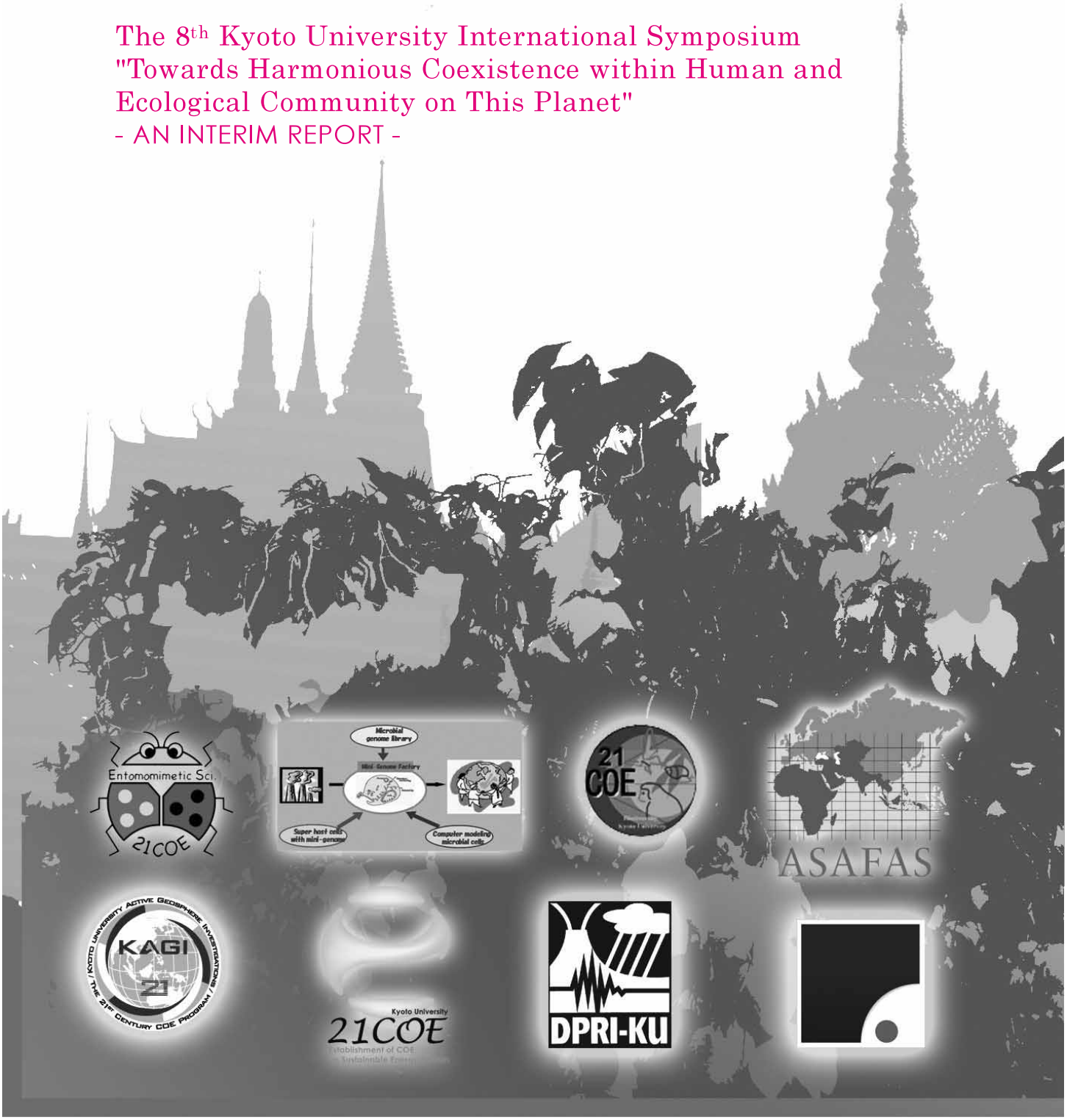
第８回京都大学国際シンポジウム
「地球社会の調和ある共存にむけて」
－ 中間報告書 －

The 8th Kyoto University International Symposium "Towards Harmonious Coexistence within Human and Ecological Community on This Planet"
- AN INTERIM REPORT -



京都大学国際交流推進機構
The Organization for the Promotion of International Relations, Kyoto University

KYOTO UNIVERSITY MISSION STATEMENT

KYOTO UNIVERSITY STATES ITS MISSION TO SUSTAIN AND DEVELOP ITS HISTORICAL COMMITMENT TO ACADEMIC FREEDOM AND TO PURSUE HARMONIOUS COEXISTENCE WITHIN HUMAN AND ECOLOGICAL COMMUNITY ON THIS PLANET.

RESEARCH

1. KYOTO UNIVERSITY WILL GENERATE WORLD-CLASS KNOWLEDGE THROUGH FREEDOM AND AUTONOMY IN RESEARCH THAT CONFORMS WITH HIGH ETHICAL STANDARDS.

2. AS A UNIVERSITY THAT COMPREHENDS MANY GRADUATE SCHOOLS, FACULTIES, RESEARCH INSTITUTES AND CENTRES, KYOTO UNIVERSITY WILL STRIVE FOR DIVERSE DEVELOPMENT IN PURE AND APPLIED RESEARCH IN THE HUMANITIES, SCIENCES AND TECHNOLOGY, WHILE SEEKING TO INTEGRATE THESE VARIOUS PERSPECTIVES.

EDUCATION

3. WITHIN ITS BROAD AND VARIED EDUCATIONAL STRUCTURE, KYOTO UNIVERSITY WILL TRANSMIT HIGH-QUALITY KNOWLEDGE AND PROMOTE INDEPENDENT AND INTERACTIVE LEARNING.

4. KYOTO UNIVERSITY WILL EDUCATE OUTSTANDING AND HUMANE RESEARCHERS AND SPECIALISTS, WHO WILL CONTRIBUTE RESPONSIBLY TO THE WORLD'S HUMAN AND ECOLOGICAL COMMUNITY.

RELATIONSHIP WITH SOCIETY

5. AS A UNIVERSITY COMMITTED TO A BROAD SOCIAL ENGAGEMENT, KYOTO UNIVERSITY WILL ENCOURAGE COOPERATION WITH LOCAL AND NATIONAL SOCIETY, AND WILL DISSEMINATE KNOWLEDGE INFORMED BY THE IDEALS OF FREEDOM AND PEACEFUL COEXISTENCE.

6. AS AN INTERNATIONAL INSTITUTION, KYOTO UNIVERSITY WILL PROMOTE FOREIGN ACADEMIC EXCHANGE AND THEREBY STRIVE TO CONTRIBUTE TO THE WELL-BEING OF THE WORLD.

ADMINISTRATION

7. IN ORDER TO ENHANCE THE FREE DEVELOPMENT OF LEARNING, KYOTO UNIVERSITY WILL PAY DUE RESPECT TO THE ADMINISTRATIVE INDEPENDENCE OF EACH OF ITS COMPONENT INSTITUTIONS, WHILE PROMOTING COOPERATION AMONG THEM.

8. KYOTO UNIVERSITY WILL CONDUCT ITS ADMINISTRATION WITH REGARD FOR THE ENVIRONMENT AND RESPECT FOR HUMAN RIGHTS AND WILL BE ACCOUNTABLE TO SOCIETY AT LARGE.

第８回京都大学国際シンポジウム
「地球社会の調和ある共存にむけて」
- 中間報告書 -

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京都大学
国際交流推進機構
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Kyoto University

はじめに

ここに、「第８回京都大学国際シンポジウム ― 地球社会の調和ある共存に向けて ― 」の中間報告書を刊行いたします。一連の＜京都大学国際シンポジウム＞は、平成 12/ 2000 年度以来の、大学を挙げての催しですが、当初は学内募集で選ばれた研究組織に企画が一任されるかたちで、国際交流委員会がその内容にかかわることはなかったと記憶します。大きな変化が見られたのは、第 3 回の「21 世紀のポスト化石エネルギー」（2002 年 9 月モントリオール開催）の準備がはじまったころでした。当時の国際交流委員会企画小委員会と担当のエネルギー科学研究科とのあいだに対話の機会が持たれ、いかにして、その催しを単なる国際学会にとどまらせず、京都大学の学術の質と個性をより広く伝えるものにするかが論じられました。この方法はその後、平成 17/ 2004 年の「国立大学法人 京都大学」の発足と翌年の国際交流推進機構の設置により、さらに強く意識されるにいたりました。今回はとくに関連研究組織が多数であったことから、多くの準備会合がもたれ、とりわけ 2006 年秋には、万里小路通近衛上ルの三才学林で、専門外にも通じうる表現をこころがけようと深夜におよぶ議論が重ねられました。

この報告書は、京都でのこのような準備を経てバンコクで実施されたシンポジウムのあらましを、できるかぎり学内外に広め、今後の国際交流事業の基礎にしたいとの思いから編集いたしました。「中間報告」と銘打っておりますのは、シンポジウムの成果は、すぐ目に立つものに限らず、長期にわたりさまざまなかたちで生まれてくると考えるからです。もちろん、それぞれの発表者は、開催時にシンポジウム組織委員会が発行した「英文アブストラクト集」（表題は本シンポジウムと同名、全 125 ページ、国際交流推進機構ウェブサイト同時掲載）に示された内容をさらに充実させて各専門分野の学術誌に公表することになりましょう。したがいまして、この冊子では、全体の概要、開会式に諸大学代表から寄せられた本学および当シンポジウムへの思い、そして総合討論での壇上と会場双方からの発言を掲載するにとどめました。作成にあたっては、まず国際交流推進機構が原稿を準備し、発言内容のすべてにつき、各発言者自身の補訂をうけました。申すまでもなく、全体にわたっての文責は当機構にあります。

シンポジウム開催にあたりまして、ご高配をいただきました本学の　尾池和夫総長はじめ役員各位、来賓各位、すべての口頭発表者、ポスター発表者、討論参加者、京都大学東南アジア研究所バンコク連絡事務所、財政支援をたまわりました　財団法人 京都大学教育研究振興財団、そして事務担当の本学国際部国際交流課の皆様に、敬意と謝意を表します。

京都大学副学長・国際交流推進機構長
横山俊夫

Preface

It is my pleasure to issue an interim report of the 8th Kyoto University International Symposium, "Towards Harmonious Coexistence within Human and Ecological Community on This Planet", held in Bangkok from 23rd to 25th November 2006.

The theme was, as I remarked when opening the symposium, a brave one. Notwithstanding, the participants proved bold enough to face the complexity of the theme. This report contains an overview of the symposium, the opening speeches, and the opinions expressed at the panel discussion, the final stage of the programme; as such, it is an interim report to precede the publication, in various academic journals, of substantial papers based on the presentations given at the symposium. The lively words recorded in this booklet are, however, not likely to be reproduced elsewhere in the same form as they appear here. It is, therefore, my hope that these words will refresh the memories of the symposium's participants even as they stimulate the imagination and thoughts of any readers who may not have been able to participate in the symposium itself.

I should like to express my gratitude to President Kazuo Oike and the members of the Governing Board of Kyoto University for their kind support of the symposium. Thanks are due also to all the honourable guests and participants of the symposium, as well as the Bangkok Office of the Center for Southeast Asian Studies, Kyoto University. In addition, I express renewed admiration and thanks to the Kyoto University Foundation Inc., for generous financial support, and the staff of the International Affairs Division, Kyoto University for efficiently taking care of all administrative matters relating to the symposium.

Toshio Yokoyama
Vice-President
Kyoto University

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Invitation

The twenty-first century has dawned to fears that human life will soon be threatened on a global scale if pressure on the earth's limited resources continues to increase. In 2001, Kyoto University pledged itself to the pursuit of 'harmonious coexistence within human and ecological community on this planet'. The pertinence of this mission statement should lend meaning to this symposium's proceedings: it is more than ever vital that Asia's academics pool essential knowledge common to the region and search for feasible policies and actions that can be shared across national boundaries.

