ANNEX 1

JAPAN – MEASURES AFFECTING THE IMPORTATION OF APPLES (WT/DS245)

RECOURSE TO ARTICLE 21.5 OF THE DSU BY THE UNITED STATES

Working Procedures for the Panel

1. In its proceedings the Panel shall follow the relevant provisions of the Dispute Settlement Understanding (DSU). In addition, the following working procedures shall apply.

2. The Panel shall meet in closed session. The parties to the dispute, and interested third parties, shall be present at the meetings only when invited by the Panel to appear before it.

3. The deliberations of the Panel and the documents submitted to it shall be kept confidential. Nothing in the DSU shall preclude a party to a dispute from disclosing statements of its own positions to the public. Members shall treat as confidential information submitted by another Member to the Panel which that Member has designated as confidential. Where a party to a dispute submits a confidential version of its written submissions to the Panel, it shall also, upon request of a Member, provide a non-confidential summary of the information contained in its submissions that could be disclosed to the public.

4. Before the substantive meeting of the Panel with the parties, the parties to the dispute shall transmit to the Panel written submissions and subsequently written rebuttals in which they present the facts of the case, their arguments and their counter-arguments, respectively. Third parties may transmit to the Panel written submissions after the rebuttals of the parties have been submitted.

5. All third parties which have notified their interest in the dispute to the Dispute Settlement Body shall be invited in writing to present their views during a session of the substantive meeting of the Panel set aside for that purpose. All such third parties may be present during the entirety of this session.

6. At its substantive meeting with the parties, the Panel shall ask the United States to present its case first. Subsequently, and still at the same meeting, Japan will be asked to present its point of view. Third parties will be asked to present their views thereafter at a separate session of the same meeting set aside for that purpose. The parties will then be allowed an opportunity for final statements, with the United States presenting its statement first.

7. The Panel may at any time put questions to the parties and to the third parties and ask them for explanations either in the course of the substantive meeting or in writing. Answers to questions shall be submitted in writing by the date specified by the Panel.

8. In the interest of full transparency, the oral presentations shall be made in the presence of the parties. Moreover, each party's written submissions, including answers to questions put by the Panel, shall be made available to the other party. Third parties shall receive copies of the parties' first written submissions and rebuttals. Parties shall submit all factual evidence to the Panel as early as possible and no later than during the substantive meeting, except with respect to evidence necessary for purposes of rebuttals or answers to questions. Exceptions will be granted upon a showing of good cause. In such cases, the other party shall be accorded a period of time for comment, as appropriate.

9. Within fifteen (15) days following the hearing with the Panel, each of the parties and third parties is invited to provide the Panel with an executive summary of the factual and arguments

sections contained in their written submissions and oral presentations, as applicable These executive summaries will be used only for the purpose of assisting the Panel in drafting a concise factual and arguments section of the Panel report so as to facilitate timely translation and circulation of the Panel report to the Members. They shall not serve in any way as a substitute for the submissions of the parties. The summary to be provided by each party should not exceed 25 pages in length and shall summarize in separate sections the content of their first written submission, their rebuttal submission and their oral presentation. The summary to be provided by each third party shall summarize in separate sections their written and oral submissions, as applicable, and should not exceed 3 pages in length. The Panel may, in light of further developments, allow the parties and third parties to submit longer summaries.

10. To facilitate the maintenance of the record of the dispute, and to maximize the clarity of submissions, in particular the references to exhibits submitted by parties, parties shall sequentially number their exhibits throughout the course of the dispute. For example, exhibits submitted by the United States could be numbered US-1, US-2, etc. If the last exhibit in connection with the first submission was numbered US-5, the first exhibit of the next submission thus would be numbered US-6.

11. Following the issuance of the interim report, the parties shall have two weeks to submit written requests to review precise aspects of the interim report. Following receipt of any written requests for review, each party shall have one week to submit written comments on the other party's written request for review. Such comments shall be strictly limited to commenting on the other party's written request for review.

12. The parties and third parties to this proceeding have the right to determine the composition of their own delegations. Delegations may include, as representatives of the government concerned, private counsel and advisers. The parties and third parties shall have responsibility for all members of their delegations and shall ensure that all members of their delegations, as well as any other advisors consulted by a party or third party, act in accordance with the rules of the DSU and the working procedures of this Panel, particularly in regard to confidentiality of the proceedings. Parties shall provide a list of the participants of their delegation before or at the beginning of any meeting with the Panel.

13. Any request for a preliminary ruling (including rulings on jurisdictional issues) to be made by the Panel shall be submitted no later than in a party's first written submission. If the United States requests any such ruling, Japan shall submit its response to such a request in its first written submission. If Japan requests any such ruling, the United States shall submit its response to such a request in its rebuttal submission. Exceptions to this procedure will be granted upon a showing of good cause.

14. The following procedures regarding service of documents shall apply:

(a) Each party shall serve its submissions directly on the other party. Each party shall, in addition, serve its first written submission and rebuttals on third parties. Each third party shall serve its submissions on the parties and other third parties. Each party and third party shall confirm in writing, at the time it provides the submission to the Secretariat, that copies have been served as required.

(b) The parties and the third parties should provide their written submissions by 5:00 p.m. on the due dates established by the Panel, so that there is still time for distribution to the Panel on that date.

(c) (The parties and the third parties shall provide the Secretariat with 8 paper copies of their written submissions as well as an "electronic" copy of the submissions on a diskette or as an e-mail attachment, if possible in a format compatible with the Secretariat's software. Paper copies shall be delivered to the Dispute Settlement Registrar, Mr. Ferdinand Ferranco (Room 3154). Electronic copies may be sent by e-mail to Mr. Ferranco, Ms Serra Ayral, Ms Gretchen Stanton, Ms Kerry Allbeury and Mr. Yves Renouf.

(d) Parties and third parties shall provide the Secretariat with written copies of their oral statements no later than close of business on the day following the date of the presentation. Written replies to questions shall be submitted at the date decided by the Panel.

15. These working procedures may be modified by the Panel as appropriate, after having consulted the parties.

ANNEX 2

ABBREVIATIONS USED FOR DISPUTE SETTLEMENT CASES REFERRED TO IN THE REPORT

Short Title	Full Case Title and Citation
Australia – Salmon	Appellate Body Report, *Australia – Measures Affecting Importation of Salmon*, WT/DS18/AB/R, adopted 6 November 1998, DSR 1998:VIII, 3327
Australia – Salmon	Panel Report, *Australia – Measures Affecting Importation of Salmon*, WT/DS18/R and Corr.1, adopted 6 November 1998, as modified by the Appellate Body Report, WT/DS18/AB/R, DSR 1998:VIII, 3407
Australia – Salmon (Article 21.5 – Canada)	Panel Report, *Australia – Measures Affecting Importation of Salmon – Recourse to Article 21.5 of the DSU by Canada*, WT/DS18/RW, adopted 20 March 2000, DSR 2000:IV, 2031
Canada – Aircraft (Article 21.5 – Brazil)	Appellate Body Report, *Canada – Measures Affecting the Export of Civilian Aircraft – Recourse by Brazil to Article 21.5 of the DSU*, WT/DS70/AB/RW, adopted 4 August 2000, DSR 2000:IX, 4299
Chile – Price Band System	Appellate Body Report, *Chile – Price Band System and Safeguard Measures Relating to Certain Agricultural Products*, WT/DS207/AB/R, adopted 23 October 2002
EC – Bed Linen (Article 21.5 – India)	Appellate Body Report, *European Communities – Anti-Dumping Duties on Imports of Cotton-Type Bed Linen from India – Recourse to Article 21.5 of the DSU by India*, WT/DS141/AB/RW, adopted 24 April 2003
EC – Hormones	Appellate Body Report, *EC Measures Concerning Meat and Meat Products (Hormones)*, WT/DS26/AB/R, WT/DS48/AB/R, adopted 13 February 1998, DSR 1998:I, 135
India – Autos	Panel Report, *India – Measures Affecting the Automotive Sector*, WT/DS146/R, WT/DS175/R and Corr.1, adopted 5 April 2002
India – Patents (US)	Appellate Body Report, *India – Patent Protection for Pharmaceutical and Agricultural Chemical Products*, WT/DS50/AB/R, adopted 16 January 1998, DSR 1998:I, 9
Japan – Agricultural Products II	Appellate Body Report, *Japan – Measures Affecting Agricultural Products*, WT/DS76/AB/R, adopted 19 March 1999, DSR 1999:I, 277
Japan – Apples	Appellate Body Report, *Japan - Measures Affecting the Importation of Apples*, WT/DS245/AB/R, adopted 10 December 2003
Japan – Apples	Panel Report, *Japan – Measures Affecting the Importation of Apples*, WT/DS245/R, adopted 10 December 2003, as upheld by the Appellate Body Report, WT/DS245/AB/R
Japan – Leather II (US)	GATT Panel Report, *Panel on Japanese Measures on Imports of Leather*, adopted 15 May 1984, BISD 31S/94
Mexico – Corn Syrup (Article 21.5 – US)	Appellate Body Report, *Mexico – Anti-Dumping Investigation of High Fructose Corn Syrup (HFCS) from the United States – Recourse to Article 21.5 of the DSU by the United States*, WT/DS132/AB/RW, adopted 21 November 2001, DSR 2001:XIII, 6675
US – Lead and Bismuth II	Appellate Body Report, *United States – Imposition of Countervailing Duties on Certain Hot-Rolled Lead and Bismuth Carbon Steel Products Originating in the United Kingdom*, WT/DS138/AB/R, adopted 7 June 2000, DSR 2000:V, 2595
US – Shrimp (Article 21.5 – Malaysia)	Appellate Body Report, *United States – Import Prohibition of Certain Shrimp and Shrimp Products – Recourse to Article 21.5 of the DSU by Malaysia*, WT/DS58/AB/RW, adopted 21 November 2001, DSR 2001:XIII, 6481
US – Section 301 Trade Act	Panel Report, *United States – Sections 301-310 of the Trade Act of 1974*, WT/DS152/R, adopted 27 January 2000, DSR 2000:II, 815
US – Wool Shirts and Blouses	Appellate Body Report, *United States – Measure Affecting Imports of Woven Wool Shirts and Blouses from India*, WT/DS33/AB/R and Corr.1, adopted 23 May 1997, DSR 1997:I, 323

ANNEX 3

TRANSCRIPT FROM PANEL MEETING WITH EXPERTS OF 12 JANUARY 2005

Chair

1. I would like to begin by welcoming the parties and the panel's expert advisers, Doctors Geider, Hale, Hayward and Smith to this meeting of the Panel on Japan – Measures Affecting the Importation of Apples, Recourse to Article 21.5.

