevora.pt/nema/), and where there had been opportunity to exchange scientific ideas and think about future cooperation. The results of that workshop have been recently published (www.brill.nl/m catalogue sub6 id21507.htm).

The proposal for Visiting Associate professor was approved early in 2005, and the result communicated to me by Prof. Tsuyoshi Takahashi, Dean of the Graduate School of Agriculture, Kyoto University on February 10, 2005. The June 15 to September 15 period was agreed.

Objectives : Two main objectives were established and agreed upon:
(a) A series of 13 lectures on General Nematology, for graduate students;
(b) Joint research on the theme "Study on the manner of the pine wilt spread"

Naturally, and although not explicited, other secondary objectives were inherent to this visit, namely the research on Japanese scientific bibliography, often difficult to access in the West, institutional contacts and the establishment of a strong and fruitful network of cooperation, useful for future activities; and also several talks given in various Japanese institutions.

Activities :

(1) Teaching: As mentioned, I produced a series of 13 lectures on General Nematology to a class of approximately 20 graduate students from various countries such as Japan, Indonesia, Brazil, Sri Lanka and Vietnam. Although no practical lab sections were anticipated, I did provide guidance to various ongoing research theses (MSc and PhD) by the students, discussing some of the lab and field work and making recommendations, when appropriate. The field trips with students provided me with a good insight on the major forestry problems around Kyoto. Several student manuscripts were also submitted for my review, for better preparation before submission to journals. The lecturing itself was a combination of classical lecture presentation (with PowerPoint) with the exploration of several other media such as CD-ROMs and internet, on appropriate web sites related to the subject of the day. The class material was made available to the students using a specific web site for file transfer. Besides the time in class, I made a point of making myself available in my office whenever the students needed my help.

This provided for an excellent interaction, and also to better understand the Japanese educational system. I gathered the impression that this style of teaching was well received by the students.

(2) Research: Portugal and Japan share a common problem, caused by the presence of the pinewood nematode, *Bursaphelenchus xylophilus*, which is the causative agent of "pine wilt disease", a serious pathogen and pest of forest ecosystems, affecting timber production worldwide; it has been particularly serious in Japan throughout the XXth century, and has been recently detected in Portugal (and the EU territory) in 1999 (Mota et al., 1999. *Nematology* 1: 727-734). During my stay, we have conducted a series of experiments, comparing Japanese (S-10 e C14-5) and Portuguese (T e HF) isolates of *B. xylophilus*. Essentially, we looked at: (a) comparative pathogenity of the 4 isolates to *Pinus densiflora* ("Japanese red pine"); (b) comparative cytogenetics and developmental biology; and (c) molecular biology (sequencing of the ITS 1 and ITS 2 (rDNA) regions. The results, in the form of scientific papers, have been submitted to 2 major nematological journals - (a) Hasegawa, K. , M. M. **Mota**, K. Futai , and J. Miwa. 2006. Chromosome structure and behavior in *Bursaphelenchus xylophilus (Nematoda: Parasitaphelenchidae)* germ cells and early embryo (*accepted, in press, Nematology*). (b) **Mota**, M., S. Takemoto, Y. Takeuchi, Y. Hara and K. Futai. 2006. Comparative studies between Portuguese and Japanese isolates of the pinewood nematode, *Bursaphelenchus xylophilus* (*submitted, Journal of Nematology*).

(3) Conferences and institutional contacts: several scientific institutions and Japanese colleagues were contacted during this 3-month period. The attached pdf file better illustrates this fact. There were 2 sites where I have produced, by invitation, scientific conferences on pine wilt disease in Europe (besides a "special guest lecture" given at Kyoto University, and entitled "*C. elegans: biological model for the XXIth century*"): firstly, in July, at the Forestry and Forest Products Research Institute (FFPRI) in Tsukuba, and later in September, in the city of Saga, at the annual meeting of the Japanese Society of Nematologists.

(4) Other activities: Kyoto University is very rich from the point of view of physical and human resources, Among this richness, I was able to recognize and search its library, where I collected copies of approximately 400 research papers on pine wilt disease research in Japan. I must kindly thank Prof. Futai and the College of Agriculture for all the support provided to this task which will enrich our own bibliography, but also, and since these papers will be scanned to pdf format, provide an easy way for researchers to access information on this very important subject. In Tokyo, I made a point of contacting our Embassy, and meet the cultural affairs officer, Dr. Paula Ferreira dos Santos, a specialist in the history of Portugal in the Far East. She provided me with useful guidance on Japanese culture and offered me some valuable books. I was also able to explain to her the objectives of my stay in Kyoto and provide her and the Embassy with some general information on pine wilt disease. In Kyoto, during one of my talks, I also made a general presentation of Portugal, its culture and people. Details on our university (founded by the Jesuits in 1559) were also provided.

Conclusion : This was a very productive stay from both points of view, ie, Research and Teaching. Apart from the work at the university, I also had the opportunity to learn about another culture, interact with students, both scientifically and socially, but also explain to them a bit of our way of life in Portugal. I believe ties have been established between our 2 universities and countries. Portugal and Japan have a special relationship since three of our seamen first arrived in "Cipango" in 1571, the first Europeans to reach Japan, and to leave a diverse heritage, from guns, clothing, etc… to language (500 Japanese terms come from Portuguese). A clear progress was made.