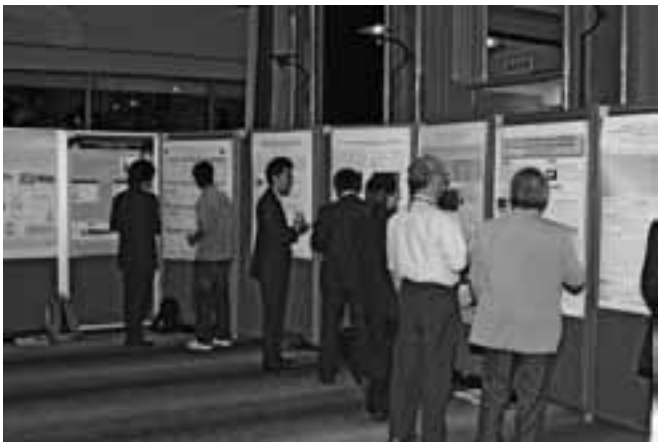
At this critical juncture in human history, Kyoto University's seven Centers of Excellence (COEs) jointly organize this symposium as a first step to integrate their activities in accordance with the university's mission statement. All speakers are committed to sharing their most recent discoveries in the pure natural sciences, state-of-the-art technologies and social sciences in the interests of furthering cooperation with Kyoto University's partners in Asia. Topics will include issues on natural disaster, bio-diversity, energy, food, and urban environment. In line with the mission statement, discussions will be guided by one of two general themes: 1) the search for a more sustainable mode of coexistence between nature and humans; or 2) a reappraisal of the relationship between humans and their 'man-made' environment.

One year ago, at this same venue in Bangkok, Kyoto University held a symposium on "Coexistence with Nature in a 'Glocalizing' World". The symposium provided a forum for the discussion of field studies carried out across Asia and Africa. This year's symposium builds on last year's attainments by promoting as a common goal a more civilized and sustainable role for science and technology within the human and ecological community in Asia.

Kazuo Oike
President
Kyoto University

Opening Ceremony

Executive Vice-President Hiroshi Matsumoto



Poster Session

Reception Desk

The symposium in progress

Banquet

Panel Discussion

Closing Ceremony

1. 概要

「京都大学国際シンポジウム」は、2000 年度以来の大学をあげての事業ですが、このたびその第 8 回が開催されました。今回の趣旨は、本学の基本理念である「地球社会の調和ある共存への貢献」を正面に据え、それへの実質的な学際共同の第一歩を踏みだそうとするものでした。期日は平成 18/ 2006 年 11 月 23 日から 25 日まで、場所はタイ国バンコクのワイヤレス路にあるホテル・ナイラート・パークでした。「地球社会」という、人間界と自然界を包みこんだ全体をひとつのものとしてとらえ直し、その輝きある安定にむけてどのような学術貢献ができるのかをめぐり、英語を共通言語に、熱い対話が進展しました。

本学より派遣の 69 名の研究者、学生のほか、本学以外の研究機関の共同研究者、学生が 79 名、総数 148 名が出席しました。日本以外からの出席者の出身国は、58 名をかぞえたタイを筆頭に、マレーシア、カンボジア、インドネシア、バングラデシュ、インド、イランのほか、オーストラリア、アメリカ合衆国、イギリスなどでした。

企画運営担当は、上記シンポジウム組織委員会（上記理念に直接かかわりのある、7 つの本学 21 世紀 COE 研究グループおよび 1 研究ユニットの代表により構成／委員長　エネルギー理工学研究所教授　吉川　暹氏、委員長補佐　生存圏研究所助教授　篠原直毅氏、同、エネルギー理工学研究所助教授　大垣英明氏）と京都大学国際交流推進機構の合同によるものでした。そして実施事務担当は国際部国際交流課でした。また、京都大学教育研究振興財団からの資金援助を受けましたことを謝意とともに記したく存じます。

◇

23 日は午後より参加者登録、ポスター・パネル設営。そして、夕刻にレセプションが催されました。司会はエネルギー科学研究科教授　坂　志朗氏、乾杯発声は東南アジア研究所教授　西渕光昭氏、来賓挨拶はラジャマンガラ工科大学のナミュート・ソンタナピタク学長でした。閉会の辞は、もと大阪大学留学生で後に本学客員もつとめられた、現在ラジャマンガラ工科大学の研究開発研究所所長であるソンマイ・ピウサート氏でした。

坂氏は、2002 年にバイオマス・エネルギーを主題とした第 3 回「京都大学国際シンポジウム」を企画実施した自らの体験を回顧しつつ、かのシンポジウムがその後の関連分野の発展にあたえた大きな影響を語り、西渕氏は、京都大学東南アジア研究所のバンコク事務所が日タイ学術交流に多面的に果たしてきた役割を紹介しました。ナミュート氏からは、エネルギー学をめぐる近年の京都大学の教育研究面におけるタイ国への貢献が語られました。来賓の中には、エネルギー学の研究教育における日タイ

交流の先達である本学名誉教授、大阪工業大学学長の西川禕一氏の姿もありました。

◇

24 日は、午前が開会式と基調講演、午後が総合セッションⅠからⅣ、夕刻からは本学研究・財務担当理事・副学長　松本　紘氏主催のバンケットでした。開会式の司会は副学長・国際交流推進機構長の横山俊夫、来賓祝辞は、チュラロンコン大学研究担当副学長　スディポン・チトミトラパプ氏、キング・モンクット工科大学学長　クライウッド・キアティコモル氏、ラジャマンガラ工科大学国際担当副学長　サキット・チャンタノトック氏、カセサート大学学術協力担当副学長　ジェスダ・ケウクラヤ氏、タマサート大学研究担当副学長　タウィープ・チャイソンポップ氏から頂きました。主催者式辞は、松本氏が述べました。

開始にあたり、横山は本学の理念「地球社会の調和ある共存への貢献」を解説、本シンポジウムのねらいは、この理念に深く関わる、科学、技術の専門家が対話を通じて互いの知識を「civilize」しあうことにあると強調。チトミトラパプ氏からは地域レベルから地球規模にわたる知識を備えた「地球市民」養成へのチュラロンコン大学での取り組みが語られ、キアティコモル氏からはエネルギー研究をめぐるアジア共同の可能性につき、またチャンタノトック氏からは京都大学とタイ諸大学の交流の実績についての紹介がありました。さらにケウクラヤ氏からは京都大学の理念への強い関心、またアジアの土壌破壊への対策が急がれることについての見解、チャイソンポップ氏からは環境保全と防災をめぐるアジア共同の近年の進展についての所感が、それぞれ、本シンポジウムの「大胆な」テーマ設定への賛辞とあわせて述べられました。これらを受けて松本氏は、京都大学の研究推進戦略は、学際、業際、国際において、彩（あや）ある学内人材が綾（あや）を織りなすことによる、「文（あや）」の創生と継承をめざしていること、各研究者が多様なフィールド研究の蓄積を背景に、世界市民のひとりとして、まことの幸福について探求することを支援するものであると語りました。

続く基調講演では、まず生存基盤科学研究ユニット長の井合　進氏が「サステナビリティ・サイエンス：　21 世紀の基本問題群への分野超越型研究」と題して、ついで、アジア・アフリカ地域研究研究科長の平松幸三氏が「前回の京都大学国際シンポジウム　―グローカライズをすすめる世界での人間と自然の共存―　が提示した視野をさらに拡げる」と題して講演しました。井合氏は人工衛星による地球表面の多彩な動画像を早送りにして、地球環境の現状を視覚に訴えつつ、「豊かさ」についての新しい定義の必要と 7 つの COE の共同の深まりが不可欠であると呼びかけました。また平松氏は、和製英語である「glocalization」を、人間に think globally, act locally を迫る世界の現況を映す言葉としてほりさげつつ、地球規模の普遍化と地域単位の特殊化の並行現象は生態系レベルでも進行しており、人間が求める環境との「共存」の研究にも新たなパラダイムが必要であること、そしてその課題への科学者や技術者による貢

献への期待を語りました。

◇

24 日午後より、総合セッションが始まるとともに、会場後方には約 50 点の研究報告ポスター・パネルがならび（＊詳細は既刊の「英文アブストラクト集」 pp.73-125 参照)、各研究室の先端研究の粋が示されました。そのうちには、今夏 8 月に、国際交流推進機構、東南アジア研究所、エネルギー理工学研究所、情報学研究科、国際部国際交流課等が、日本学術振興会の誘いに応えて、「タイ国科学技術週間展示会」へ出展するために共同で作成した京都大学紹介パネルもありました。また、会場入口では、本学総務部広報課制作の、　尾池和夫総長による京都大学紹介 VTR の放映が繰り返されました。なお、20 点あまりのポスターは、シンポジウム終了後、ラジャマンガラ工科大学学長の「学生のために」とのご希望に応えて、かの大学へ寄附されました。

この日のセッションは、Ⅰ～Ⅳまで、いずれも＜人間界＞と＜自然界＞の共存をテーマにしたものでした。(＊以下の発表内容の詳細については、上記アブストラクト集参照）まずはセッションⅠで、COE「**生物多様性研究の統合のための拠点形成**」を代表して生態学研究センター教授　山村則男氏が学際研究推進のための拠点構築の概要を紹介しました。ついで、生態学研究センター助教授の酒井章子氏が、サラワクにあるランビルの熱帯雨林が干ばつを引き金に一斉開花するしくみについての最新の知見を語り、パナマのスミソニアン熱帯研究所準研究員のレット・ハリソン氏からは、ランビルの熱帯雨林のイチジクが林中の生物多様性の維持にはたしてきた役割の発見とともに、同熱帯雨林の現在の規模では、その多様性の維持のために人手による積極的な介入が必須であるとの考えが示されました。

セッションⅡは、地球規模の諸問題に対処するには昆虫の智恵に学ぼうとの研究グループからの報告。COE「**昆虫科学が拓く未来型食料環境学の創成**」の代表である農学研究科教授の藤崎憲治氏から、4 億年にわたる生存と百万種におよぶ規模を誇る昆虫の世界の豊かさをめぐり、科学から哲学にわたる熱いメッセージが語られ、ついで同研究科教授の西田律夫氏が、いわゆる「害虫」の繁殖をその性フェロモンの作用過程に介入することで抑制し、虫殺しを最小限に抑える先端農法を提唱、マレーシア国際植物防疫会議議員、元マレーシア理科大学教授のケン＝ホン・タン氏は、害虫駆除のための農薬使用をめぐって各国が抱える困難の緩和のためには、生態学や昆虫生理学の新知見をふまえた長期的視野と生物多様性維持への責任の自覚の上にたつ国際、業際、そして消費者をも加えた共働の必要を、ミバエと野生種の蘭の共存についての貴重な影像を示しつつ語りました。

セッションⅢは、COE「**微生物機能の戦略的活用による生産基盤拠点**」からの報告で、微生物の働きを利用する先端技術開発の現在が語られました。まず、農学研究科の植田充美氏から、微生物資源に富むアジア諸国がもつ「ホワイト・バイオテクノロ

ジー」発展の可能性が語られ、とくに産学連携で成功した新たな酵素の発見とその触媒作用の研究、応用の例が紹介されました。ついで同研究科教授の二井一禎氏から、「マツ枯れ」の世界的流行への対処法として、樹木内部に内生する放線菌の耐病性促進作用の研究がどこまで進展してきたかについての報告があり、また同研究科教授の東　順一氏からは、和歌山県龍神村の溜め池で強アルカリ耐性を持つ藻類が発見されたこと、それが未記載種のクロレラであり、そのアルカリ耐性は細胞壁を構成する一定のタンパク質の働きによることが解明され始めたことの報告があり、クロレラの多様性とその応用の可能性について新たな視界が提供されました。さらに、神戸大学工学部応用化学科教授の近藤昭彦氏からは、酵素の表面加工技術を駆使して澱粉やセルロースをバイオ燃料に転換する技術開発と、その工業化のためにプラント・システム設計を並行させる研究の報告がありました。