2. The Panel has agreed to the Japanese delegation's request for them to provide continuous and consecutive modes of translation between Japanese and English, and may I request that Japan confirm that all the necessary arrangements are in place? Thank you.

3. Let me begin by introducing the Members of the Panel: Dr Kathy-Ann Brown, Mr Christian Haeberli and myself, Michael Cartland, who will be acting as Chair of the Panel. I recall that the proceedings of this meeting are being recorded; therefore, when taking the floor, representatives are asked to use their microphones. It is not only for the recording but also for the translation.

4. I would like now to invite each of our experts to introduce themselves, beginning with Dr Geider.

Dr Geider

5. I am Professor of molecular genetics and phytopathology at the University of Heidelberg in Germany. One thing which has changed after the last meeting two years ago is that I am now located at the BBA, which is the Federal Biological Research Organization, near Heidelberg too. It is not actually the same place. The BBA is dedicated to more applied science and they do research on fire blight. They have an experimental orchard where they can do assays with the pathogen and they have S2 or L2 equipment, greenhouse facilities. It is a good environment for applied molecular science also connected to fire blight. One thing I may mention too, which is a little bit personal, is that I am also a good friend of Cal Kado at the University of Davis and I got involved in the Lux Reporter System twenty years ago. I was probably one of the first people who got these plasmids and I have been working with these genes for quite a bit of time. Later on in the meeting I may come back to that position that I am quite familiar with this signalling system used in many bacteria and also in other systems like micro organisms, or in plants.

Dr Hale

6. I have recently retired over the last eighteen months since we last had our meeting, and I am now a Consultant, specializing in plant protection. I am an Honorary Research Fellow of the Horticulture & Food Research Institute of New Zealand, which means that I still have an office in the Research Institute and still involved in some of the day-to-day laboratory work which is going on there. I am a Fellow of the New Zealand Society for Horticulture Science and now the Vice-Chair of the Plant Protection Commission of the International Society for Horticultural Science. Instead of being a practising scientist now, I work more in the consulting area.

Dr Hayward

7. I am a retired academic from the University of Queensland in Australia. I retired in July 1997 and then I set myself up as a consultant on bacterial plant diseases. The only other current work I have is in relation to the application by the Philippines to export bananas to Australia, and that is the same situation as it was two years ago.

Dr Smith

8. I am a plant pathologist, Ian Smith, but for the last twenty-five years I have been working for the European and Mediterranean Plant Protection Organization, which is a European organization concerned with plant quarantine and with the development of recommendations on technically justified phytosanitary measures for the European countries, and the pest risk analysis, which is done in support of this. Although, I am familiar with the fire blight disease, my expertise lies rather more in the more general area of phytosanitary measures.

Chair

9. Turning now to the presentation of delegations, perhaps I could invite the Heads of Delegations to introduce themselves and the other Members of their delegations. If you have not yet done so, but I see that you have, please submit a list of your delegation's members to the Panel secretary. I think that has already been taken care of. Perhaps I can begin with the United States.

United States

10. Good afternoon Mr. Chairman, members of the Panel. My name is Jay Taylor, and I am an Assistant General Council with the Office of the United States Trade Representative. I was not so bold last time, but I will do my best to introduce my delegation to you today.

Stephen Kho, from the US Mission, here in Geneva.

Dr. Rodney Roberts, Research Plant Pathologist from Wenatchee, Washington, USDA/ARS.

Dr. Jay Norelli, Research Plant Pathologist from Kearneysville, West Virginia, USDA/ARS.

Richard White, Director of Sanitary and Phytosanitary Issues for the US Trade Representative's Office.

Doreen Chen-Moulec, at the Japan and Vietnam Desk for the Foreign Agricultural Service in Washington DC.

Mary Revelt from the US Mission here in Geneva.

George York, who is also with the US Mission here in Geneva.

Lottie Erikson, who is with the Animal and Plant Health Inspection Service.

Dr. Kenneth Vick, Senior Program Leader, Post Harvest Entomology, with the Agricultural Research Service, USDA.

Japan

11. Thank you Mr. Chairman and members of the Panel. My name is Toyoharu Fukuda. I am Director of Plant Protection Division, Food Safety and Consumer Affairs Bureau, Ministry of Agriculture, Forestry and Fisheries. Now I would ask each of the Japanese delegation to introduce himself.

Good afternoon. Masaru Kitamura, Legal Advisor to the Ministry of Agriculture.

Masao Goto, Plant Pathologist.

Akira Uchida. I am Deputy Director of the WTO Dispute Settlement Division, Ministry of Foreign Affairs.

Akihito Furuta, International Economic Affairs Division, MAFF.

Junichi Taniuchi, Deputy Director of Plant Protection Division, Food Safety and Consumer Affairs Bureau, Ministry of Agriculture.

Keiichi Higuchi. I am with the Japanese Mission here in Geneva.

Akifumi Mizuno, Ministry of Agriculture in Tokyo.

Chair

12. Thank you very much. As a preliminary matter, I wish to recall that at its meeting of 30 July 2004, the Dispute Settlement Body decided, in accordance with Article 21.5 of the Dispute Settlement Understanding, to refer to the original Panel the matter raised by the United States in document WT/DS245/11. I further recall that the Panel held a first substantive meeting with the parties on 28 October 2004.

13. In the light of the arguments submitted by the parties, the Panel decided to seek technical and scientific advice from experts in this compliance case, focusing on questions relating to relevant scientific developments since the original case and on Japan's new risk assessment. The Panel invited the same experts who participated in the first panel, Doctors Geider, Hale, Hayward and Smith, to serve as scientific experts in this compliance panel. The working procedures were communicated to the experts on 16 November 2004.

14. In accordance with those working procedures, and after comments by the Parties, the Panel communicated questions to the parties. The experts were requested to reply in writing by 15 December 2004 and these replies were communicated to the parties and comments received from the parties on the expert replies were circulated to the experts.

15. The purpose of today's meeting is for the experts to meet with the Panel and the parties to discuss their written responses to the questions and to provide further information. Today's meeting will proceed in the following manner: first, I would like to request the experts to make introductory or general remarks. I will then open the floor for the parties, followed by the Panel, to ask questions. The experts may wish, in particular, to address any point where they believe further clarification is needed in the light of the parties' comments on an earlier response to a question, and finally, I will invite experts to make closing remarks.

16. I would like to remind the parties that the meetings of WTO panels are tape-recorded. The tapes are part of the record of this Panel. So please be sure to use the microphones when addressing the Panel.

17. In addition, parties will recall the requirements relating to confidentiality provided for in Article 18 of the DSU.

18. Unless there are any comments or questions, we can now proceed to hear the experts' introductory remarks.

United States

19. Excuse me Mr. Chairman, the United States would like to make a brief comment. We were concerned upon reading Japan's comments on the experts that it hoped to provide yet another scientific study or set of results in the context of this meeting with the experts. In light of Japan's request, the United States seeks confirmation from the Panel of its statement in its 16 November letter,

in which it restated the text of paragraph 8 of the Working Procedures, setting the time limit on a party's ability to present new evidence absent a finding of good cause by the Panel, and further stating that: "The Panel considers it of particular importance that any evidence which the parties intend to submit during this proceeding, be made available to the scientific experts at the time they received the questions from the Panel, i.e. 25 November 2004." Thank you.

Chair

20. Does Japan have any comment on that statement?

Japan

21. No, we are not going to submit any evidence *per se* at this time.

Chair

22. Thank you very much. I think that answers the point. Are there any other comments or questions at this stage? Mr. Kho.

Mr. Kho

23. Some of us were talking earlier today and we were wondering how the process of the experts would go. We know that last time you went alphabetical order as you just did now and requesting the experts to introduce themselves and poor Dr. Geider had unfortunately to go first all the time and for those of us who were here last time we thought maybe we could spice things up a little and maybe go reverse alphabetical order, or however you choose. Just a suggestion. Thank you.

Chair

24. That's fine by me if that is alright with the experts. We will do it in reverse alphabetical order. If that is all at this stage, I will now invite the experts, in particular, to comment on any point raised by the parties responses to the experts' written replies to questions, and in the context at the same time to make whatever introductory remarks they wish to make. I suggest we hear from the experts in reverse alphabetical order, starting with Dr. Smith.

Dr. Smith

25. Thank you Mr. Chairman. I would like to make a general comment, which is that what we have been asked to do as experts has proved for me rather difficult. We are asked to consider new evidence, which was submitted to us in the form of short papers which contain significant results, which suggest that maybe if more research were done more substantial results could be obtained that might open some new areas of fire blight research. But the possibilities for generating this new information, are limited in the short time span in which this whole operation takes place. The question has been asked: 'Are these scientific papers that we read published?" I feel in the circumstances those questions are hardly relevant. There has not really been time for the information to reach the stage of publication and of appearance in a refereed scientific journal.