Future perspectives ; Kyoto University has declared its interest in reinforcing the scientific and cultural ties with Portugal, and specifically with the University of Évora. I have already passed on this manifestation of interest to our university officials. A new President (and staff) are now at the head of our institution and I am certain that very soon an official protocol will be established, so that researchers, professors and students may travel from one country to the other, exchanging knowledge and experience in many areas such as Art, History, Agricultural Sciences and Engineering. In July 10-14, 2006, a major international meeting on pine wilt disease will take place in Lisbon, at the Gulbenkian Foundation (www.nemalab.uevora.pt); I now have confirmation that several Japanese colleagues and students will participate, mostly, of course, for scientific

reasons, but I also believe that many will be curious and interested in visiting this very different country. We welcome all with open arms! Portugal and Japan have a long common history, highly significant. It is my sincere belief that the XXIth century, with its enormous challenges, will be a time of increased opportunities, through very rapid media such as the internet, so that we here in Europe should not forget the country of the rising sun!

Évora April 13, 2006.

Analysis of the structure of the functional centromere of barley chromosome

By: Andreas Houben
(Institute of Plant Genetics and Crop Plant Reseasrch (IPK), Germany
Invited Period: September 20, 2005 – January 5, 2006
Div. of Applied Biosciences, Lab. of Plant Genetics
(Host Professor: Prof. **Takashi Endo**)

Topic: Characterization of barley centromeres
Based on in situ hybridization of the genomic barley clone BAC7 it has been postulated previously that barley centromeres contain the Ty3/gypsy-like retroelement *cereba* (centromeric retroelement in barley) and G+C-rich satellite sequences. Similar sequences representing parts of Ty3/gypsy-like retroelements were found in centromeres of a number of cereals and even in Beta species, while the G+C-rich satellite seems to be species specific.
Whereas there are no universally conserved DNA sequences associated with centromere function, kinetochore proteins are highly conserved. Data from several organisms indicate that CENH3 replaces histone H3 on active centromeres and is required to recruit other key kinetochore proteins. A selective interaction between centromeric sequences and CENH3 has been demonstrated for rice, maize, sugarcane, and Arabidopsis.

The aim of my work was (i) to prove whether *cereba* and the G+C-rich satellite interact with the kinetochore protein CENH3 and therefore sequences involved in the formation of functional centromeres in barley and (ii) to characterize the chromatin composition/structure of the barely centromere.

CENH3 is present at kinetochores throughout the cell cycle and occupies a distinct metaphase structure
Since anti-rice CENH3 antibody has been noted to widely cross-react with CENH3s of Gramineae species, this antibody was used to detect CENH3 in barley. Immunostaining resulted in a centromere-specific labeling throughout the mitotic cell cycle. At meta-anaphase, a close localization was observed between microtubule- and CENH3-signals. To obtain at the sub-chromosomal level a detail localization of CENH3 high-resolution, immuno-scanning electron microscopy studies were performed in collaboration with E. Schroeder-Reiter (Germany). The analyses revealed that CENH3 colocalizes with parallel chromatin fibrils in the core of mitotic metaphase centromeres. Notably, only few histone H3-specific signals were found in this region, indicating a centromere-specific replacement of histone H3 by CENH3 over the entire length of the core centromere.

CENH3 interacts and colocalizes with *cereba* and (AGGGAG)n-repeat
We conducted chromatin immunoprecipitation (ChIP) experiments using an antibody against CENH3 in the laboratory of K. Nagaki and M. Murata (Okayama University). Data from independent experiments showed that, *cereba* and (AGGGAG)n-repeat interact with CENH3. As negative controls, we used the subtelomeric (HvT01) repeats and the ITS1-5.8S-ITS2 region of the 45S rDNA of barley. Both types of repeats are appropriate controls because they are tandemly arrayed, highly abundant and are not found at centromeres. The association of the (AGGGAG)n repeat with CENH3 was also visualized by sequential detection of CENH3 and the (AGGGAG)n repeat on nuclei. At interphase, anti-CENH3 signals always colocalized with the (AGGGAG)n-repeat sequence, but did no encompass all the area covered by the centromeric repeats. To ascertain the localization of CENH3 a sequential detection of CENH3 and (AGGGAG)n-repeats was performed on stretched chromatin fiber preparation. A nearly perfect overlap of CENH3 and (AGGGAG)n-repeats was found. However, we frequently observed fiber-FISH signals that spanned regions not covered by anti-CENH3 signals. Rarely chromatin that was stained by CENH3 antibodies revealed no in situ hybridization signal. The observation that the (AGGGAG)n-repeat were not fully covered with CENH3 suggests that the CENH3 protein binds only part of the (AGGGAG)n-repeats. These results provide evidence that the conserved *cereba* elements together with barley-specific G+C-rich satellite sequences are associated with

kinetochore formation of wild-type centromeres in barley. These findings bolster the view that centromeric-retrotansposons are key elements of grass centromeres. To characterize centromeric sequences of the centromere-truncated chromosome 7Hs** microdissection/cloning experiments were performed. The chromosome segment specific DNA library obtained will be used for the characterisation of a functional neocentromere in future experiments.

Pericentromeric histone H3 undergoes cell-cycle dependent modification

Immunostaining revealed that somatic pericentromeres are marked by a number of post-translations histone H3 modifications such as phosphorylation of histone H3 at positions serine 10, 28 and simultaneous phosphorylation and acetylation at serine 10 and lysine 14, respectively.

Acknowledgments

I would like to thank the Kyoto University for the financial support and T. Endo and S. Nasuda for inviting me and their helpful participation in this work.