この日最終のセッションⅣは、フィールド・ステーション活用による地域研究の展開を目ざすCOE「**世界を先導する総合的地域研究拠点の形成**」からの報告でした。まず、アジア・アフリカ地域研究研究科教授の小林繁男氏から、「熱帯荒廃林のリハビリテーションにむけての統合的アプローチ」と題して、年間1250万ヘクタールの森林が地上から消滅している現状に鑑み、とくに熱帯の二次林の修復法として、タイのトンパープン地区の調査を背景とした提言がなされました。すなわち、森林修復に資する技術は多岐にわたり、それらの選択肢も土地ごとに多様であることをふまえての統合的な処方の展開が重要であり、とくに、植生回復の初期段階にのぞましい樹種選定、土壌の生産性にかかわる生態学的要因群のデータ集積と有効利用、地域の経済社会に根付く森林観への配慮と、より健全な森林育成のための国際共同ネットワークの構築が喫緊の課題であるとのことでした。ついで、プリンス・オヴ・ソンクラ大学助教授のワラポン・ヴッダクン氏と東南アジア研究所教授の西渕光昭氏による「人間にとって、食糧だけではなく、害となりうる組織体をもはぐくむ、海洋環境というものに関するリスク･アセスメントについての日タイ共同研究」と題しての報告がありました。その研究により、特定の貝類に含まれる腸炎ビブリオが、件の貝類の収穫、販売、購入、調理の段階でどのように増殖するかの実態がはじめて解明され、その知識を活かしての、あらたな調理法、つまりは食文化の提案がなされるに至りました。これを受けて、東南アジア研究所助手の中口義次氏らの研究グループから、そのビブリオの毒性の遺伝子レベルの解明結果（耐熱性溶血毒タンパク類をつくる2種の遺伝子）と、それらが食材に潜んでいるかどうかは、その転写遺伝子を検出する簡便な装置で容易かつ迅速に判定できるとの実験結果報告とともに、その技術を活かす新しいリスク管理行政の提案がなされました。セッションⅣの最後は、カリフォルニア大学バークレイ校のGIS（人工衛星による地理情報システム）センター副所長、カヴァリィ・ケリー氏による「歴史と地理の結び目に―地域研究におけるGISの応用」と題する報告がありました。同氏は、午前の松本氏の「あや」をめぐる演説を引用しつつ、従来、専門分野ごとに、また国ごとに分断されがちであった、さまざまな地域にまつわる知見

の画像データをいわば断像と見なし、それらの蓄積をより広い時空概念のもとに連結させる試みを語りました。それがもたらすのは、ある種の予期せぬ「動画」であること、そしてそのような表現がもたらす、研究者の思考のグローバル化の可能性が、実演をまじえつつ説かれました。

◇

夕刻は、同じ会場を模様替えして、本学理事・副学長の松本氏招待のバンケットが催されました。1998 年にキング・モンクット大学を始め、チェンマイ大学、プリンス・オヴ・ソンクラ大学、シリントン国際工科大学等 5 大学が合同で設置したエネルギーと環境のための合同大学院大学（JGSEE）のディレクター　バンディット・フングタマサン氏の挨拶のあと、本学副学長・国際交流推進機構長の横山の発声によるタイ式乾杯でスタートしました。宴なかばには、ラジャマンガラ工科大学の演劇・音楽学部学生たちによる、タイ各地の新旧舞踊が披露され、まことに華やかな懇親の場となりました。ホスト席には、当シンポジウム企画アドヴァイザーの一人、本学エネルギー理工学研究所所長　吉川　潔氏、また来賓席には、ラジャマンガラ工科大学の研究担当副学長　チュライラート・ドゥアンデン氏、日本学術振興会バンコク研究連絡センター長　吉田敏臣氏（大阪大学名誉教授）ほかの姿がありました。

◇

翌 25 日は、午前にセッションⅤからⅦまで、午後にパネル討論と閉会式が行われました。なお、セッションⅤは昨日に続き、＜人間界＞と＜自然界＞の共存がテーマ、ⅥとⅦは、＜人間＞と＜人工環境＞の共存がテーマでした。

まず、セッションⅤは、COE「**活地球圏の変動解明**」グループが担当。防災研究所教授のジェームズ・モリ氏が、geosphere なる新造語のもとに、地殻、海洋、大気全体の変動を、水移動と温度変化のふたつの次元を中心に統合的に捉え直そうとする研究体制の全体を解説するとともに、アジア・オセアニア地域での研究、教育交流の成果を報告しました。ついで、理学研究科助教授の里村雄彦氏が、熱帯地域の気候変動および天候予測を可能にするための数理モデル構築の国際共同作業の報告と、その成果に基づく気象と海象の連動する最新動画シミュレーションの開示がありました。続いては、チュラロンコン大学理学部助教授のタナワット・ジャルポングサクル氏が、南タイのアンダマン海域沿岸部における 2004 年スマトラ沖津波の堆積物の解析により、今後の沿岸域地質調査に新たな視野が開け、津波被災の歴史の発見とともに、将来の災害発生予測にも役立つ知識が得られる見通しを語りました。

つづくセッションⅥは、「持続可能なエネルギー・システム」と題して COE「**環境調和型エネルギーの研究教育拠点形成**」グループが担当し、まず、グループの代表で

ある吉川　暹氏が、2060年までの世界のGDP成長率を年2%と前提して、まずは2030年をターゲットに推進中の「新エネルギー50%イニシャティヴ」について語りました。とくにバイオ、風力、太陽、水素、海洋からの循環可能エネルギーの最適混合についてのアジア地域での国際協力体制構築の意義と、その実現に向けてのこれまでの実績とともに、「京都議定書」にかわる枠組みとしての「新エネルギー・イニシアティヴ」の提案が、研究機関レベルから政府レベルに及ぼうとしていることが紹介されました。ついで、インド工科大学ニューデリー校（IIT）エネルギー研究センター名誉教授のH. P. ガルグ氏から、「南・中央アジアにおける再生可能エネルギーの展望」と題しての報告がありました。同地域における「人間性開発指数」向上のために、再生可能エネルギーの開発が急務であること、インド政府は新エネルギー資源開発のために専門の省レベルの組織を構え、すでに国内エネルギー需要の5%を再生可能エネルギーでまかなう実効をあげているとのことでした。続いて、本学エネルギー科学研究科教授の坂　志朗氏による「京都議定書とのかかわりで見たバイオエタノール、バイオディーゼルの現状と展望」と題する報告がなされました。アジア各地でのガソリン燃料へのエタノール混合の進展において日本や韓国では木材のリグノセルロースからのエタノール生成が鍵となること、それを可能にする超臨（亜）界水利用の新技術開発が説明され、バイオディーゼルについても、使用済み食用油の再利用が大きなエネルギー供給源となること、しかし、アルカリ触媒依存の旧来の技術では利用可能な油脂類に限りがあり充分な再利用の実が上がらず、超臨界メタノール利用の無触媒法の開発を進めていること、それらの技術革新が軌道に乗れば、温室効果ガス排出削減に1.7%の貢献が見込めるとの報告がなされました。

最終のセッションⅦでは、「自然災害研究と減災」と題して、COE「**災害学理の究明と防災学の構築**」グループが担当しました。まず、防災研究所教授の高山知司氏による正確な退避警告のより迅速な通達のための「リアルタイム津波予測」システム開発の報告がありました。日本の東南海沖でのさまざまな規模の地震発生に備えるために開発された計算モデルの紹介で、近海域を数多くのマトリクスに小分割し、GPS津波計等によって沖合で観測された津波波形を逆解析することにより、これら小分割域における海面の垂直変動を求め、沿岸海底地形や海岸の形状による波動の変化、相互干渉をも含めて沿岸域の要所ごとに津波の予測が出せるというもので、その一層の精緻化への課題の説明がありました。続いて、同研究所助教授の立川康人氏が、水文観測が不十分な河川流域における洪水予測の精度向上に関して、東南アジア域での国際共同研究の経過を報告するとともに、そうした河川流域を対象とする洪水予測汎用モデルの開発の重要性と研究実績を語りました。このセッションの最後の話者は、アジア工科大学（AIT）教授のタワチャイ・ティングサンチャリ氏でした。その報告は、スヴァルナブミ第2バンコク国際空港開設に伴う周辺域の洪水予防と排水策をめぐる、環境配慮型工事に関するものでした。地中工事も含めいくつか考えられた選択枝のうち、大型排水路と排水ポンプ施設の建設が選ばれるまでの行政、学界、利権者、地域

住民などとの利害調整をレヴューしつつ、その周到な意見交換こそが環境と人間社会双方に「最適」の結果をもたらしたとの報告がなされました。

◇

この日の昼食時間は、ポスター・セッションも含めて、やや長く設定され、そのあと午後 2 時から 4 時までが、議論総括のためのパネル・ディスカッションと閉会の辞にあてられました。パネルの司会は、吉川　暹氏、パネリストは、ジェームズ・モリ氏、二井一禎氏、コン・ケン大学農学部客員教授のテリー・ランボー氏、チュラロンコン大学植物学準教授のワラウット・チュララクサナヌクル氏、同大学生化学助教授のアリサ・ヴァングナイ氏、H. P. ガルグ氏でした。この討論はパネリストに限らず、会場からも続々と発言が出て白熱したものとなりました。詳細は、本冊 25 ページ以下をご覧頂くことにして、ここでは概要を記すにとどめます。

議論はまず、人間と自然、人間と人工物とのかかわりについての学際研究の方法をめぐる危うさや困難とそれを少しでも乗り越える意義の確認からはじまり、「調和ある共存」のとらえ方が多様にありうることをめぐり、生物学系の研究者と工学技術系の研究者のあいだにある考え方の違いが浮き彫りになる議論展開となりました。ただ、技術についても現代世界にはかつてない選択肢が揃いだしていることから、技術者の視野の拡大こそが時代の要請であると強く意識される場面もありました。つづいて、「持続性」が話題にとりあげられ、エネルギー学の諸分野から技術革新の可能性と各種エネルギー源を複合するシステムの開発の見通しが説かれました。しかし他方では、地球上の生物種の数が激減している現状にはどの程度の歯止めがかかりうるのか、「調和ある共存」は幻想ではないか、食糧生産のグローバル化の是非は国家安全保障のみならず地球全体への環境負荷をも考慮して論ずべきではないか、といった問いかけがなされました。

それらの問いを意識しつつ、議論はアジア諸国がかかえる課題の多様性と共通性へと移り、資源消費の大都市集中問題、バイオマス利用のための国際共同、いわゆる発展途上国がかかえる優先課題をめぐる相互理解の必要性、京都議定書の重要性とそれが温室効果ガス排出削減という限られた目標を掲げたものであるという制約、「持続性」という社会理念が求める広領域を視野に入れた研究方法の開発、環境への関心の高まりによる地域研究の変容、アジアの大都市防災の諸課題の共通性と地域によって異なる最適解決法といった事柄が語り合われました。最後の話題として、アジア諸国間での環境改善をめぐる互恵的な学術共同の可能性、そのための有効な情報の共有とネットワーク構築の必要性が説かれました。

閉会の辞は、モリ氏と吉川氏から述べられました。両者とも、議論全般にわたり解決困難な課題がとりあげられながらも悲観論に終始しなかったことを評価し、バイオ技術の可能性や、微生物や昆虫の世界の豊かさが見えだしたことへの感動を語りまし

た。また吉川氏は、タイの共生の文化をあらためて強調し、バンコクが共存を基礎とする社会であるがゆえに本シンポジウムを開催するにふさわしい場所であったと、謝意を表しました。

◇

そのあと、主催側を代表して横山が、すべての出席者と事務担当者への謝辞を述べるとともに、シンポジウムを通じて、分野を横断する対話が着実に進んだこと、またそれを助けたものが、多くの報告者の工夫による、旧来の世界像を揺るがす映像表現の数々であったとの感想を述べました。また、このような対話の努力の蓄積と視野の変革、拡大によって、科学者や技術者が、これまで社会的には、どちらかと言えば、孤立する主体、つまり、その知識の一部を他者から利用されるのを待つという受動的な存在であったのに対して、人間界や自然界にまたがるさまざまな関係そのものを、知識人として自己の知の全体を活かしつつ能動的に創り出す「媒介者」へと変容してゆく時代がはじまっているとの印象を強く持ったと語りました。じつは、このような人々が核となるはずの「媒介者の時代」の到来を先取りして、京都大学では、研究成果を日常生活の言葉で語り直すことにより市民との対話をすすめていることや、現代世界共通の学術語である英語による出版活動についても、専門分野を超えた議論が可能となるような文体を工夫した学術誌を出し始めていることも紹介、ますます「言語意識旺盛な大学」でありたいとの希望を述べて締めくくりました。

（編集：国際交流推進機構長 横山俊夫）

Overview

In 2000, Kyoto University began an initiative called the "Kyoto University International Symposium" that sponsors symposia in various locations around the world, and this year the 8th Kyoto University International Symposium was held. The university's mission statement – to contribute to harmonious coexistence on earth– was taken up as an issue in this year's theme, "Towards Harmonious Coexistence within Human and Ecological Community on This Planet," with the intention of marking the first step in substantive interdisciplinary collaboration towards that goal. The event was held in the city of Bangkok during 23-25 November. In this symposium, the "Community" was taken to mean a community organically composed of both humankind and nature, and the vigorous discussions centered on how academia can make a contribution towards bringing us closer to the bright, stable future of such a "Community". As the participants came from a number of different countries, the common language of discussion was English.