26. And secondly, I would say that these papers, which are trying to address all the specific questions connected with the dispute, are not suitable for publication in scientific journals, and possibly would not be accepted for publication in journals simply for that reason. So that the criterion of the refereed article is a difficult one to apply in the circumstances. We, as experts, have almost been asked to do our own refereeing process, indeed I think probably all of us have been referees for articles in journals, in time to judge what reliance we can give to the results as reported. This is an important general issue, because in plant protection there is a large body of scientific evidence on the biology of plant pests and on the economic importance of plant pests. But when we come to information such as whether certain pathways for entry of pests are likely pathways on the one hand,

and on the other hand, whether certain measures taken are likely or not likely to be effective or how likely they are to be effective, we are significantly lacking published information. The only way this information can be obtained is for new research to be done. There is no doubt that the criterion, if it was strictly applied, that scientific information should come from a refereed scientific source is not a practical one in the circumstances. I don't believe it is strictly applied. I think that the information which has been provided to us for consideration, subject to the limitations that it has because it has been done rapidly and recently, does need to be taken seriously into consideration. Thank you.

Dr. Hayward

27. Mr. Chairman, I would like to make two comments. The first one is a minor correction in my answer to question 1. I did look at the website of the Journal of General Plant Pathology, published by Springer, Tokyo, and the associate editors are nineteen in number and twelve of them are from Japan. There are seven non-Japanese and I omitted to include the one from Italy. There are two from Korea, one from Thailand, three from the United States and one from Italy. So that is a minor correction, but I apologise for the error, because I don't think errors should be allowed to get through, no matter how minor.

28. My other comments concern the questions regarding "Potential pathways for transmission of fire blight via apple fruit" (Questions 19 to 24). Over the past four years I have been very much concerned with a completion of the pathway from an imported commodity - tropical fruit, or temperate fruit like apple or pear - the potential for transmission from the imported fruit to a healthy host, whether an ornamental host or an economic host like apple, in the case of fire blight. I have been giving a lot of thought to this question, and I must make the general comment that there is a remarkable lack of evidence. Prior to the SPS Agreement, very few people had done experiments in pathology orchards or any kind of field environment that looked at the possibility of transmission, in other words, the possibility of initiating an infection. Plant pathologists are concerned with preventing epidemics from beginning. So it is not surprising this sort of question, which is now demanded, of the pest risk process after the SPS Agreement, has not been addressed very often. In fact there are very, very few studies, and of course the one study that is relevant in this case is Taylor and Hale and their associates in New Zealand, who have looked at the orchard environment and the potential for spread from artificially infested apple fruit. There is a gap there, so we are forced to the historical record. Briefly, Mr. Chairman, if I may, I would like to bring up the question of citrus canker. There is a message here which is of interest in this context. In Australia we are surrounded by countries like Indonesia, Papua New Guinea, Fiji, many countries which have citrus canker. Australia has detected outbreaks and eradicated outbreaks since about 1912. There have been about six of these outbreaks and there is a current outbreak in a production area. The point of my comments is that all of these outbreaks as far as we can determine, have been brought about by the introduction of planting material.

29. Now, two years ago at a conference in Canberra, the Executive Director of the Citrus Growers of Australia, said that over the past three years in Australia, more than 300 interceptions of infested leaves and of individual fruit had been made at ports of entry into Australia.[1] More than 300 of these, and no less than 10 per cent had been determined as having citrus canker. So the point is that we can guarantee that with sniffer dogs and the improved precision, which we have today at ports of entry (citrus canker specimens mostly picked up at airports), we can assume that this is very close to 100 per cent. But you cannot assume that that was the case ten years ago, or twenty years ago or thirty years ago. With the large volume of traffic coming in, some must have dribbled through into the urban environment. Infested fruit or leaves must have come in at some stage, how much we cannot be sure, but at least there is no outbreak of citrus canker in Australia which is referable to the importation

[1] Damiani, J. p.69 In: Conference Proceedings Quarantine and Market Access Conference 2003, Canberra, ACT, Australian Government, Department of Agriculture, Fisheries and Forestry

of such material that is coming illegally and which has not been intercepted at the airport. Thank you Mr. Chairman.

Dr. Hale

30. Thank you Mr. Chairman. I have looked at this in perhaps a slightly different way. What I want to do is to really summarize briefly my views on where we are at on this whole topic. First I want to state that I realize that the new studies commissioned by Japan have been carried out within a very restricted timeframe. However, I still find it surprising that the new PRA is based on this new evidence, that in the main is still in the process of being published. I find the extremely artificial conditions under which most of the new work was completed bear very little relationship to the natural conditions likely to be associated with commercial apple production and export. I realize the constraints of carrying out research on *E. amylovora* in countries without fire blight. However, I think it would have been – this is as a general comment I think, that it would have been useful perhaps to have arranged for some collaborative research to go on in countries where the disease is endemic, and where the natural conditions could, in fact, prevail.

31. I find that much of the new evidence under discussion is from work carried out under artificial conditions and this is a difficult thing for me to get my head around, but we do need to bear in mind that there is still no evidence of latently infected mature symptomless fruit, and the new evidence that we have had in front of us does not really support this under natural conditions. I think we perhaps would also need to go back and say to date there is no proven evidence of exported apples ever being implicated in fire blight outbreaks, although there has been an enormous amount of movement of apples around the world.

32. Just to move on a little bit to buffer zones, or border zones, as we seem to be calling them now. These have been shown by Roberts to provide no phytosanitary protection. They may however, possibly be used to designate an export area, if this is required. However, there is no evidence whatsoever of *E. amylovora* being disseminated by a mature, symptomless fruit, and if this is the case, then buffer zones are not really justified. Any orchard inspection procedures, if deemed necessary, I think would need to be developed between the parties concerned. There is no hard and fast rule as to how this could, in fact, be done.

33. Just to say a word about severely blighted orchards. By whatever definition, I think a severely blighted orchard would need very little inspection, unless a severely blighted orchard was defined as one which had any infection at all. Small numbers of these orchards could possibly harbour the bacterium in the calyxes of the fruit. We have evidence of this, but there is no evidence of dissemination from discarded fruit to susceptible hosts under natural conditions.

34. There is no evidence that postharvest treatment of fruit, other than that required for codling moth, and normal storage and shipping is really necessary in this disease situation. The evidence of survival presented by Japan is under conditions that do not really simulate normal procedures for commercial production storage and export of apple fruit. As far as potential pathways for transmission of the bacterium via apple fruit, again the experimental conditions imposed in the work that we have been looking at are completely artificial and are really not plausibly ecological conditions. This has come through from each of the experts. Conclusions drawn that contaminated flies, for example, could cause infection under natural conditions are not necessarily substantiated by the data presented. The probability estimates presented rely heavily on assumptions that latently infected, mature, symptomless apple fruit actually exist and the pathway can be completed and to date, neither is proven under natural conditions.

35. As far as the pest risk assessment is concerned, once again the new PRA relies very heavily on the as yet unsubstantiated assumption relating to latent infection and completion of a pathway.

There is no evidence in my mind that mature symptomless apple fruit have ever been implicated in the introduction, establishment and spread of fire blight, despite the fact that millions of tonnes of apples have been shipped worldwide for many years.

36. So that is a brief summary of the responses that I made. Thank you Mr. Chairman.

Dr. Geider

37. Thank you Mr. Chairman. Maybe I have to make a general remark about fire blight. Looking back to the history there are only a very few events that were really long-distance spread of fire blight: the first one in New Zealand and the next one was in England and the next one was soon after in Egypt, and I may recall recent one in Australia, even if it's gone, although fire blight spread into a remote area. So, I think from these data we cannot trace back events which occurred at that time, although we can make suggestions. When I talk to my colleagues from New Zealand, they would say: In the old times there was free trade of many plants and that included fire blight host plants, and it happened'. With England its still a little bit a matter of discussion which comes up from Eve Billling who is saying, I feel, that there was something wrong with fruit boxes. I am not sure that she has seen these events and there was a documentation about that. I think this opinion recently came up and it was also published in one issue of "Acta Horticulturae", in a way that there are speculations how fire blight could have come to England. Although there might be many other sources and many other possibilities and I would still say that since the strains in England are a little bit diverse, there could have been two or three induction events.

38. The one in Egypt is open. Nobody is discussing that, maybe it is not so in the trade politics. It is there and it was there for a long time. Slowly it moved to Israel and Turkey and now it is in the Balkans, Iran. It's still moving. It is one wave. We think, at least from our data, that is PFGE analysis, that this event was also unique.

39. The fourth one in Australia I have discussed many, many times. Some people were asked by the press and by TV reporters how did it come that fire blight arrived in Australia. I said there is no real hint how it could happen, although, and this was actually one of the first statements I heard from Peter Merriman, the Botanical Gardens in Melbourne are visited by 1.5 million visitors per year, which is a big impact to introduce something. They are doing strange things. One colleague was saying they are taking samples with knives which could be contaminated with something. There are housing areas which grow a lot of fire blight host plants and this is still the big risk: that fire blight is introduced by those private activities into areas which can be damaged by the disease.

40. This is just a summary of a very basic problem we are faced with. Therefore I personally refuse a little bit to do risk assessment studies or to read them and say this is something meaningful, when we limit apple exports or imports to a certain amount then the risk is zero and then it is a bit higher. We can never say how fire blight comes into a country and it can happen all the time or it can still wait for many years but the chances are increasing because all global activities are getting faster and more intensive. I think, this is a very general judgement, that you cannot completely protect a country from all these events. I am always impressed when I come to Australia that I'm really wiped out of all my vegetables and fruit and whatever I might have. You can do that but there are boats coming to the shores and they will have something. I think it is very difficult to get to a conclusion about how to keep a disease like fire blight out of a country. But anyhow, I think we have to face the problems there is no fire blight in Australia, there is no fire blight in Japan and there is no fire blight, officially at least, in other countries.