From Kyoto University there were 69 participants, including researchers and students, and from other institutions there were 79 participants, including researchers and students, for a total of 148 participants. Participants hailed from a number of other countries, including Thailand with a strong turnout of 58 people, as well as Malaysia, Cambodia, Indonesia, Bangladesh, India, Iran, Australia, the United States, and the U.K.

The event was put on by the Kyoto University Organization for the Promotion of International Relations and the 8th Kyoto University Symposium Organizing Committee (which is composed of representatives from seven 21st Century COE research groups and one research unit*).

**COE for Innovative Food and Environmental Studies Pioneered by Entomomimetic Sciences*

COE for Microbial-Process Development Pioneering Future Production Systems

COE for Formation of a Strategic Base for the Multidisciplinary Study of Biodiversity

COE for Integrated Area Studies

COE for the Elucidation of the Active Geosphere

COE for Sustainable Energy Systems

COE for Natural Disaster Science and Disaster Reduction

Research Unit for Sustainability Science

2. Opening Remarks

Speakers:

Soottiporn Chittmittrapap (Vice President, Chulalongkorn University)
Kraiwood Kiattikomol (President, King Mongkut's University of Technology Thonburi)
Numyoot Songthanapitak (President, Rajamangala University of Technology Thanyaburi)
Jesda Kaewkulaya (Vice President, Kasetsart University)
Taweep Chaisomphob (Vice Rector for Academic Affairs, Thammasat University)
Hiroshi Matsumoto (Executive Vice President, Kyoto University)

Chairperson:

Toshio Yokoyama (Vice President, Kyoto University)

Yokoyama: Sawasdee Kerap. My name is Yokoyama, Vice President of Kyoto University for International Relations.

Distinguished guests, dear colleagues from Thailand and many other countries, ladies and gentlemen, it is my honor to open the 8th Kyoto University International Symposium. The theme chosen for this gathering is a brave one. That is, "Towards Harmonious Coexistence within Human and Ecological Community on this Planet." This symposium has been planned as Kyoto University's first step in its quest to realize its Mission Statement of 2001 in which the university set out to "pursue harmonious coexistence within human and ecological community on this planet." The mission statement drafting members conceived of this "community" as including non-humans, ranging from animals and plants to rocks and streams - reflecting perhaps the traditional Asian idea of "civilized society" that has never been confined only to the human world.

One year ago at this same venue in Bangkok, we held a symposium on "Coexistence within Nature in a Glocalizing World - "glocalizing" is a new word. That symposium provided a unique forum for the discussions of field studies in Asia and Africa. It is to be hoped that this year's symposium, organized by seven

research groups, each registered by the Japanese government as a "Center of Excellence," would build on last year's discussions and if possible discover through constructive dialogues *more civilized roles* for science and technology on this endangered planet.

Now I should like to request opening remarks from our distinguished guests. First, we welcome Vice President Soottiporn Chittmittrapap of Chulalongkorn University, the renowned promoter of a number of important interdisciplinary research cores at Chulanlongkorn University, an institution with which Kyoto University has enjoyed a long academic relationship. Professor Soottiporn Chittmittrapap, please.

Chittmittrapap: Thank you. Professor Matsumoto and Professor Yokoyama, Vice Presidents of Kyoto University, Presidents, Vice Presidents, dear colleagues, ladies and gentlemen. On behalf of Chulalongkorn University we are honored to be here at the 8th Kyoto University International Symposium as one of the very close and sincere partners. Chulalongkorn University and Kyoto University have a long history of collaboration and cooperation. This symposium's theme about harmonious coexistence within the human and the ecological community and last year's theme about *glocalization* well-reflects Kyoto University's focus and concern. I will mention this subject from our point of view.

Talking about the scenarios of the 21st century, we cannot avoid the globalizing role of information and communication, science and technology, which link us all together. The new concept of *glocalization* (which, as mentioned, is globalization and localization) has taken into consideration after many problems have occurred during the process of globalization. Globalization creates a very big gap between the haves and the have-nots. Education enhanced by the development of information, communication, science and technology still cannot be provided to the many societies and many countries of the have-nots.

The problem affecting us educators is how we are going to educate our students to act as a *glocal* citizen sensitive to the needs of themselves and their own people (that means their own family, society, communities and country) as well as being aware of the global knowledge-based community where opportunities are provided for all. I think that cultural diversity, the environment and ecology are also very important issues. Our global citizens should be aware of the difference between

citizens of the world. How can we educate our children to be aware of these issues, to be aware of the diversities and to understand the way people in different cultures live, eat, love, feel or hate? They must be trained to be sensitive to cultural diversity, to understand, accept, appreciate and accommodate such differences. They may not need to change themselves or adopt a different way of life.

Another problem is how we are going to educate our students and motivate our staff to be aware of these issues, either within their own countries or in different countries. How can we widen the students' and the staff's horizons in this diversified world? The classroom should offer more about human concerns, ecology, society and community concerns. That course may be a problem-based or a project-based course where the student has to choose to explore one situation which is different from theirs.

Another big issue that is affecting us educators is how and what we are going to teach our students about humans and citizenship. The concept of citizenship is as a global as well as a local citizen. When we are looking at a problem we should have two perspectives, looking at the problems as their own country's problems as well as world problems. They should be able to look at the problem not only from the angle of their discipline but from other disciplines as well.

I would like to conclude my talk by saying that actually science and technology itself is oriented towards human beings, communities and societies because it answers the needs of human beings. However, the scenario of society has changed and sometimes it has changed because of the science or technology itself. Societies and human problems will also change. Education, research and development of the 21st century need to be developed with more social and human outlooks with more concern about the environment. We have to balance the global concerns with the local context. The next generation of our population educated by us should be trained to be more all-around, to be able to look at the problems and the ways to solve the problems from different angles, having alternative methods and able to access the best alternative with an all-around perspective.

On behalf of Chulalongkorn University, I would like to convey our sincere appreciation and heartfelt thanks to Kyoto University for their hard work in conducting this symposium, which will create more and more significant

knowledge and understanding. I hope that during this symposium a fruitful discussion will strengthen our relationship and will also pave way for further collaboration and coordination in the future. Thank you.

Yokoyama: Thank you, *Ajaan* Soottiporn, for your encouraging and insightful remarks.

Next I should like to invite opening remarks from President Kraiwood Kiattikomol of King Mongkut's University of Technology Thonburi. Kyoto University has cooperated closely with King Mongkut's University since the 1990s, particularly in the field of energy sciences. President Kraiwood Kiattikomol, please.

Kiattikomol: Professors Hiroshi Matsumoto, Executive Vice President of Kyoto University, Vice President Toshio Yokoyama, President and Vice Presidents of Thai universities, distinguished participants, ladies and gentlemen, it is my great pleasure and honor to be here with all of you at the 8th Kyoto University International Symposium, "Towards Harmonious Coexistence within Human and Ecological Community on this Planet." We are indeed fortunate to have experts distinguished in this field to share and pass on their knowledge and experience to Thailand. KMUTT and Kyoto University have had academic cooperation for more than 10 years. We have a very strong relationship and collaboration through our academic activities, which has brought our people together and given many academic and technical outputs.

Before this symposium, on the 21st to 23rd of November, KMUTT in cooperation with Kyoto University organized a Second Joint International Conference on Sustainable Energy and the Environment. I think some of you participated in that conference as well. I would like to take this opportunity to express our sincere appreciation to Kyoto University for the support and contribution extended to our students and staff and also for the effort in arranging this symposium. This is a great chance for us to learn the most recent discoveries in pure natural science, state-of-the-art technologies and social science for further cooperation among Kyoto University and university partners in Asia. May I once again say how happy I am to see that the strong ties between KMUTT and Kyoto University will be enhanced. I believe our friendship will continue to build with stronger bonds and better mutual benefit, and wish you all a productive and successful conference. Thank you.

Yokoyama: Thank you, *Ajaan* Kraiwood, for your impressive remarks.

For our next guest speaker, we welcome President Numyoot Songthanapitak of Rajamangala University of Technology Thanyaburi. Kyoto University has been collaborating with Rajamangala University particularly since the recent major reorganization that made Rajamangala University Thailand's largest institution for higher education. President Namyoot Songthanapitak, please.

Songthanapitak: *Kon'nichi wa,* good morning. Executive Vice President Hiroshi Matsumoto and Vice President Yokoyama, distinguished guests and delegates, first of all I would like to welcome all delegates to Thailand and wish that you have a pleasant stay in Bangkok. We at Rajamangala University of Technology Thanyaburi are very pleased and very happy to be a part of this important international symposium in the field of harmonious coexistence within human and ecological communities.

Actually, we do have so many activities with Kyoto University. We have been good friends for a long time with the Institute of Advanced Energy. We have been receiving a lot of support and assistance. For instance, we have received visiting professors from Kyoto University to give lectures to our faculty and students. This long-term relationship between these two institutions has gone so far. We have to say that this relationship will be everlasting in the future.

Concerning this symposium, I wish to express my sincere appreciation for inviting us and so many staff members from Rajamangala University of Technology Thanyaburi to take part of this symposium. We want to answer so many questions, for example how to live peacefully and how to live harmoniously in this world. We hope that this symposium will carry on and produce an effective solution to our ecological problems and also the problems in our world. We do believe that from this symposium we will gain something very important for the world, for Kyoto University and also for the various universities that have participated in such an important event. We also cherish these long-term relationships with Kyoto University. We hope that this symposium will be effective and very fruitful for future collaborative activities in the field of ecology. Thank you very much.

Yokoyama: Thank you, *Ajaan* Namyoot, for your encouraging speech.

Our next guest speaker is Vice President Jesda Kaewkulaya of Kasetsart University. Kasetsart and Kyoto have enjoyed close academic ties, particularly in agricultural sciences since 1984. Vice President Jesda Kaewkulaya, please.

Kaewkulaya: Dr. Matsumoto, Dr. Yokoyama, Vice Presidents of Kyoto University, friends from Kyoto University, panelists, honorable speakers, distinguished participants, ladies and gentlemen, good morning.

First of all, please allow me to express my whole-hearted thanks and gratitude to the Organizing Committee for your invitation to allow me to meet with outstanding scholars here in this forum. It is an honor. I myself feel most honored with this special opportunity.

This 8th Kyoto University International Symposium with the major theme "Towards Harmonious Coexistence within Human and Ecological Community on this Planet" sounds very interesting, with some essential implications. May I encourage you all to reconsider that science has lead human being to vast potential and capacity to accomplish their goals, as they decide, such as economic and industrial development. Nevertheless, in the midst of such advancement, our planet earth has to pay more. In particular, our environments have been destroyed for several decades until several events occurs related to the rapid change and destruction of environment have been continually emerged as the effects and outcomes caused by the ignorance towards the great significance and essence of our nature. Especially, pollution, vast flood by El Nino, drought by La Niña, soil erosion have become major environmental issues waiting for the solution from mankind. It seems that after decades of destruction, nature, right now, is conducting her great revenge.

Ladies and gentlemen, at present, we all realize that nature has become an essential factor for us and the next generation. People seek for their peaceful lives. We do believe that the sustainable development of our planet earth is on the same route to live with nature. Then, Harmonious Coexistence within Human and Ecological Community must be taken into account. It is possible to say that harmony between human being and nature can be sustainably existed if we all keep on assisting hand-in-hand to preserve our environment which means we are preserving our planet Earth for the next generation. This is our commitment, our

duty, and our responsibility.

Ladies and gentlemen, may I invite you all to join me in expressing our appreciation to our host, Dr. Hiroshi Matsumoto, and Dr. Toshio Yokoyama, Vice Presidents of Kyoto University, and their colleagues for their devotion in arranging this special forum, which is very essential for our present and future. My appreciation also goes directly to all speakers and participants for your contribution. Excluding that, we will be unable to have the forum like this. I believe that with your experiences, there will be some new ideas emerged from the forum although this seems to be your tough work.

On behalf of Kasetsart University, may I invite all here to join me in wishing this forum a very great success.

Thank you very much.

Yokoyama: Thank you, *Ajaan* Jesda, for your heart-warming remarks.

Our next speaker is Vice Rector for Academic Affairs, Professor Taweep Chaisomphop of Thammasat University. He is an old, distinguished friend to many in Japanese academic circles. The academic exchange between Thammasat and Kyoto has been developing since the 1960's. Professor Taweep Chaisomphop, please.

Chaisomphob: Professor Hiroshi Matsumoto, Executive Vice President of Kyoto University, Professor Toshio Yokoyama, Vice President of Kyoto University, Presidents and Vice Presidents of Thai universities, distinguished professors and scholars, ladies and gentlemen, first of all please allow me to convey the greetings from Thammasat University Rector, Professor Surapon Nitikraipot, who regrets that he is unable to attend this morning's ceremony but wishes to express his best wishes for a successful symposium.

The issues and topics that form the basis for this symposium are becoming of increasing concern. Not a day goes by that we don't learn of the impact of the human community on the ecology that supports us. Every day we are confronted with disturbing news about climate change, flooding, soil erosion or the least appearance of fragile habitats. Every day we are reminded of the threats posed by

energy depletion, pollution, avian flu or water-borne diseases. Every day we learn of the efforts of people around the world to understand what is happening and the necessary steps to bring man back into balance with nature. We are also becoming increasingly aware that these are not just issues of science, medicine or researchers working in laboratories. These are issues of food, human security, poverty and peace. We are learning that the accelerating pace of environmental degradation is another major cause of violence in the world today.

The positive news is that scientists and researchers in collaboration with their international colleagues and partners are committing themselves to a common goal, the preservation of a harmonious balance between human civilization and the planetary ecology of which we are just a part. The 8th Kyoto University International Symposium, like last year's Kyoto symposium held at this very same venue, represents a venerable and honorable contribution to solving the greatest challenges we face in the 21st century. Whether the papers presented at this symposium are on natural sciences, technology or social sciences, they are all the work of dedicated and accomplished individuals who have distinguished themselves as model citizens of the globe working for the betterment of their fellow human beings and the protection of natural life that provides our hope.

On behalf of Thammasat University, I express our profound respect for the presenters at this year's symposium and our deep gratitude to Kyoto University and its Centers of Excellence for once again organizing this effort to reach out across the Asian community. May the symposium be a success in pooling the knowledge essential to our goals. Thank you.

Yokoyama: Thank you, *Ajaan* Taweep, for your warm comments.

For the last opening remarks today, please welcome Professor Hiroshi Matsumoto, Executive Vice President for Research and Finance at Kyoto University. Professor Matsumoto is a world-leading researcher in space plasma science. He has also pioneered solar power satellite research in Japan. *Ajaan* Matsumoto, please.

Matsumoto: Thank you, Professor Yokoyama.
Honorable Presidents and Vice Presidents from Thai universities, distinguished guests, all participants and ladies and gentlemen.

On behalf of Kyoto University I would like to say a few words on what I have contemplated while formulating our University's research strategy at a point about 2 years after Kyoto University was chartered as an incorporated national university. When we think of research at a university, what are the standards of measurement for the worth of various strategies? I believe that the standard is without doubt the creation of knowledge. However, it also occurs to me that what is also needed is research framed by a Japanese word, "*aya*." The primary meaning of *aya* is "a rich and diverse palate of color." An exceptionally broad range of research is being carried out by a variety of colorful researchers associated with our university with passion and flair.

The second meaning of *aya* is "a patterned brocade woven from warp and woof," the vertical and horizontal stripes. The intellectual approaches and philosophies of a variety of researchers interact with each other. Through hot and rich dialogue, as Professor Yokoyama mentioned, they are woven together to form the whole fabric of Kyoto University. It may even be appropriate to say that this should be the essential nature of a comprehensive university such as Kyoto University.

The third meaning of *aya*, in its narrowest sense, is "literature," but in the broadest sense it refers to academic action in general. It means carrying out research that is appropriate for a center of academia. Not to mention, even a center of academia must not become an ivory tower. I believe that such an institution should make a contribution to human welfare. It is important to be aware that we are contributing to welfare on every level of human experience: the individual families, workplaces, ethnic groups, the country and even the human species.

Kyoto University has good fortune of having been one of the original centers of the Kyoto school of philosophers, *Kyoto Gakuha*. They have carried a truly wide range of research into many areas, such as philosophical thought, grappling with new topics that transcended existing concepts and were not imposed from above or from the government and creating their own methodologies. One of their most widely known approaches, which I am proud of, is field science, which proceeds almost like an adventure investigating whatever is not yet understood. It is a unique system of scholarship. The performers of this school of thought are put together in contact with the local people with local people in mind. It is an approach to research with the three meanings of *aya* that I have just mentioned. It is an outgrowth of research style and methodology that Kyoto University has

developed throughout its history.

Ladies and gentlemen, today more than ever we must look seriously at the issue of what it really means to be happy as members of the global and ecological community of this planet because we live in an era when organizations such as the Science Council of Japan are discussing the possibility that humans have reached a historical dead end. I hope that all of the individuals in academia will pursue research with their eyes firmly fixed on the horizon of our future. In this sense, this international symposium will be a milestone where 7 groups of COE, out of a total of 23 COE projects in Kyoto University, and one research unit get together here with international participants, especially the Thai people, and discuss the university mission as stated on the board behind me. What is really needed is to create valuable interfaces, which could not be achieved without having face-to-face interactions among the individuals and the independent projects, not only at Kyoto University but on an international scale.

Finally, I would like to thank the Presidents and Vice Presidents from the 5 Thai universities, all the participants and distinguished speakers as well as the organizers who have worked behind the screen so seriously for the preparation of this symposium. Thank you.

Yokoyama: Kop Koon Kerap, Professor Matsumoto, for your stimulating words. In closing, I should like to express my deepest gratitude to all of our distinguished guests for their kind cooperation in speaking to us this morning.

After a short break, the program for the keynote lectures will commence. I should like to ask all of you to return to your seats by 11:00. There will be tea, coffee and some other drinks in the gallery and the posters of our colleagues, as you see near the windowside of this room, are inviting you. Again, many thanks to you for your kind cooperation

3. Panel Discussion

Panelists:
Susumu Yoshikawa (Sustainable Energy System, Kyoto University, Japan)
James Mori (Elucidation of the Active Geosphere, Kyoto University, Japan)
Kazuyoshi Futai (Microbial-Process Development Pioneering Future Production Systems, Kyoto University, Japan)
Terry Rambo (Area Studies, Khon Kaen University, U.S.A.)
Warawut Chulalaksananukul (Biomass Conversion, Chulalongkorn University, Thailand)
Alisa Vangnai (Biomass Conversion, Chulalongkorn University, Thailand)
H. P. Garg (IREDA Chair Emeritus Professor/ Renewable Energy, Center for Energy Studies, Indian Institute of Technology, India)

Yoshikawa: Ladies and gentlemen, we are starting the last session of the panel discussion. My name is Susumu Yoshikawa of the Institute of Advanced Energy, Kyoto University. I will moderate this panel discussion. Let me start my talk by introducing the panel briefly.

The first panelist next to me is James Mori. He has been a professor at the Disaster Protection Research Institute at Kyoto University since 1999. His prior career experience includes seismology at the Rabaul volcano.

For further details, please introduce by yourself.

Mori: I'm Jim Mori. Basically I'm a seismologist. As I mentioned yesterday, I came to Kyoto about 7 years ago. Before that, I was working as a researcher and administrator with the U.S. Geological Survey in California. I've actually had experience with quite a few earthquakes and volcanoes, so that's my main interest in research.

Yoshikawa: Professor Futai, please.

Futai: I am Dr. Futai. I have been studying Pine Wilt Disease, which is a really serious forest disease and right now is becoming very, very global. However, this disease gave me a lot of chances to go to other countries, that's very good for me,

anyway. Actually, I had a really good opportunity to visit Canada from 1987 to 1988. That improved my English a little bit. After that, I didn't have any opportunity to speak in English, so my English has rusted so seriously. Sorry about that.

Rambo: I am Terry Rambo, an anthropologist specializing in Southeast Asian studies, particularly the study of Vietnam and more recently Thailand. I am currently a special professor in the Faculty of Agriculture at Khon Kaen University, and prior to that I was a professor in the Center for Southeast Asian Studies at Kyoto University. Thank you.

Chulalaksananukul: My name is Warawut Chulalaksananukul from Chulalongkorn University. I graduated from Chulalongkorn for my Bachelor's degree in Genetics and Master's degree in Botany,, and I went to France for a PhD and worked on ester synthesis by lipases. Now I'm interested in Biodiesel production by lipase catalysis.

Vangnai: Good afternoon. My name is Alisa Vangnai from Chulalongkorn University. I graduated from the Department of Biochemistry at Oregon State University, USA. Currently, I am an assistant professor at the department of Biochemistry, Chulalongkorn University. Today my talk will be a bit different from what you have heard before because I'm a Biochemist. My research is involved with environmental biotechnology as well as environmental-friendly bioconversion using biomass. During this discussion I'll tell you more about my research when it is involved to the topic.

Garg: My name is Professor H.P. Garg and I am working as Emeritus Professor at the Indian Institute of Technology in New Delhi, India. Prior to that I was the UNESCO Chair Professor for 10 years. I am Professor for the last more than 30 years and I've been in the field of renewable energy for more than four decades. I've published more than 500 papers and 14 books on renewable energy and supervised more than 30 PhD students. Thank you.

Yoshikawa: Thank you very much. Let's start the panel discussion. This symposium is entitled, "Harmonious Coexistence with the Human and Ecological Community on this Planet." Since 2001, Kyoto University pledged itself to pursue this principle. In this symposium, we'll discuss the coexistence among humans and

nature and also between human and man-made systems. Twenty-three presentations have been given on this viewpoint, and these are mainly related to the Asian aspect. I think in this panel firstly we want to discuss the specific points for Asia. I would like Professor Rambo to tell us about this subject.

Rambo: This is an extremely broad charge and I have a very short time. I'd actually just like to focus on two key issues, one the nature of the changing relations between people and ecosystems in 21st century Asia and secondly how Kyoto University may more effectively engage in studies in the region.

As Professor Iai pointed out in his keynote yesterday, the human ecological footprint in the world in general and Asia in particular is very heavy. It exceeds the carrying capacity of the planet already. There are two major causes for this. One is growth in population. The other is increased standards of living and rising consumption. We would be in trouble everywhere in the world even if per capita consumption wasn't rising just through population growth. In my lifetime, the United States has gone from under 100 million people to 200 million this year. That's a lot more people, and in Asian countries the growth rate has been even greater, except for Japan.

However, the changes in consumption are the more important driving force. The U.S. currently has a footprint per capita about eight times as extensive as developing countries on average, but Asian countries are racing to catch up, particularly in China and Southeast Asia. In northeast Thailand, which is well-known as the poorest region in Thailand (people still think of this as a very backward, underdeveloped area), two years ago (the most recent statistics we have) 73% of rural households had refrigerators. 93% had color televisions. This is getting to consumption levels equal to Japan or the West. Other Southeast Asian countries are not so far along. Vietnam obviously consumes much less and Burma even less, but they all want to catch up. It's very, very difficult for Japanese, Americans or Europeans to say, "Stop, you're expanding your ecological footprint too much." It's not going to happen. They used to talk in the 60's about the revolution of rising expectations. It's still going on. Anyone who tries to stop this forward move in the consumer society is going to get run over by it. How do we cope? I don't have the answers but I think many of the papers in this symposium have dealt with some ways, such as managing energy better.

The second point I wanted to address is how Kyoto University can respond. Many of you may know Kyoto University has the nickname "Expedition University." This is quite a proud nickname. It was because Kyodai was the first university in Japan to reach out and try to learn about Asia. This goes back to when it was an Imperial university. Scholars from Kyoto University have a very proud reputation for their field research. The Center for Southeast Asian Studies is one of the best-known area studies centers in the world. It is highly regarded.

However, expeditionary research has certain inherent limitations. It's necessarily short-term, and that affects the type of problems that can be studied and the types of data that can be gathered. It can also generate resentment locally. Japanese scholars come on a short-term basis, collect data together with local scholars and then go back to Japan, analyze the data and write and publish the reports. My Thai colleagues will not say this, but I will. You need to be sensitive to this problem. I think Kyoto University is sensitive and is starting to change. Professor Hiramatsu described the new approach that's being developed of establishing field stations where younger Kyodai staff will actually be based in universities in Southeast Asian countries and will work closely with local staff, work in the local language and be able to do long-term collaborative research.

I hope that this movement will continue. I would actually call on my former colleagues from Kyoto University to be even more radical in their thinking about this, to try to become much more embedded in institutions in Southeast Asia. Don't just have the field station. When Kyodai faculty are there, volunteer to teach in our program. In my program, Systems Approaches and Agriculture, at Khon Kaen University we already have two Japanese professors, Tanaka Koji and Fukui Hayao, who have agreed to be visiting professors. Every time they come to Khon Kaen they will give a seminar. They work with our students. I would hope all of you will do that and start to develop really strong not just collaboration but partnership. Thank you very much.