41. Now, one remark to the three papers, or four papers issued as the Progress in fire blight research. I think, since I am also a little bit involved in researching what is *E. amylovora* doing in apples, that I have to say basically there is nothing wrong in these two papers. When you inoculate

apples with *E .amylovora* we will find the pathogen. It will persist. It will even increase little bit depending on the storage conditions or it will just persist for as long as the apple is suited for storage. So, this is trivial. You can bring a pathogen to other surfaces like plastic bags, or paper or wood or something else - even to metal – it will persist for some time. Sometimes for a very long time. On this basis the papers are not wrong. But as I expressed in my statements, they also do not say very much about distribution of fire blight. The last paper, which is about the spread of fire blight by flies, is also not completely wrong. In this respect fire blight is actually initiated every spring by ooze coming out of infected trees. This ooze is picked up or insects are feeding on the ooze and then they visit flowers. I think we should be honest. This is the way fire blight is initiated in an orchard with fire blight. Otherwise I think no flowers will survive in the winter but the pathogen survives in the stem sections and the stem sections are oozing. As far as I recall there was an older, not well documented, but still somehow published experiment of Tom Van der Zwet saying: "When I remove all the cankers and I protect the whole tree against visiting insects then it will not develop any fire blight." So, I agree with this statement, but I also have to admit that ooze is the primary source to get fire blight into the trees in spring. In this respect the paper is not wrong. But it is wrong in this assumption that everything that looks like ooze on fruit is now a source to bring fire blight to other places. There is no evidence that this can happen. Although, and this is my scientific task, I cannot completely reject and deny that it can for all reasons never happen, the chances are close to zero. But what is zero mathematically? It is a difficult number. Of course I could also comment a little bit on the papers what they did and what are the pictures and the results. Maybe at a later stage I will come back to this point. Thank you.

Chair

42. Thank you Dr. Geider. I wonder if, before I go on, if I could just go back to Dr. Hayward. We heard Dr. Geider refer just now to an outbreak in Melbourne, Australia. I wonder if you had any more information about that that might be relevant to this case?

Dr. Hayward

43. Well I wouldn't call it an outbreak, Mr. Chairman. It was a single plant of Cotoneaster, as I understand it. There was no spread from that point source. Because it was in that category of there having been no spread from point source, it has to be categorized as an incursion, I think, isn't it? If you have no spread, it's an incursion. I have no more information. We have the published record, and that is it.

Chair

44. There was no information about how it got there, or where it came from?

Dr. Hayward

45. No, I think Dr. Geider has made a number of suggestions which are quite reasonable. He had 1.5 million people visiting the Melbourne Botanic Gardens. Human nature being what it is, various things might have happened. It is all hypothetical and speculative.

Chair

46. Thank you very much. Thank you to all the experts for their pertinent remarks. At this stage I would now like to ask the parties to pose questions to the experts. I propose that the parties begin the opportunity to do so in alternate order, starting with the applicant, the United States. The United States, you have the floor.

United States

47. Thank you Mr. Chairman. The United States thanks the experts for the care they have taken in responding to the Panel's questions, and in particular their efforts to respond to the Panel's questions in terms of the scientific evidence as it relates to apple fruit and fire blight. The experts' role in advising the Panel on the scientific evidence is an important component to an SPS proceeding. In light of the experts' role as advisers on the scientific evidence, the United States has only a few confirmatory questions, one of which we will ask now in light of the Chairman's suggestion of alternating questions, but both of which I believe can be answered with little more than a yes or a no response.

48. The United States' first question to each of the experts is: Does the scientific evidence relating to apple fruit and fire blight demonstrate that such a commodity as a mature, symptomless yet latently infected apple fruit exists?

Dr. Smith

49. Well, Mr. Chairman, first of all I would say that I don't see how one can regard this as a commodity. I think this is a misuse of language. Apples are traded, or mature apples are traded, but latently infected apples are only unintentionally traded. The purpose is to find measures to prevent this infection from happening if it is capable of doing so. But I think I can answer the implied question that there is at the moment no evidence that latent infections can be found in mature apple fruits. But it is not a subject which has been very much investigated. There are possibilities for investigating it further, and I would hesitate to say that this cannot happen. The paper which has been labelled as Azegami II, which shows that bacteria can apparently be recovered from fruits where the pedicel of the fruit was inoculated, or the twig was inoculated with bacteria, at some time earlier, seems to show that in that experiment you can obtain latent infection of an apple fruit. But this work is very preliminary. As the American comment says, there are various controls that perhaps should have been done to make certain that that result is valid. Nevertheless that result is put before the Panel.

50. So at an experimental level there are suggestions. There are a few suggestions from the past. There is no convincing evidence that this happens naturally, but there is information that suggests there is still a phenomenon to be investigated.

Chair

51. Thank you very much Dr. Smith.

Dr. Hayward

52. Mr. Chairman, I have no evidence that there is such an entity as a mature symptomless latently infected fruit. There are several papers which fail to detect *E .amylovora* in mature symptomless fruit. I guess that is all I would say, except that you could hypothesise that there was a latent infection which was below the level of detection by the earlier method. But I think that is a bit doubtful.

Chairman

53. Thank you. Dr Hale.

Dr. Hale

54. Thank you. I would just like to say that I agree with what Dr. Hayward has just said. I probably have to agree with what Dr. Smith says as well, because when you are dealing with biological entities and so on, it is very difficult for us to categorically say that it couldn't possibly

happen. All I can say is that at this stage there is no evidence. No, I don't see any scientific evidence that this is happening under natural conditions.

Chairman

55. Thank you very much. Dr. Geider.

Dr. Geider

56. Of course there are two ways to look at an apple. One is the apple which is mature and looks healthy. It is very difficult to find in those apples *E. amylovora.* That means that you have to assay tons of apples to make a big survey to find out if this can really happen or it cannot happen. I think there are enough data from New Zealand that in certain circumstances that apple can carry some *E. amylovora* cells in the calyx. This was supported and discussed a couple of times. So I think this is about the present situation and that an apple is internally infected and is healthy. To my opinion, it is very unlikely but it would take a lot of effort at least to disprove that and it is quite normal. So, I think my answer is no. You can also ask about apples which do not look healthy any more after some time. They may be locally rotten or totally rotten. My big concern on those apples is what do they say for fire blight? It's a very difficult situation in terms of microbiology. These apples usually are also infected with soft rot erwinias and with other things which just cause the rotten appearance. It's now a task which nobody will easily do because it is a big effort to dissect those apples in terms of taxonomy, finding out what is causing the rot, what is causing other events and even what is causing oozing. When ooze is coming out of a fruit it might not be always fire blight. When I look into one of these three or four recent Japanese papers, there are reports that these apples were not oozing, but they had some droplets of liquid at the outside. Then they tried to isolate *E. amylovora* out of these droplets, but in many cases they failed. I think there were 146 droplets and in eleven of them they could detect *E. amylovora*. So these droplets were not the typical fire blight ooze. They were something else. This means even ooze is not in terms of *E. amylovora* bacterial ooze, just caused by the pathogen. We have to be very cautious on all these events to make a statement. Is this a pure occurrence of fire blight or is it a mixed infection? Is an apple rotten due to fire blight or by other events. The last time the Japanese delegation had these intimate pictures from Canadian apples which were also oozing some how on the trees. I felt this is complex. It is not just fire blight. It is more. I might join the investigations to have a look at what is an apple which is appearing rotten and was infected, or at least challenged, with *E. amylovora*. There is still a lot to do to find out what is going on in such apples, but it's certainly not as clear as it is suggested by the Japanese investigations. Thank you.

Chair

57. United States. I may have used an ambiguous term when I suggested that we took it in alternate orders. What I meant was that we take all the US questions first and then all the Japanese questions. I hope that's how it came...

United States

58. The next question for the experts is: Does the available scientific evidence relating to mature apple fruit and fire blight demonstrate that mature apple fruit will serve as, or complete, the pathway for transmission or introduction of fire blight?

Dr. Smith

59. Well, Mr. Chairman, a pathway has to be completed from the very beginning to the very end to be effective. Evidence is lacking at the moment for the end of the pathway. There is not clear evidence that even if a latently infected apple were to arrive in Japan, that there is a real possibility of transmission to susceptible apple trees.

Dr. Hayward

60. If I may go back to what I said at the beginning. My comments about citrus canker aren't totally irrelevant because citrus canker is an example of a disease which most manifestly is carried on the fruit. The fruit are heavily infested, in fact that's how they are identified, from the surface lesions on the fruit, after interception at ports of entry.

61. With regard to fire blight, I can find no evidence at all. I am not convinced by the work that has been reported from Japan that they have demonstrated completion of the pathway. This evidence is lacking. We have one good study by Taylor and Hale (published in the periodical *Crop Protection*). Actually it is two papers reporting the first season's results and a second paper, on plant protection, reporting the second season's results. I do think that this is only one study. It is possible to conceive others which could address the same question. (As I said in my first remarks, these questions have not been studied scientifically. They are the kinds of questions which were forced on plant pathologists by pest risk analysis in the post-1995 era, and that is a relatively short period). I have called it a model study, and I think it is. I think it can be criticized for various reasons, but it was a good attempt. There are other studies that could be considered, but they wouldn't necessary involve apple. They would probably involve pear. They would probably involve ornamentals. The literature just is completely lacking in evidence about the completion of pathways.