Yoshikawa: Thank you. He presented some of the Asian problems. As first presented by Professor Iai, sustainability is a very key issue in academia. For this subject, I think each scientist still has very narrow views. I think in the future we must reconstruct the scientific fields in a more interdisciplinary way. Do you have some more concrete ideas for sustainability? Does somebody have a comment on this?

Chulalaksananukul: What were you asking?

Yoshikawa: I think in the near future we should reconstruct the sciences themselves to be more interdisciplinary.

Mori: Actually, I just have a short comment. I made it when I talked. I think interdisciplinary sciences are very good, but actually one of the dangers I see is that in a sense we become very superficial. Everyone tries to do everything, and that's just not possible. I think we have to be careful not to move the real technical expertise, which is really the basis of everyone's work here. It's not here, but sometimes I go to meetings and I see people who try to present very grand schemes or try to have a very big picture but in a sense there's no substance behind that. It's just a comment that I'm all for interdisciplinary work and we really need to do that but we also need to do it in a way so that we're doing something meaningful, so we aren't just putting window dressing on what we're doing already.

That's sort of a negative comment, but on the other hand I think certainly for the kind of efforts that are going on at Kyoto University we see new ideas. I was actually surprised to hear about how many PhDs you had in such a short amount of time. I think that's a very good example of a rising field. There's this new unit which Professor Iai is heading up, which is also trying to do the same kind of thing. I think Kyoto University is really heading in the right direction for that. I think a lot of the more traditional people are always a little bit worried because they say, "What are they really doing? What's the real meaning behind that?" Again, it just comes down to balance, I think. It's just a comment that I hear a lot from my colleagues that it's good to do this but we really need to be thoughtful about the actual subjects that we're working on.

Yoshikawa: Thank you. I think teamwork is one of the interdisciplinary methodologies. Also, energy science or sustainability science are newly developing fields. They should establish some kind of methodology for their own field. If possible, can I have Professor Susumu Iai (Disaster Prevention Research Institute, KU) talk on this subject?

Iai: Thank you very much for the comments, Professor Mori. I totally agree with

your view of the danger of trying everything pretending one knows everything, just like one of the commentators or critics on a TV program trying to present something as easily as possible. Of course, it is easy because that person does not do anything to uncover the mechanisms that are hidden below the surface. On other hand, in my presentation I mentioned some of the opportunities presented by satellite monitoring or say a spatial scale. If we notice something easy to understand then I would say that is something that we haven't realized before by doing some of the detailed studies sticking to the various disciplines. In a certain way, we can actually find a certain step up to a new approach that is required by the current situation of sustainability science.

Of course, other actions are very difficult to implement in practice. I would say it is very good for Kyoto University to initiate this program called "the sustainability science program" as an interdepartmental, interdisciplinary area supported by the chemistry specialists, disaster prevention specialists and specialists in various human spheres, such as Southeast Asia, and then advanced energy research. The institution actually took part in strong initiatives to do something. The implications of the data are serving to guide a certain program or a certain resulting flexible organization to do something.

On the level of interacting with the local people, I would welcome that initiative. Actually, the people who go around to the centers did not know if the technology would be different or if the institutions have different disciplines. Now we seem to be having frequent interaction with the people. We can say it's the modest beginning of something like that. Thank you very much.

Yoshikawa: Thank you. Sustainability science has just started. I hope that this will be concretized in the near future. Today's main subject is the harmonious coexistence, and maybe there are a lot of viewpoints on this subject. In this symposium, there were many presentations on this subject in different manners. If possible, each panelist, please give some ideas about the coexistence.

Futai: I have been very, very interested in the relationship between plants and microbes or microbe-mediated relationships found in the various biological relationships. That has been neglected in the field of biology because it really is a small event. It happens in the microbial world. However, recently I found that it's a really important relationship. We have to learn a lot about these important

relationships hidden in the microbial world. I have studied just one epidemic disease, but it teaches us so many things about the importance of a symbiotic relationship. Maybe this is a typical harmonious relationship, I think, in the biological world.

Yoshikawa: Thank you.

Rambo: I would agree that in natural systems symbiosis is extremely important and has been under-studied. When we're talking about human relations with ecosystems, though, it gets a little trickier because we have very symbiotic relationships with some species, rice for example. Rice and people interact in ways that benefit both species, but that's at the cost of many other species. This is built into the nature of human existence in the world. We cannot be symbiotic with everything. This is a fundamental dilemma to which I think there is no happy solution.

Vangnai: I actually agree with Professor Futai about the relationship between either plants or humans and microorganisms. I have found that the interaction between humans and microbes can also be classified as harmonious relationship. We are actually using microbes for many things. In my research we have studied and applied microorganisms for biotransformation such as bioconversion as well as for the cleanup of contaminated environments. In my point of view, this relationship is much more than only coexistence. It's a sort of partner for our lives.

Chulalaksananukul: I think raw materials for mass production from nature is the most important topic for the future.

Yoshikawa: Do you have some comments from the viewpoint of energy, Professor Garg?

Garg: I think we have to see things globally. Today we are meeting in a different context or point of view. If we discuss only ecology, many things are related. We have to take issues one-by-one, for example energy. I specialize in energy. I find today energy is the most important component responsible for social and economic development of the country.

I know that China and India have been mentioned. We are both developing

countries. We have high growth rates now, and both the countries are not thinking very much about the environment but the progress. We are thinking only about poverty, education and economic development. That is why you might have seen that in China the growth rate is more than 10 percent and in India the growth rate is about 9 percent. In India in 1950 when the first time year plan was being made and Pt. Jawaharlal Nehru was the first Prime Minister, at that time we never talked about the environment. In 1950 the growth rate was fixed at 4 percent. Jawaharlal Nehru, the first Prime Minister of India, was very upset. He called the famous economist Professor K.N. Raj and he said, "I want a high growth rate." Prof. Raj said that in democracy one can not have very high growth rate.

At that time he thought that we should be satisfied with the 4 percent growth rate. Later in 1977 at one of the U.N. conferences the late Prime Minister of India, Smt. Indira Gandhi (perhaps you might know her) said that our top priority is not the environment but poverty and education. Perhaps poverty is directly proportional to the environment. If we talk of the environment we have to talk of poverty first. For poverty and education we have many issues to discuss, no doubt about that. Perhaps if time permits I will discuss these issues. Energy is one of the most important issues.

If we are a developed nation and the human development index is high, we have seen that environment gets polluted. It is directly proportional. You might have seen that the carbon dioxide being produced by an average American is more than 100 times the world average. We have to keep a balance between development and also the greenhouse gas emissions. We need optimal utilization.

Technology utilization and type of technology is another issue. Next month (December, 2006) there is going to be a big meeting where environmental ministers and finance ministers are going to meet in Africa. The main agenda of this meeting is of technology transfer and technology utilization for sending less and less carbon dioxide into the atmosphere. This is the main agenda. They are going to discuss how it is to be done. The main countries on the list, let me tell you, are the United States, Japan, Australia, China, India and South Korea.

We have formed an Asian Pacific partnership for clean development and climate called AP6. Next Monday they are going to meet and the main agenda is on technology. When the developed countries and developing countries meet, we talk

of poverty and education. Our top priority is economic development. The developed nations are right that we should stop sending more green house gases in the atmosphere and should bring down to the level of 1990. This may be possible perhaps by technology transfer, technology development and technology utilization.

Yoshikawa: Thank you.

Mori: Just following up on that point, I don't really have a comment. It's more of a question. I think you bring up a very good point. I think it's very similar to the point Terry made when we said we can't be symbiotic with everybody. We really need to make our choices. We talk about energy. We want to live in coexistence with everybody, but I think practically that's just not possible. We need to make certain choices about where we're going to put our resources. I think you made a very good point in your talk that when you have a very poor country just feeding people probably becomes a higher priority than keeping a clean energy balance for your country.

I think that's very understandable, and maybe that's an important issue that we as a community of researchers we have think about. We have what we want to do, but in a practical sense (and practical I guess means money) what's realistic to do? Maybe we can open it up to some other people. Are there some ideas? We heard a lot of good things about what to do but there's always sort of the flipside of how much of this can we really afford to do and what are we giving up if we want to make a very clean society, a very well-balanced society? It comes at a certain cost which probably Japan is very willing to bear but India probably has a harder problem. Thailand may be somewhere in the middle there. I think that's a really interesting problem and actually probably one of the hardest problems in terms of implementing all of these good ideas that we've heard about.

Garg: Let me also say something. You just mentioned Japan. I have the figures from Japan, also. I do not know whether you'll like it or not, but you may comment on this issue also, which I am going to tell you with figures. Even in a meeting to be held in December 2006 experts are going to discuss this. It has been stated and reported that Japan is still far from the target under the Kyoto Protocols. It's far behind. UN forecasts show that Japan's emissions will grow by 6% instead of shrink by the same rate, as mandated by the treaty. It's not only the developing

countries, the developed countries are very far behind, including Japan.

Yoshikawa: Yes, and it's a very important problem currently around the world. I think for sustainability of the Earth, maybe, other kinds of innovation are quite important for developing sustainable energy. In theory, we might discuss what should be the sustainable energy system in the future. I want to ask Professor Maekawa to talk about that, please. He is a specialist in fusion technology.

Maekawa: My name is Takashi Maekawa (GS Energy Science, KU). I have worked on plasma fusion experiments for over 30 years. Now I'm working on microwave spherical torus experiment. Maybe some of you know the International Thermonuclear Experimental Reactor Project. This project has been approved in the United States, Japan, Europe, Russia, China and South Korea. I think recently India joined this project. The purpose of this project is to prove fusion burning experimentally. We will spend 10 years for the construction of this device. And then from 2016 to 2036 for the 20 year experimental plan. Primal purpose of this project is to prove fusion burning, so for the next step of this project we need address economical and safety point. Our group is working on making this reactor very compact. The point is the removal of central solenoid forever. Recently, we basically showed that this is possible in experiments.

Garg: When will fusion technology be available?

Maekawa: This is a very, very difficult project because we need to keep plasma over 100 million degrees. In a container, so the temperature gradient is very, very steep. One technical point is how to contact the very hot plasma and the solid container is very important and difficult. I don't know when fusion becomes available. I am confident fusion burning is possible, but we do not have confidence that a reactor will actually be feasible on an economical basis. However, it's very attractive because fuel is very abundant and also we have no problems such as atomic chain reaction problem. Fusion has a lot of very good points, so we take up the challenge of these very difficult issues.

Yoshikawa: Thank you for your comment. Another possible technology in the future is space power stations using solar cells. Professor Kozo Hashimoto (Research Institute for Sustainable Humanosphere, KU), could you please give us some comments on sustainable energy systems?

Hashimoto: I am working on solar power satellites because it solves the problems on carbon dioxide. We have abundant energy from the sun. Solar power satellites would be geostationary satellites. We could get energy 24 hours a day. One of the ideas is that in space we can get a lot of energy for a very long time. We are working towards solar power satellites, not as a dream but to realize this. To make this a reality, we have to overcome some very technical problems. I hope we can realize solar power satellites as soon as possible for sustainable energy.

Yoshikawa: Thank you. I think technological development is one of the factors which affect the sustainability of this planet. With novel technologies, how can it be possible to make sustainable coexistence?

Garg: Even the right choice of energy is very important. In power generation, it can solve many problems apart from emission generation. A right choice can save a lot of energy. There is energy security, efficiency, resource utilization, cost effectiveness, job creation. We have seen by modernizing power stations, switching from coal to other appropriate technologies and fuels, you can have a lot of other benefits. Global environmental conditions can improve. You can have a lot of benefits by the proper choice of technology and technology innovation. Both are very important. The main issue now is technology choice and technology innovation, the development and implementation.

Yoshikawa: Thank you. In this symposium, also there have been a lot of discussions about the sustainability of the biosphere. Are there any comments on the sustainability of forests, biological systems or coexistence with the ecological communities? How about comments on insecticides?

Mori: I have a question. We heard a lot of interesting talks about the insects, which I have never heard before. We heard there are many, many species. Is it true species are always disappearing and appearing? There must be changes, and probably it's natural for things to disappear and to appear, right? In a sense, you don't necessarily want to preserve every species of insect? Is that true or not? For example, I like birds. We always say we should save every species of bird. Is that true for insects also?

Futai: To my knowledge, maybe every year many, many organisms are

disappearing, not appearing. For one new species to appear it takes a long time. It's almost impossible for humankind to discover, but humankind has discovered so many disappearances of organisms. We have a red data book and every year we have to face the crisis of disappearance organisms, so frequently. This is my understanding.

Mori: So you think it's bad that species disappear?

Futai: Bad.

Vangnai: Disappearing or appearing is not only a natural phenomenon. Sometimes it depends on human activity. For example, sometimes we use chemicals such as pesticides too much, so some insects disappear and some appear. Basically, this is about human coexistence with nature. We do something more to nature, so nature changes. If we improve the quality of environment, probably birds or insects that we want to see could appear and increase the numbers again. So, we have to improve the environmental co-existence between humans and nature.

Tan: My name is Keng Hong Tan (The International Plant Protection Convention). This topic reminds me of my recent visit to Fitzwilliam Museum, University of Cambridge, England, where an antique porcelain vase, which was previously broken into hundreds of pieces, was reassembled for public display. Beside the vase, was a poster that briefly defined unwelcome visitors/pests - these range from fungi, insects, rats to the worst and most dangerous - humans. We constantly talk about many species going extinct due to human activities such as environmental contamination, deforestation and over exploitation of natural resources. Most of our technological developments are so anthropocentric, focusing only on the human needs, that we ignore our environment and the importance of maintaining our rich biodiversity. We often forget that human activities based purely on economic consideration without consideration for the rich biodiversity in this world, and the needs of our future generations should be totally discouraged. I am for technology, but technological developments should help protect our precious environment; and at the same time we must also consider that whatever we do on a large scale some species, be they microorganisms, insects or other large organisms, are going to be affected directly or indirectly.. Some may strike back at mankind sooner or later. I fear that due to our indiscriminate and inconsiderate destruction of natural ecosystems, human beings may one day become an endangered species

due to the wrath of Mother Nature.

Rambo: I agree we tend to be anthropocentric, and there's a very good reason. We're people. Humans have to watch out for themselves. Nobody else is going to. We are destroying species at an excessive rate. There's no question about that. We should do everything possible to control it. At the same time, we're generating new species and our survival is not sure because of microorganisms, because of many disease organisms. Everyone is now worried about avian flu. We've had SARS. We've got HIV. Humans are now the largest biomass target for disease organisms. If you talk to epidemiologists and medical specialists, they're very worried. We're not sure that we're going to keep dominating the ecosystem the way we have now.

Yoshikawa: Is there any comment from the floor about this?

Futai: Yes. From such a viewpoint, I'm sure that every year a new species arises. I agree.

Endo: My name is Takashi Endo (GS Agriculture, KU). I think that that comment is just for the low-level organisms, the microorganisms. We are worrying about high-level species, the mammals and birds, and their extinction. I don't know about diseases. Probably we don't want to cooperate with them, but we are worrying about the extinction of fish and mammals and birds. They cannot be replaced so easily. Evolution is one-way. There's no coming back. There's no return. They are going to extinct. That's all. This harmonious coexistence, I don't believe in that for diseases. The point is how long we can sustain human beings or how we evade a catastrophe. Sometimes species go extinct due to some other things, so that's something we must worry about. That's my opinion.

Fujisaki: My name is Kenji Fujisaki (GS Agriculture, KU). I think that self-sufficiency in Japan is very, very low, less than 40%. It leads to a very serious problem because Japan imports many agricultural products as well as forest resources and many other resources from foreign countries. It will lead to the destruction of forests and the marine environment and a marked decrease in biological diversity all around the world. I believe we must increase the self-sufficiency of agricultural production. What do you think about this, audience or panel members?

Iai: Increasing the self-sufficiency is one way of solving the problem, but it is not the only solution. Actually, the Kyoto Protocol calls for what is called a "clean development mechanism." That is just like Japan. Japan at certain times has abandoned the idea of producing all foods. We decided to import most foods to Japan from other countries. Because of that, Japan efficiently kept the ecological burden to a very low optimum level. In order to solve this problem on the global scale they offered the other mechanism. That is called the "clean development mechanism." Japan decided not to directly put the burden on the biological environment, but Japan can actually invent and do something provided by other means to the other countries, like China, India and other Asian countries to do much more in the new way of doing agriculture. In that way, actually we can be successful in minimizing the environmental burden in the global scale.

Vangnai: I have something to add on the clean mechanism. Basically, most of the non-renewable resources in the world have been used to produce things we need, for so many things for human activities. Working with bioconversion of biomass, I would encourage people to use more biomass. Especially in Asian countries, like in Thailand, we have so much diverse biomass to use as a substrate. If we encourage this, we could improve the process of production to use bio-production to produce so many things and generate less waste. In this sense, we might reduce the toxic waste generated and accumulated in the environment. This environmental-friendly bioconversion is to encourage a more harmonious coexistence between humans and nature. Besides the human-nature relationship, as for human and human coexistence, we can have collaboration and work together in the Asian countries to improve this cleaning process, in another word, a biological process.

Yoshikawa: Thank you. Some ways to keep a harmonious coexistence have been presented now. I think there is a lot of diversity in Asian countries, very rich and poor and also the diverse production. Among Asian countries, how can we have harmonious coexistence? I think this will become a very important issue in the near future. If you have some comment on this, please give some ideas.

Garg: This is possible if we have a common goal. There's no doubt about that in each country the priority can be different. We know the problems in developing countries are more or less the same. Almost all are importing energy. In almost all,

to some extent even food is being imported. Poverty is also there to some extent. Health in these countries is another concern. The land is also becoming infertile. We have common problems. Of course collaboration and cooperation is required, no doubt. We have to learn from each other. That is why we are meeting. As I said, even the developed and developing countries have made a forum. Similarly, a forum should be made among the less developed and developed Asian countries or even the very much less developed countries within the Asian region.

There are many things to learn from each other. I talk about renewable energy. We are leader in Renewable Energy field in Asian countries but we should tell others how we have gone about this. The less developed countries have to learn from India or China the secrets of progressing. In India, as I have said earlier, the growth rate was very low, 3-4 percent. Now it is reaching almost 8-9 percent. The same is also true in China. Earlier we had closed economy now we have open economy. One is to be more flexible, more open and willing to cooperate because nobody will come forward and give you the technology. Nobody will come and give you the resources or the money. You have to have collaboration with your neighbors for development. Priorities are definitely different, like poverty. There's no doubt about that. Energy shortage is also an issue. I know even Japan is importing energy and food and many other agriculture products, but technology-wise there is no comparison in the world. It is mutual. Coexistence from that point of view is very good, but we have to give and take. What we in India say is give and take. For survival you have to give something and you have to take something. Thank you.

Chulalaksananukul: May I propose some proposal for this panel discussion? The Kyoto Protocol is very famous. Everybody knows it very well. This is a good occasion where we should discuss many objectives and ideas. Can we propose a conclusion from this meeting to make another protocol and we can ask for everybody to give his idea?

Yoshikawa: Are there any ideas about that?

Chulalaksananukul: The Second Kyoto Protocol.

Iai: It is certainly a good idea to do something that is a continuation of the Kyoto Protocol. One thing about the Kyoto Protocol is the major objective of the Kyoto

Protocol was to reduce the current burden on the environment and the climate. I have a feeling that if we look at the rate of change in the climate as well as the change within the ecosystem, at the current rate we have to accept the change in the coming 30 years in the environment, climate and ecosystems as well as natural resources and energy, as well. After the Kyoto Protocol, perhaps we need something to actually adapt to the climate change rather than just taking the original idea of shaping the reduction of the burden on the planet. As I have pointed out in my keynote lecture yesterday, the current state of that burden seems to be that critical.

Garg: I think this is not the forum to adopt a protocol. We are all educationists. Our objective is very different. It's to educate. We can educate even the policy makers and Ministers. We are scientists. I think we have to identify the reasons why we are not able to reach the target. We have to keep that in mind. Even Japan, which is so technically advanced, is not able to make the target. Why? We have to identify and list the reasons. We must know. That is our aim. I think we need not to have a protocol but to create awareness, to educate each other, to know each other, to identify the gaps. What is going on in the world? Why has the tsunami took place? What has gone wrong? Why were we not able to predict it beforehand? How can we predict it? This forum is very different. We are not politicians.

Yoshikawa: Yes, you are right. But still from the viewpoint of academia maybe we can suggest some direction.

Garg: That is what perhaps what we can discuss.

Yoshikawa: The subject is so wide that I cannot make it more compact, but in the symposium a lot of presentations were about the natural systems or life systems. For harmonious coexistence with ecological systems, what is the most important subject to be developed? What should we do to construct a harmonious coexistence? Are there some comments on this?

Ueda: My name is Mitsuyoshi Ueda (GS Agriculture, KU). Coexistence is a very difficult word. The meaning is very heavy and I think that it seems to be hopeless. However, coexistence is very significant for the world and the next generation, and thinking how or what is coexistence is important. We again think about what is sustainability or what is a sustainable level? Professor Garg commented that the

choice of technology could change the sustainable levels in the world, in each country or in the fields of research. I would like to discuss about the new concept, Harmonious Coexistence, instead of Sustainability. Yesterday, Professor Hiramatsu talked about the word, Glocalization. It is a very new word including sustainability. Then, the next topic in this panel discussion is how or what coexistence is necessary.

Yoshikawa: OK. Our discussion will be changed to glocalization. If possible, Professor Kozo Hiramatsu (GS Asian and African Area Studies, KU) will give us some ideas about the importance of glocalization.

Hiramatsu: I think "glocalization" is connected with views. When we talk about globalization, we have a view from the sky. It is a bird's-eye view. On the contrary, locals have a view of worms. They walk around on the ground, crawl around in the paddy field, but not fly over the sky. "Glocalization" is a word for combining the two views. Everybody knows that a motto of the environmental movement is "Thinking globally, act locally." This means the combination of two different views from the sky and from the ground. Field workers go to their field, live in the local villages and do surveys for years. We do not know if our knowledge of field works has something to do with sustainability because livelihood of locals has been more or less sustained as it is. It may be safe to say that the livelihood of the locals has been destroyed mostly by wars and disasters which local people can hardly control. So the researchers of area studies are required to have the two different views as the environmental activists need to have. The disciplines of participants of this symposium vary from bird's-eye view to worm's-eye view and this is really a good opportunity for researchers of Kyoto University where professors and students are vertically constructed.

Mori: I have a comment on natural disasters. You mentioned floods or natural disasters, and actually what you said is very appropriate. You have an earthquake or a tsunami and from a geophysical point of view or scientific point of view we try to understand the phenomenon and try to explain to people what the hazard is, but when we really get down to addressing the damage or the risk it's very different from country to country. I think that's obvious. In Japan building standards are very different from Indonesia or from India. We see very often that even though the earthquake shakes in the same way in Japan as it does in India the actual damage patterns or what you would do to mitigate the damage is very

different.

This is becoming increasingly a larger problem with great urbanization. Now we have big cities and we're really concentrating people. We're concentrating infrastructure. For example, we heard today about the problems in the region of the airport due to flooding there. That's just another example of the kind societal construction that we make and have to do directly with natural disasters. If the airport weren't there, we wouldn't have those problems.

In the same way, we have a very complex transportation system. Likewise, they become very susceptible to even small events. Everyone knows that the Kobe Earthquake was a very disastrous earthquake but from a seismologist's point of view that actually was not a large event. It was relatively small. An earthquake of that size happens maybe 50 or 60 times a year somewhere in the world. It was just the unfortunate fact that that particular quake happened right underneath a very densely populated Japanese city and that's why 6,000 people were killed and there was so much damage. That's why locally it's very important to deal with natural disasters, especially. In Japan we work very hard to improve our buildings. We hope there's not an earthquake when we're riding the bullet train to Tokyo or when the typhoons are coming we hope we're not near the shore.

I was in Indonesia during the summer. Actually I was in the country when that tsunami happened that we heard talked about today. People didn't feel the earthquake in Java in July. That's why 500 people were killed, because they didn't know to run. That's a local problem and could actually be solved with the kind of technology that Japan has, like tsunami warnings. The point is exactly what you were saying. Solutions differ very much on a local level even though the problems are very common on a very large scale. Maybe seeing that sequence of where you go from the broad commonality to the individual solutions and details is a real challenge in the future for putting together these kinds of projects.

Yoshikawa: Thank you. Are there any other comments on glocalization?