Dr. Hale

62. I suppose I should defend myself. What Dr. Hayward said is absolutely correct. There is very little evidence. In our work which we published in 1996, we were unable to show that there was any completion of a pathway and certainly when we looked at this in a lot more detail, looking at insects and so on, and other possible ways of transmitting the disease in the most recent papers. Again, we were unable to show that there was any transmission from the calyx end of an infested fruit an infected fruit, or a latently infected fruit, if there is such a thing, because we never looked at that. We only looked at the possibility of transmission of the bacterium from the calyx end of fruit, infestation as opposed to infection of the fruit. I think probably I can leave it at that. So I have no scientific evidence of this happening. I guess, as far as the people in the room are concerned here, and the experts, I am probably the one that has been most closely associated with some of this work actually in the field. There is not a lot of evidence, it is purely the evidence that we have come up with. Of course it is always difficult to prove a negative. The fact that we didn't find any transmission doesn't mean to say that it couldn't possibly have happened, but we didn't get any transmission to susceptible hosts.

Dr. Geider

63. I think to answer that question, I agree with my colleagues that it is very difficult because to design the experiment to find out is not only tedious but a little bit experimentally difficult. Nobody will easily do it, but it can be done. I think we could do that experiment probably in America, not in Japan. In America it could be done in an experimental orchard. We could inoculate apples with fire blight, maybe with a strain which has some features, not necessarily genetic, which can be traced back. Then we can find out if bacteria of this strain go into host plants. I think this experiment is not too difficult but there must be some willingness and support to do it. Right now, I think we have no evidence at all that this transmission *per se*, has ever occurred in a field or in an orchard.

Chair

64. Thank you. Can I just come back to Dr. Hale for a moment, just on the remarks you made just now? You mentioned work that you had done on the calyx end of the apple. Did you choose that because you thought that was part of the apple that was most likely to be the source of transmission, or is there a higher probability the other way around, other parts?

Dr. Hale

65. The reason that we have done the work on the calyx end of the fruit results from some earlier work in the 1980s which looked at apples, mature symptomless apples harvested from a heavily infected, or severely blighted orchard with more that 75 strikes per tree. We were unable to pick up any bacteria on the surface of the fruit, of these mature, harvested fruit, but we did pick up bacteria in the calyx end of the fruit. We have been consistently able to do this from apples taken from severely infected orchards. The fact that there has never been any evidence from any other work that has been done, which has shown that there is any latently infected fruit, or any fruit – mature symptomless fruit which has bacteria which have moved through the tree, from the branch into the fruit. This could possibly happen with immature fruit, very young immature fruits. There is no evidence of mature symptomless fruits having been infected internally. The work by Dueck and Roberts, and various other people over the years, where samples have been taken from cores taken directly through the fruit, which includes the flesh tissue, has not picked up anything in that flesh tissue. There was no latent infection in that flesh tissue. Our work has always been directed at the calyx end of the fruit because we know that it is a possibility. We wanted to see whether there was any possible transmission from the calyx end of the fruit. So those are the reasons why we have directed our research in that area.

Chair

66. Thank you very much. If the experts have nothing more on that question, let's go back to the US for the next question.

United States

67. If I may take just one minute, Mr. Chairman. Thank you.

68. Mr. Chairman, that would conclude the US questions at the moment, thank you.

Chair

69. Thank you very much. In that case, perhaps I could now invite the delegation of Japan to pose any questions, or make any comments they have for the experts.

Japan

70. Like the United States, we would like to thank deeply the experts we understand who have spent many hours and efforts into preparing these documents which we had visited previously. And also I would like to thank particularly Dr. Hayward for the encouraging words about the citrus canker, about which we are planning a different case against the United States.

71. Now let me begin my question – very simply yes and no question – addressed to each of the experts. That's about the completion of the pathway or specifically Tsukamoto II, as it is called. So many questions have been raised by each of the experts about the results or the relevance to the natural environment in Tsukamoto II. My question, very simply yes or no question – is: Is it your opinion that Tsukamoto II has no scientific value? Yes or no please.

Dr. Smith

72. Mr. Chairman, I think that in designing a series of experiments to determine which insects might carry bacteria from fruits to flowers, and cause new infections, you first have to set up a basic experimental design to get the thing to work. You design things in your favour. You work with heavily infested fruit material. You confine the insects so they have really no choice but to walk on it. At the other extreme, you contaminate the insects directly and again, make sure that when these insects have the maximum possibility of doing so. And when you have obtained those results, you

say: yes, we have a model to start with. We can obtain a positive result, in the most favourable scenario. Then you must go on, and you must investigate scenarios that are more realistic. I cannot be convinced by what I would call a kind of preliminary calibration of the experimental system, that transmission really happens with the insects which really visit rotting apple fruits in orchards under conditions which are reasonably close to those which are really required to complete the pathway.

Dr. Hayward

73. Mr. Chairman, we are talking about Tsukamoto II – transmission of *E .amylovora* from blighted mature apple fruit host plants via flies. To me it is quite remarkable this study could have been done at all. I think the authors of the work were severely constrained by having to work under highly contained quarantine conditions. But I was persuaded by the evidence, I think from New Zealand, about the nature of the fly and the fact that the fly is not one which is necessarily one which could complete the pathway. So you ask whether the work has any scientific merit. I can only say that it is incredible to me that it was done at all, really, under the conditions, the severe constraints of the containment. I don't know whether my colleagues agree with that.

Dr. Hale

74. Again, I think I probably have to agree with both Dr. Smith and Dr. Hayward in what they have said there. This is a first part of an overall experiment, if you really want to find out what is going on, I think it is difficult to make the conclusions that the pathway is completed by carrying out work under extreme conditions with any sort of fly, or any sort of insect, and also to make the conclusions on two separate parts of the experiment. If the whole thing had been done as one experiment so that the flies picked up the bacteria, and then those flies that had picked up the bacteria had actually infected other host material, then that is possibly the next stage which could be looked at. But to conclude that the pathway could possibly be completed by the two separate experiments under those extremely artificial, no-choice conditions for those insects, just doesn't gel with me, I'm afraid.

Dr. Geider

75. I will certainly not now judge the value in these assays. Actually there are other papers showing the same. When I started with fire blight there was an old paper from Milton Schroth saying that an insect which was crawling on ooze was then placed on a selective agar plate, and you could see the footprints of the insect. Where the insect touched the agar you saw developing micro colonies. It's certain that insects can carry the pathogen. You may also recall that we did that paper in 2001, Hildebrand et al., where we caught insects in a fire blight orchard to find out which ones were carrying fire blight, that means which were contaminated with *E. amylovora* and there was appreciable amount of insects carrying the pathogen. I think this occurs and the fire blight orchard was not heavily oozing. There was fire blight but only in minor twigs and not completely destroyed. There are other reports and there is this report which is actually a very tough one just by constraining insects so heavily, and then putting them onto peeled pears. It is known that a few cells of *E. amylovora* can cause heavy symptoms on a wounded or sliced pear. Fifty cells are enough to cause normal symptoms on a pear. So I think it is no wonder that you can contaminate an insect, or you can even pick up a contaminated insects in an orchard and then bring it on a wounded pear and it will cause fire blight symptoms.

76. So, I think with all the knowledge we had before, this paper is not telling us a new aspect of how fire blight can spread under those conditions. For those reasons I agree with Doctors Smith, Hale and Hayward that it's an artificial experiment which has to succeed because we know there are living cells and we know there is susceptible plant tissue. For those reasons I would agree it is not too meaningful on completing a pathway of transmission of fire blight.

Japan

77. Thank you. As a follow-up question to the same issue, of Tsukamoto II- completion of the pathway, certainly some expressed that the conditions are very extreme because it was done in very limited opportunities and very close lab situation. We had to choose it, as Dr. Smith expressed, we really would have like to used the earth instead of the insects, but we didn't have a choice. Now, is it fair to say that, assuming all the conditions are equal, every ecological conditions are equal, the presence of a certain amount of inoculum and common flies and wounded pear, with these three elements present, isn't it more likely that the pathway will be completed than in the absence of these three elements, assuming all the other conditions, ecological factors, are identical? And it seems to me that Tsukamoto II, too, had assumed all these combinations of these three elements, these three factors, it would be more likely that the pathway will be completed than otherwise, than in the absence of these elements. Is it fair to say that, or no?

Dr. Smith

78. Well, I must reflect, Mr. Chairman. One could speculate that if this line of investigation was continued, and the various experimental variables were changed to be closer to natural conditions (that would mean that perhaps the amount of inoculum from the fruit was brought down to a lower level, that the insects were freer to move and to decide for themselves whether they would or would not contact the fruit, that they had more time in which then to fly, disperse, to do various other things, before they would alight on other fruits and infect them). It is perfectly possible in that case, that although there is a starting inoculum, and the insects do pick up some bacteria in the first instance, that the amount of bacteria picked up is quite small. Even that it is undetectable. I recall that in the studies in New Zealand, no bacteria were recovered from any insects which were associated with rotting fruit. That is the behavioural pattern of the insects. Even if you could recover bacteria from the insects, they may hardly make contact with the susceptible host issue, so that in practice, the pathway is not completed. It is a question of amount, intensity, how much inoculum, how well does it survive, how do the insects behave over the period of time? And the outcome of such an experiment under realistic conditions could perfectly well be that the disease is not transmitted in that scenario.

Dr. Hayward

79. Mr. Chairman, I don't really have anything much to add to what Dr. Smith has put rather well. The only evidence we have, and this is our problem, concerns apples, and the experiments done in New Zealand over two seasons. Insect transmission does occur, in spite of the adverse environmental factors – drying, desiccation, UV irradiation – these are the kinds of environmental factors which will be inimical to the fire blight pathogen. Insect transmission occurs, from oozing cankers to blossoms in fire blight of apple and pear. It also occurs on banana. In spite of the adverse environment, insect transmission does occur, but I really don't have anything more to add to what Dr. Smith has said. Thank you.