Rambo: There's one thing. I think the question was, "What can Kyoto University do in terms of field science?" There are several places in Southeast Asia where Kyoto University has been doing research for a very long time. Actually, work started in the 1960's at Dong Daeng in northeast Thailand and then was followed

up by Professor Fukui's group in the 80's. I believe there's currently an ongoing restudy in Dong Daeng. There's a site in northern Vietnam started more recently by Professor Sakurai of Tokyo University, but with Kyoto University scholars involved. These are very precious in that they give a longitudinal view of change both in the environment and in the societies. I think finding ways to maintain that information when people retire, for example, is very, very important. I don't know if there really is a mechanism to keep that as a long-term operation.

Yoshikawa: Thank you. We are almost finishing, so I want to move on to the next subject on collaborations among Asian nations. I think for harmonious coexistence we should establish some kind of very good collaborative network among Asian countries. There is a lot of experience at Kyoto University of collaborations with Asian countries. If possible, could you please comment on this?

Garg: Yes, I know the importance of networking. I was involved in this process. I was involved in networking in Madhya Pradesh. I was Principal Secretary in Madhya Pradesh government, one of the largest states in India. The capital of Madhya Pradesh is Bhopal. In Bhopal there were 52 institutions including, scientific, technological, educational, medical and scientific departments. Nobody knew each other, what is going on, what are they doing, what kind facilities they have in their laboratories and the books available in their libraries. The first thing I did was networking of scientific institutions so that we know each other. It helped in solving many problems. It has helped knowing each other, each others specialization, areas of research, amending duplication, resource sharing, facilities available, etc.

The same is true with networking within a country and outside a country. Networking should be given top priority. It's very important. This will save a lot of energy, a lot of time, a lot of work and a lot of resources. But we have to keep an objective in mind while networking. Networking for what? What is the objective? The target is also very important. It should be achievable. We have to do networking with our partners. We have to make a networking with an objective. We have to make a network with a goal in mind. Objectives should be well-defined and should be achievable. I will support this networking. I have congratulate and would like to again congratulate Professor Dr. Susumu Yoshikawa for taking a lead in this direction. This is a good beginning for Asian countries.

Vangnai: Actually there are already several networks in Asian countries. As Professor Garg talked about, we should have a precise target for networking. One of the networks or the societies that has been created is the Asian Society for Environmental Biotechnology. From the name, we can guess that we are focusing on humans and nature regarding the application of biotechnology for environment. We want to apply the technology we have, either biological systems or chemical systems, either to treat our environment, to clean it up, to make it better system and processes, and to improve the humans' quality of lives. This society, the ASEB, is only in the beginning stage.

Actually, I have been contacted from Professor Otake, one of the main organizers of this Asian society. We met in Germany during the meeting called ISEB. The ISEB is the International Society for Environmental Biotechnology, while ESEB is a European society. As you seem other countries already have these societies. They are all concerned about the environment and humans. Now it's our turn to think about our environment, our nature. We, as Asian people, have also thought of this and have started this Asian Society of Environmental Biotechnology. It is a good opportunity for Asian countries. In Thailand we didn't have it before, but now Japanese people have started it and we agreed to get involved in the society. Why? It's for us, it is to improve the environment for our countries. This is one of the benefits of getting together to have a good network between Asian countries. This is my point of view.

Chulalaksananukul: I have an excellent example because now our group is interested in Biofuel production by biocatalyst. I pay an annual visit to France because I have got relationship during my PhD with my laboratory. I knew that the large company called the Airbus Company provided the budget to do research on Biocatalyst for Biodiesel production for the regional cooperation. I had opportunity to discuss it with my French colleagues at INSA in France. They are interested in the field of Biofuel production from natural resources. The interesting feedstock in Europe is rapeseed. It's different from other countries. I'd like to talk about the strong point of Asian countries in the field different from other parts of the world. I think about technology. Japan is prominent in technology, like Professor Ueda from Kyoto University. He is an expert and very famous in biofuel, so we invited him to give a lecture in Bangkok and established the first collaboration. I suppose that in Asian countries we have various types of biomass whereas Japan has right now the excellent green technology. Regional

cooperation is therefore very important for all countries.

Yoshikawa: Thank you. How about you?

Rambo: Well, it's a little difficult for me as an American to comment on Asian cooperation.

Yoshikawa: Now you're in Thailand.

Rambo: Right. I think the point that Prof. Garg made about "networking for what" is the critical question. Unless there's some mutual benefit that people get out of the network, it won't work. I can speak from experience with American institutions. There's been far too much donor-driven networking, which is somebody sits in New York or Washington or Tokyo and thinks, "We ought to have a network about this or that," and then they go out and they try to get people in Southeast Asian countries to join. I think it needs to be a very different approach to be successful, which again Kyoto University is admirably placed to develop. Find out what people in Southeast Asia want to do and then tie them together with capabilities in Japan to form a real network.

Futai: My idea is the same as Dr. Rambo's idea, but I experienced very curious matters in my field. In Japan we've already experienced the Pine Wilt Disease for a long time, 30 years or more. Many, many protection procedures have already been developed. In the end, we failed to control that. Right now our neighboring countries China and Korea also have a very serious situation but they are still trying to repeat our failed experience. My opinion is the most important point is sharing information. We have to write our results just in Japanese, especially in our field. It's very bad. I think sharing important information is the most important thing to make a good network.

Yoshikawa: Thank you very much. Our time is already up, so I want to ask Professor Mori to summarize and conclude.

Mori: I don't know if it's a summary, but just to wrap things up based on the comments made, we were talking about sustainability. We heard that we have a problem. We heard the populations are increasing. Our footprint is too large. If we continue doing what we are doing now we are going to end up with some very bad

problems in terms of the survival of the human species.

What have we been talking about to solve that problem? Coexistence seems to be one of the keywords. Coexistence of what? Well, coexistence within a lot of the other biologic communities that we've been hearing about. This includes very large species, such as mammals and birds, down to the various tiny microbes that we're learning a lot about and actually may be the key to some of the problems. There may be a lot of new solutions hidden right now for us at that level. We talked a lot about the biological aspects in terms of coexisting over the next few decades. The other major point that we've been talking about with coexistence is the energy problem. We saw over and over again that we're using too much of certain types of energy and we need to change the way we are consuming the different types of energy. There actually seem to be some very promising options on the horizon that the research is pointing at. One thing that was actually very new to me was hearing about this biomass energy. That again ties us back into some of the biological discussions that we had.

There are problems, but it looks like there are some possible solutions. We talked about coexistence. The next thing we talked about was this harmonious existence. Is that the right word? I got that. We moved from coexisting to harmoniously existing. What does that mean? I think it's very clear that especially in Southeast Asia we do have to cooperate with the other countries. It's certainly not going to be a one-way street where the more developed countries are telling the smaller countries what to do. We've heard over and over that there are just different priorities in some of the underdeveloped countries which maybe at this point especially the U.S. does not understand very well. Maybe that's a place where Kyoto can play a very important role in being the mediator there and being the person that can communicate between the highly developed countries and the more developing countries in Southeast Asia.

We've also heard that a lot of this harmonious coexistence means communication. We have to learn to communicate well. We are communicating well. Actually, one point is for me talking here is very easy because I'm speaking in English, but I realize the English speakers in this audience are maybe half a dozen or so. I just applaud the efforts people go to to actually try to speak in a language that's not their mother tongue. I know now how that it is. It's hard, but I think it's probably a necessity in a world where people really are growing up with different languages.

That's just another hurdle that we have to overcome.

Just as a closing comment, I'd like to mention one thing that's just my own opinion. Often we get to these kinds of meetings and especially people in my field, earthquakes and volcanoes, always just say the bad things. We say, "There's going to be an earthquake. It's going to destroy your city," or "This volcano is going to erupt so you have to prepare. The typhoons are coming so the floods are going to wipe out all the urban areas." Actually, that's very easy. It's very easy to say the bad things. It's very easy to say that there's global warming so the sea level is going to rise. It's very easy to talk about all the problems that are coming out. It's difficult to find a solution. Actually in one sense I was very surprised to hear about some of the new solutions that are going on here like some of the things we're learning from the biotech people, from the microbes. In a sense I think that's really the promising part of this kind of meeting. Now we've all heard the problems several times, and that's important. We have to understand the problems, but probably the really important step now is to go out and solve the problems. I'll stop there.

Yoshikawa: Thank you very much for your kind cooperation. Now, I want to close this panel discussion. Thank you very much for your important comments and fruitful discussions.

編 集 後 記

今回のシンポジウムは、本学の半世紀にわたる東南アジアでの地域研究の蓄積が背景となり、先端の科学や技術の諸分野における新知識が語られる場合にも、多様な歴史と文化のなかに暮らす人間にとって、それらがどのような意味を持つかを多角的に考えさせられる機会となった。とくに、後半でとりあげた人間と人工物の共存という課題が、そのような思考を促した。人工環境研究 ― それは自然と人間との共存という年来の研究課題とともに、今後さらに重みを増すだろう。エネルギー開発をはじめ、情報伝達処理や生命操作にかかわる技術、その他数かずの新技術によって増殖しつづける時空の全貌をどのように捉えるか ― 真剣に取り組むほどに、旧来の人間観、自然観がゆらぎ、あらたな世界観をさぐる営みとならざるを得ない。京都大学国際交流推進機構は、このような視野を忘れない知識人の活躍を支援してゆきたい。

この報告書の出版は、シンポジウム実施から４ヶ月後となった。各発言者による校閲に時間がかかったことと、年度末にさしかかり、学内でいくつかの職を兼務している筆者の不手際がいや増したためである。本冊をお手にされる方は、どうか気分を新たにご一読くださり、ご批評を賜れば幸いである。このような報告書の編集作業は、シンポジウム組織委員会と国際交流推進機構の共同によるのが、本来望ましい姿であろう。ただ今回は、諸般の事情から、国際交流推進機構が引き受けることになった。編集作業には、国際部国際交流課の皆様の特段のご理解、ご協力を得た。とくに同課の対外政策グループの　田代　恵氏のご尽力に支えられた。さらに英文校閲については、同課の　グレース・スダ氏、また、大学院地球環境学堂三才学林の学術誌 *Sansai* の編集長である　トレイシー・ガノン助教授からも、文体に関する貴重な教示を受けた。記して謝意を表したい。

（横山　記）

Editor's Note

This symposium strongly reminded me of the past fifty years of Kyoto University's collaboration with universities in Southeast Asia. Whenever new scientific discoveries came under discussion during the sessions of the symposium, participants gained the opportunity to broaden their minds and evaluate their new knowledge in terms not only of their respective academic groups, but of the wider community of people living in Southeast Asia, with its long history and rich cultural diversity. In the context of these discussions, I was not surprised to find that the academic importance of one of the concerns of the symposium – 'reappraisal of the relationship between humans and their "man-made" environment' – increased substantially. This theme may well encourage scholars to keep on reconsidering conventional ideas of Nature and Humanity.

I am grateful to all the speakers who cooperated with me in revising the draft transcriptions of speeches and comments given at the symposium. Special thanks are due to Ms. Megumi Tashiro and Ms. Grace Suda of the office of the Foreign Affairs Division, Kyoto University for their kind cooperation with me in producing this report. Also I should like to express my gratitude to Dr. Tracey Gannon, Associate Professor of Kyoto University's new Graduate School of Global Environmental Studies, and Editor of the School's periodical, *SANSAI: An Environmental Journal for the Global Community*, for her valuable suggestions to improve the language in some parts of the text. (T.Y.)

第 8 回京都大学国際シンポジウム
The 8th Kyoto University International Symposium
「地球社会の調和ある共存にむけて」
"Towards Harmonious Coexistence within Human and Ecological Community on This Planet"
– 中間報告書／AN INTERIM REPORT –
編者 横山俊夫・田代　恵
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京 都 大 学 基 本 理 念

京都大学は、創立以来築いてきた自由の学風を継承し、発展させつつ、多元的な課題の解決に挑戦し、地球社会の調和ある共存に貢献するため、自由と調和を基礎に、ここに基本理念を定める。

研　究

1. 京都大学は、研究の自由と自主を基礎に、高い倫理性を備えた研究活動により、世界的に卓越した知の創造を行う。

2. 京都大学は、総合大学として、基礎研究と応用研究、文科系と理科系の研究の多様な発展と統合をはかる。

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4. 京都大学は、教養が豊かで人間性が高く責任を重んじ、地球社会の調和ある共存に寄与する、優れた研究者と高度の専門能力をもつ人材を育成する。

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5. 京都大学は、開かれた大学として、日本および地域の社会との連携を強めるとともに、自由と調和に基づく知を社会に伝える。

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