Dr. Hale

80. It's quite correct of course that insects can transmit fire blight. We know that insects do transmit ooze that can infect flowers. What we are talking about here really is fruit which is symptomless, mature and as far as I can make out, are only likely to be carrying bacteria in the calyx end of the fruit. How can we get those to be transmitted by insects, even if those fruit are breaking down, as fruit will do if you just leave them on the ground or in a tree in an orchard? How do those bacteria actually get to flowers and cause the symptoms in the flowers? Do the insects which are on the rotting fruit actually go to susceptible flower tissue? I agree with Dr. Hayward. The evidence that we have was only over a two-year period, although there was an earlier reporting in 1996, where we actually did a similar experiment, but were not looking at whether insects were involved in the transmission. We were just assuming that there could be a possibility of transmission from the surface of a fruit or from the calyx end of the fruit to a susceptible flower. Now, the situation is that we have not been able to show that there is any transmission. Again I just want to reiterate that the

information that we have is from trying to transmit bacteria from the calyx end of the fruit, which is a fairly protected area of a fruit, to a susceptible flower. There are other possibilities that could be looked at. But that is the evidence that we have at the moment under normal field climatic conditions, which takes into account a lot of the things that Dr. Hayward suggested, as being factors which might be involved in the survival of the bacteria and the possibility of their movement.

81. We know that oozing cankers do provide bacteria, which can be transmitted by insects to susceptible blossoms. This is a basis of how fire blight actually starts in the orchard, but that's actually not what we are talking about right now. We are talking about the possibility of the bacteria coming from discarded rotten fruit and being transmitted by insects to flowers, and we have no evidence of that under plausible ecological conditions. Thank you.

Dr. Geider

82. Still, we are coming back to this problem: Is rotting fruit rotting because of fire blight? And I think we should realize as bacteriologists that soft rot is not fire blight. Soft rot is also caused by fungal micro organisms and therefore it is a very complex situation in a fruit. I am really cautious to say that a rotting fruit is a plain source for *E .amylovora* , and all insects sitting on the fruit will then carry the pathogen to other locations. For those reasons I still think and this has been said before, that this pathway is very unlikely. As usual in these instances it cannot be completely ruled out because you can always say even that an event one to 10^{12}, can occur once in the world. I think this is so unlikely that we can discard this suggestion.

Dr. Hayward

83. I profoundly agree with what Dr. Geider said, I think it is very important. The examples of insect transmission we have in banana, for example, or in fire blight, are where insects with their limbs, pick up what is almost solidly a pure culture, almost a pure culture, of the specific pathogen causing that type of infection. If you have a rotten fruit, as Dr. Geider has referred to, you are picking up what is a mess, a succession of organisms, which have got nothing to do with fire blight. And I think that is a very important distinction. Ooze from a canker in fire blight, or ooze on a banana, these are almost pure populations of a specific pathogen.

Japan

84. Thank you. With the consent of the Chairman, we would like to invite Dr. Goto to make a short remark about the responses we have had so far. We invite reaction from each one of the experts. But since we have spent about over one hour, should we break here for a moment, or just go on?

Chair

85. Not yet, but please invite Dr. Goto to put any questions that he wants or to make any comments that you want him to, if that is what you would like to do.

Dr. Goto

86. Thank you Mr. Chairman, members of the Panel and all of the experts. I would like to comment on the replies of the four experts to the Question 3 of the Panel on this opportunity.

87. I consider from the following reasons that both Azegami Studies I and II clearly demonstrated that apple fruit can be latently infected with fire blight bacteria. Some of the experts agree on the view that the invasion of the bacteria into the fruit from the pedicel is a consequence of transpiration without active colonization. However, the activity of the bioluminescence genes inserted into the bacteria might not be observed so clearly if only 10 to the fourth power (10^4) to 10 to the fifth power (10^5) bacteria of 1 to 2 micrometres transpired into the fruit. Azegami described that they proved the

presence of the pathogenic bacteria in the flesh at the level of colony formation units of 10 to the sixth power (10^6) to 10 to the eighth power (10^8) per 0.1 cubic centimetres. This fact clearly indicates that the bacteria actively propagate in the fruit tissues.

88. Since the growing stage from fruitlet to immature fruit, and further to mature fruit is a continuous process, I consider that the notion, "infected apple fruit always develop visible symptoms, and thus symptomless fruit are always healthy and free from fire blight bacteria" has not yet been established. On the contrary, both Azegami Studies I and II seem to suggest that a possibility has become extremely high where apple fruit may become latently infected with the bacteria which exist inside a fruit-bearing twig and then invade through a pedicel into the fruit before completion of the formation of an abscission layer.

89. Azegami Studies and Tsukamoto Study I also seem to suggest that the current view that "mature apple fruit can not be infected or infested with fire blight bacteria" should be modified, and that latent infection should be further confirmed under the natural conditions.

90. In order to confirm this latent infection, scientists, in impartial position, from both fire blight occurring countries and fire blight-free countries should jointly conduct experiments in a fire blight occurring country and to find conclusions. I believe that the International Society of Plant Pathology (ISPP) would be the most appropriate organization to conduct such project.

91. The necessity to confirm the results of Azegami Studies under natural conditions is also recognized by all of the four panel experts, although their expression somewhat varies form one another. I believe that there are still many important phenomena that we have overlooked on fire blight epidemiology. The transmission by latently infected fruit is one of the most important features to be reinvestigated immediately. Thus, I believe that the research of fire blight epidemiology has entered into a new era, and we "plant pathologists" should seriously consider this situation in order to protect apple and/or pear orchards in the world from further spreading of fire blight disease.

92. It is my view that the quarantine measures for fire blight of apple fruit should be maintained until the results of the proposed research under the ISPP project research proves that the latent infection of apple fruit does not really occur under natural conditions, and latently infected fruit does not certainly relate with fire blight dissemination in the natural world. I thank you for your attention.

Chair

93. Thank you. Can I ask if there is an English translation of that document, a written English document available? Could it be circulated to the Panel and to the experts before we invite them to respond?

United States

94. Mr. Chairman, if it is possible, we would like a copy as well.

Chair

95. Yes, indeed I intended to include you in that.

96. Can I ask the Japanese delegation if that will be the end of your questions and comments? It will. When we have dealt with this, depending how long it takes, it will then be the time for the Panel to ask questions to the experts. We will have a brief adjournment, after we have heard their responses to the Japanese document, and before we put our questions, because we want to put our questions in writing. Not because we are expecting a written answer, but so the experts have the chance to prepare themselves and to have the questions in front of them. We will take a fifteen minute break after we

have dealt with the response. I don't suppose it will take too long for them to run off a few copies, will be back in a minute.

Dr. Hayward

97. Chairman, may I ask a question? May I ask the Japanese delegation if the Azegami I study scheduled for publication in the December issue of the Journal of General Plant Pathology is already out. It has been published?

Japan

98. Azegami I has been published. Tsukamoto I is going to be published in February.

Chair

99. I'll just give a moment or two for the experts to read through the documents from Japan and Dr Smith are you prepared now, thank you. Dr Smith you have the floor.

Dr Smith

100. Mr Chairman, I am sorry, I am not prepared. Can I pause while you ask someone else?

Chair

101. You can come back, yes

Dr. Hayward

102. Thank you Mr Chairman. I'll go through questions one, two, three, etc. The Azegami I studies involve inoculation of bacterial suspensions onto the pedicel. I accept the evidence that there has been some proliferation of the bacteria because the data given in paragraph 2 do show that you get an increase in numbers. That's done by plating, that has nothing to do with the luminology, the bioluminescence. Azegami II studies involve application of inoculum to a scalpel incision. The exact numbers I don't recall but they were fairly high numbers. This was in periods of 15-30 days prior to maturation. 22 October was the date of harvest, the inoculation into the fruit bearing twig had been up to 30 more days prior to 22 October. Now in order for these results to have any relevance to real world conditions you have to postulate that there is some injury event which is equivalent to a scalpel incision into a twig. You have to ask how is that wound going to occur equivalent to the incision of a scalpel to a certain depth into a twig. It won't be anything equivalent to what was used under artificial conditions.

103. I have to come back to the fact that latently infected mature symptomless fruit have not been demonstrated by previous studies. This has not been established by previous studies. So, with respect to 5 and 6, the idea of an internationally-sponsored fire blight epidemiology experiment involving countries with and without fire blight in theory might sound fine but I think it will be very difficult to implement in practice. And as Dr Smith said, how do you, in fact, replicate conditions where your are going to generate injury to a twig that is equivalent to a scalpel incision to a certain depth? You can have wind blasting experiments. I am not sure that I do agree with 5 and 6. I agree with the desire to keep fire blight disease of apple and pear out of countries that don't have the disease but I am not sure that paragraphs 5 and 6 take us in a useful direction. Simply because we don't have enough impetus from what has been done so far to say this needs to be done.

Chair

104. Thank you very much. Dr Hale.

Dr Hale

105. If I could just go on to numbers 5 and 6. In theory, it sounds great. But I find that it could be fraught with all sorts of problems in being able to do a piece of work like that. As far as number 7 is concerned, I agree entirely that we should try to keep fire blight out of countries which don't have fire blight. As a plant pathologist, or plant protection person, of course that is what we would like to do.

106. As for the inoculation studies of Azegami. It does seem to show that if you inoculate a cut pedicel you can get bacteria transmitted into the fruit, whether they be transmitted by sucking in through transpiration or active movement of the bacteria. The suggestion that the bacteria do increase in numbers is not to be denied. The data are there. Again, as far as the movement of bacteria from the stem or twigs through into the fruit is concerned, I still have my doubts that this has actually happened. I feel that if this had happened much of the work that has been done by earlier workers, such as Dueck and various other people, and the work that Rodney Roberts did many years ago, would have shown that some bacteria would have been detected in fruit tissue if that was actually happening. Hypothetically, of course, we could say, it could possibly happen.

107. But just going back to what Dr Hayward said. We have got to look at what the real situation would be. I am not sure that the experiments that were done by Azegami actually do have a relationship to what could happen in a real life situation. Again, as Dr Hayward clearly pointed out, you have got to have some method of getting the bacteria through the twig and into the pedicel. While this could possibly happen through storms and winds and so on, this is a possibility. But where are these bacteria actually going to come from? There is no evidence that bacteria within the tree are moving through the tree into twigs and into mature fruit. If this was something that was happening then I am sure that some of the detailed studies that have been done in the past on fruit would have been able to detect some bacteria in that fruit.

Dr Geider

108. I agree with some part of these studies and I disagree with other parts. I think that when you artificially inoculate apples with *E. amylovora* they will not only persist – they will also multiple to a very low extent. I mentioned in my abstract, which was added at the end of my comments, that its an increase of ten. When you do a similar experiment with immature pears you will get a multiplication which is 10^4 to 10^6 above the level of inoculation. So I think there is a clear difference. When I read these numbers that in these apples there was 10^8 bacteria per 0.1 ml that sounds incredibly high. I cannot imaging that a mature apple inoculated with bacteria 10^4 also will develop such a high population of *E. amylovora*. Though there are objections coming up with the papers.

109. I told you in the beginning that I have quite a bit of experience with bioluminescence. I started with Cal Kado in '85 and we found that bacteria which produce light have to have an active cell metabolism. And the reason is that the light substrate which is a decanal has to be recycled by the consumption of ATP. And whenever the bacteria grow to a stationary phase and they don't multiply anymore, or they don't grow at all that means at low temperatures they do not produce light. You can easily show that when you take bacteria and cool it down. Next week we will have a student course doing the same reaction: dump in a little bit of antibiotic and the bacteria will produce no light within five or ten minutes. So, whenever the cell metabolism is disturbed the light production is zero. For those reasons, I am really wondering that there is a statement in the papers saying that "I can see even light production in the dark by naked eye". I wonder that in an apple, with bacteria which are at the intermediate to lower level and apples are stored up to five months, although I think this is a record, then there is still an appreciable high amount of light production.

110. I don't know about the second paper – I think the name is Tsukamoto – that if these apples were somehow pre-treated before the pictures were taken, that means when you take them out of the cold room they had to recover Cal Kado showed me that. Many times he took plates of the cold room and I had to wait two hours until I saw light. I think this is very obvious. Bacteria with slow

metabolism do not produce light. For those reason, I appreciate the high technology of Japan in developing cameras which amplify single photons without any background. Still when I look to the conditions in the first paper its one minute exposure, it's a very short time. I think these cameras must be extremely powerful to see all that light from these few non-metabolising bacteria.

111. We did many experiments showing whenever those bacteria go into a stationary culture the light production is so low that it is hard to detect it, even in a dense culture. I am wondering what these pictures and what these observations mean. I don't know the camera and I don't know the light detecting system. I know that a colleague of mine was cited before, Sherm Thompson, tried similar experiments (in cooperation with NASA) in Utah, that he had a camera which was amplifying light to a million fold or so and they could see a few dots. There was a lot of background and it was difficult. I think it is a very difficult system in biology, in biochemistry, of light production, and also in physical arrangement – how to pick up the light. For those reasons, I severely have objections if these papers are really producing a message. I would have expected that these methods which are attractive (and Dr Smith, I think, said in his comments) that its an advancement in biology to do that, that there are basic publications telling about the circumstance of light production, how was a mutant created, in which gene is a transposon inserted? In that it must be a strong promoter, it must work continuously, otherwise it would shut off the light immediately if the promoter was not working. So we did similar experiments. We used that transposon and, of course, you can get strains which have a high life production with insertion of a transposon as a chromosome. It might happen that it's not a relevant gene affected, so there still can be virulence. I think I agree to this extent but with the other things that the light production is continuing in stationary cells and in cells which are in apples cooled for so long time, I am wondering....

Dr Smith

112. Well, the point I want to make is that under natural conditions, not after artificial inoculation, you are dealing with much smaller bacterial populations. Whether they are sucked in by transpiration or whether they go in through some wound that you could imitate by mimicking storm damage or hail, or some other kind of damage. This research would be interesting to do, but what is the likely outcome? The likely outcome is that you would find that you can get, under some circumstances, bacteria getting into fruit under very unfavourable conditions when the plant is highly infected and you design the experiment appropriately. You can recover fruit that have some latent bacteria in them, not only in the calyx but also in the flesh of the fruit. But is that important? And is that dangerous? Probably not. The amounts of bacteria involved would be really rather small. And the past work that has been done shows that attempts to recover large numbers of bacteria from fruits have not found them. And if one can never find fruits with large numbers of bacteria then where is the inoculum to complete the pathway. So these separate parts of these experiments can be analyzed separately but in the end everything has to work at a sufficiently high level for the whole thing to function.

113. A final comment I would make is that I don't know whether this needs some international collaborative effort. I would have thought that if such a research programme is interesting for Japan then it should be possible, through international circles, to negotiate laboratories where experiments can be done. I don't see any fundamental reason why such a thing could not be arranged, without having to call on any international organization.

Dr Goto, simultaneously translated

114. Thank you very much for all the comments and opinions raised by the experts. However, I have noticed some misunderstanding among some of those comments and opinions we have heard from the experts. I would like to comment on each one of those points.

115. First of all, about the comment made by Dr Smith. Dr Smith stopped in the middle of his comments, however, I heard that he said that the inoculum level or density was quite high and I have

also seen they say this expression in some of the reports made by the experts. However, this level of inoculum we are talking about is 10^4 or 10^5. This is not high at all. This is very natural. This is the level of inoculum we can easily find out in natural conditions.

116. As for the comments made by Dr Geider on the issue of light. Azegami carried out our research on the issue of light and also on the number of bacterium at the same time. He looked at the two issues at the same time. He did not look at the light issue only. This is the very reason why this is one of the misunderstandings we can find among the people. This is one of the very reasons why we are asking for international collaborative research on this issue.

117. The next point I would like to talk about is the role played by the abscission layer. People tend to say that the abscission layer does not work as a barrier to prevent the invasion or invasion or introduction of the bacteria into the fruit, but Azegami continued his study or research on this point. He has already produced some data about this. He found out that the bacteria can actually infect the fruit itself through the abscission layer, even on the mature fruits.

118. I wanted to touch on the comments made by Dr Hayward. He said he was quite doubtful whether the same kind of wound made by the scalpel in the Azegami research can really happen in natural conditions or not. He did not really look at the possibility whether the bacteria in the fruit bearing twig can actually go into the flesh or the fruit of the mature apple. We can say that some bacteria which already exists within a twig can actually be increased in the natural conditions. Then they can actually go into the fruit bearing twig, and then into the pedicel and into the flesh, and then they can become the primary infection source.

119. Many of the experts said that we have already observed such and such data and the results in the previous research and in experiments which were carried out in the past, but any progress made in the scientific field is based on the denial of made in the past, and if we stick to the result found in the past we cannot made any progress in the scientific field. Over the last two years we have made such a great progress in this field. We are living in a world with high speed and if we really identify the core problem we can make great progress in this field. Therefore, we should not stick to data produced in the past. If we keep doing so we cannot make any progress in the field. This is one of the reasons why I am advocating for the establishment of joint research – collaborative research – in this field. So that we can make more progress.

Chairman

120. Can I ask the experts whether they wish to say anything further in response to that. There were a number of different points there. Dr Smith? Nothing to say.

Dr Hayward

121. I would only refer to Azegami II study; entry of *E. amylovora* into apple fruit from fruit bearing twig, through abscission layer prior to fruit maturation. The experiment was done as follows. Fruit bearing twigs on trees were injured by cutting; a width of 2 mm to a depth of about 2 mm, with a surgical knife or scalpel, 1 to 7 centimetres from the abscission layer between fruit pedicel and porse and a five micro-litre drop of inoculum, about 10^7 CF counted, for me it's units per ml., was deposited in each cut. Now, Azegami and co-workers showed that they could get transmission of that inoculum into the fruit in order to show, they believe, that it could occur. But it has never been demonstrated under natural conditions. Isn't that the point? We have no supporting evidence of such an infected fruit, a latently infected fruit under natural conditions.

Chairman

122. Thank you. Dr Hale?

Dr Hale

123. I am interested in what Professor Goto has just said because from what I just heard, Azegami has shown that the bacteria can actually go through the abscission layer into the mature fruit. Now, we haven't seen that evidence anywhere. We haven't seen the paper which says anything about that. The only evidence that we have is with Azegami II, where the bacteria from inoculated twigs were then found in the fruit. But that could well have been before any abscission layer had been produced. So, are we now being asked to comment on some evidence or some data that we haven't seen? I don't need to comment on the other things, but I am confused at the moment as to what we are actually talking about. Is this some new information that we have not seen yet?

Japan

124. It's new information, not in Azegami II. It's a different study.

Dr Hale

125. Well, then I have no comment to make on it.

Dr Geider

126. To start with the last words of Dr Goto, I agree that past and present are not always comparable. Of course, its dangerous to cite papers from 1926 and this year's and to refer that these people have seen or not seen something. Of course, including your papers, progress is made. I think we should be open to new methodologies and to new ways to answer questions.

127. On the other hand, there are also biological requirements and just biological facts which cannot really be changed. One fact is that light production and cell number are not in a ratio. The light is dependent on the ATP content of the cells and not so much of the cell number. By having few cells with high ATP and having many cells with low ATP you can get the same light production. This is an example where we cannot proceed. We can proceed on technology; that better cameras with better background sensitivity will pick up other signals, but there are also some biological facts that cannot be changed.

128. This other fact that was the answer to Dr Hayward's that the bacteria were used as a low group density and they multiplied quite a bit. I cannot confirm that. I told you in our hands they multiplied by a factor of ten. The only thing we can discuss is if we used the wrong cultivar. We used Braeburn and, as far as I understand in the Japanese experiments, 'Rome Beauty' was used and Jonagold. So, 'Rome Beauty' is considered to be most susceptible. I don't know if we can get to this cultivar easily in Germany but we can, of course, try to answer the same questions with other fruits, other cultivars and find out if there is a difference. We have to be a little cautious that we are not doing all our lab work looking for these minor differences and minor changes which might occur or may not occur. At the end, the question is: does what we are finding in artificially inoculated fruits, where ever its coming from a pedicel or even from the stem section, say something about distribution of fire blight. I agree, somehow, that whatever we know – and I think this was published earlier – that fire blight is moving from the tip, from the shoot, down eventually to the root. This is the proposed way to move down and up again to the twigs with fruit bearing twigs. I cannot really say if on a natural tree fire blight is coming from the top and is distributed in all parts. I think I mentioned that in my comments. Pears have a tendency to be more systemic in the distribution of *E. amylovora* within the tree. For those reasons, pears can get systemically infected and the whole tree can die. With apples, I don't know if there are cultivars which might have the same feature but, is it possible that

apples can systemically be destroyed by single infection? [....Yes, it is possible....] But I don't know if this is the case for the apples which are thought to be exported. Do we have cultivars that are so highly susceptible that they can be destroyed systemically – that the whole tree is affected at the end and everything that is on the tree might bear the pathogen? That is a question, I may give to the American delegation if they have these sort of observations. At least, in general, heavily blighted tree will be destroyed and removed by the owner of the orchard. We are now thinking about very hypothetical assumptions which may not really be realistic.

129. You objected that three experts were referring to soaking up bacteria just by water evaporation. You can always say that this is not true in all cases or its not exclusively this mechanism. I still think it is rare that a cut wound in the plant will take up water and when there are bacteria in the water they will be soaked up. There is another earlier experiment (after so many years, its historical, but we are talking about the past, too) with Bob Goodman who took EPS preparations he called *amylovorin* showing that they cause wilt in cut apple branches. These ESP preparations clog the vessels and the plant wilts. When there are bacteria which do not clog the vessels they will be soaked up and disappear in the plant tissue. For those reason, I think it's natural to show that an apple will take up liquid from outside, which disappears within the fruit.

Dr Smith

130. I would like, finally, to make a comment which is that the significance of the results also depends on the kind of circumstances in which fruits might become latently infected. We could imagine, in theory, that a new field of fire blight epidemiology can be discovered which has not yet been appreciated, which is that even in trees that are not very heavily infected there may be a movement of bacteria into fruit establishing latent infections. But, that doesn't seem likely. It seems much more likely that the circumstances of latent infection will be when you have a very severely blighted twig. We then have to bring it back to the scenario of exporting apples and say: are apples taken from severely infected orchards? And, they aren't. It may imply that certain phytosanitary measures have to be taken to make sure that this doesn't happen. But we are still talking about a scenario that doesn't correspond to normal commercial practice.

Chairman

131. Thank you very much. Now, if the experts have nothing more to say. Does that conclude the Japanese presentation? Good. In that case, it now comes to the time for the Panel to put its questions to the experts and I propose to adjourn for 15 minutes while we prepare a written version of those questions. Some of our questions have already been covered to some extent so we will have to edit it as well. We will resume here in 15 minutes time.

132. Let's resume. We were at the point where the Panel was going to put questions to the experts and these questions are now in writing. I hope everyone has got them including the interpreters, yes I see the interpreters have. I am going to put these questions one at a time and then offer each of the experts the opportunity to respond to them.

133. The Panel wants to ensure it clearly understands the responses of the experts with regard to the scientific relevance of the fire blight status of an orchard. In particular the Panel notes that:

> Dr Hale stated that "harvesting of mature symptomless fruit from severely infected orchards is unlikely"(answer to Q4).
>
> Dr Hayward indicated that "the available scientific evidence does not demonstrate that imports of mature apple fruit from severely blighted orchards could complete a pathway for introduction of fire blight into an orchard"(answer to Q13).

Dr Smith stated that whether the requirement for a pest free place of production or a pest free production site is an effective phytosanitary measure, is a technical question depending primarily on the biology of the pests and also on the management of the crop".(answer to Q10).

Dr Geider stated that "there should be no severely blighted commercial orchards. In that case the orchard is not suited for fruit production and the trees have to be removed. An orchard with only one fire blight strike - is a blighted orchard and should be handled with care for fruit trade to fire blight free countries". (answer to Q12).

(a) given the available scientific evidence regarding the biology of *E.amylovora* and commercial apple crop management in the United States, is there any scientific justification for requiring that apple fruit be sourced from an orchard free of fire blight irrespective of how an orchard is defined? Let me stress here that I am interested only in the scientific basis, if any, for such a requirement. I'm not asking whether there is a common practice or policy in this regard.

(b) if there is scientific justification for requiring that apple fruit is sourced from an orchard free of fire blight, is there any scientific justification for distinguishing between a severely blighted orchard and one in which a limited number of strikes occurs?

(c) if there is justification for requiring that apple fruit is sourced from an orchard free of fire blight, can this freedom be maintained without requiring that the orchard be surrounded by a fire blight free buffer zone.

Chair

134. I'll follow the order that we followed before and invite Dr Smith to address this question.

Dr Smith

135. Well, Mr Chairman, the justification of requiring that fruits should come from a fire blight-free site is that it solves all your problems. All the other questions about transmission, about latency, about completion of pathway and everything else. Provided that the fruit is taken in the first place from a fire blight free orchard, you are not going to have any contamination of the fruit and if you have no contamination of the fruit then you're safe. I don't know whether I have produced a scientific argument or if that is a technical argument. You are asking to limit ourselves to strictly scientific arguments. It is notable in a case like fire blight in apple fruits that the inspection of the fruit themselves will not necessarily tell you very much. You can't inspect them all, you can only inspect samples. If you are going to inspect anything, it is the orchard which would make sense to inspect. Now the question remains whether as an expert I am completely convinced that there is no risk at all that fruits will become contaminated provided that they satisfy the commercial requirements of being mature and symptomless. Because if that were so, (as in the American submission), the fruit would indeed only need to meet technical standards and perhaps not even need to be accompanied by a phytosanitary certificate. I've advanced similar arguments in the last discussion. I still have a doubt about this, and feel that there is technical justification for taking what appears to be a very effective measure. Thank you.

136. Regarding questions (b) and (c), I think the point is debatable. Question (b) is, I think, a question which can only be subject to detailed negotiation. There is no firm scientific basis for deciding where to set the limit between severe and light infection. These things have to be solved pragmatically. Concerning the question of the buffer zone, I don't believe there is any necessity for a

buffer zone except to the extent that it separates the production site from which the export is coming from other production sites around it and they must be physically distinct.

Chair

137. Thank you. Dr Hayward

Dr Hayward

138. Well, my understanding is or my reading of the literature indicates to me that the scientific study most relevant to questions (a), (b) and (c) is that of Roberts in 2002 I think I accept that scientific evidence as a thorough study. So in answer to question (a) I would say that there is no scientific justification for requiring an apple fruit be sourced from an orchard free of fire blight. I think my answer to (b) would be similar to Dr Smith's in that I am not very happy about sourcing fruit from a severely blighted orchard, but in saying that I am contradicting my acceptance of the work of Roberts in 2002. With regard to buffer zones, coming back to Roberts, the buffer zone of any size did not provide any additional help. I think again with (c) I would say there's no justification for requiring that apple fruit be sourced from an orchard free of fire blight.

Chair

139. Thank you very much. Dr Hale.

Dr Hale

140. My comment would be very similar to Dr Hayward's, and the only extra information that I can add is that in work that I did with Professor Sherman Thomson in 1987, shows that we did harvest some fruit from an orchard which was severely infected. The only bacteria that we found associated with that fruit was in the calyx end of the fruit and that was only in a small proportion of the fruit, a very small percentage of the fruit, and from the research that we have done recently that's already being discussed today, I still feel that we are not getting bacteria transmitted from the calyx end of the fruit to the susceptible host tissue. So I don't think that there really is any justification for buffer zones. I think this is borne out by the work of Roberts in 2002 which was a very extensive study where apples were taken from orchards where there was infection and there were no bacteria found associated with any of those fruit even from adjacent to where the infection sources were. Really I guess that by saying that there is no justification, I don't really have to answer (b) and (c). I did mention, I think, in my initial comments that a buffer zone or at least something which separates the production site could be quite useful, but this does not have to necessarily be a buffer zone. It could be a marked area and as Roberts pointed out no further phytosanitary protection is provided by a buffer zone. Thank you.

Chair

141. Thank you very much. Dr Geider

Dr Geider

142. I think we are now going into definitions which can be seen that or this way. I think the question about severely blighted orchards and blighted orchards is maybe a little bit academic here. I think for research purposes you might define something severely blighted but it is not widely accepted. It came up in New-Zealand for some reasons. In general the question is, anyhow, what effort is applied in orchards, and as far as I understand it is not easy to say if there is no strike at all in a big orchard. There are of course necrotic branches. There is something which could be fire blight. I think it is very difficult to define a fire blight free orchard anyhow and one in which fire blight has occurred. Of course to trace events back that can be extended indefinitely, like agreement between Japan and Australia with apples when this affair came up and Tasmania was suddenly involved in fire

blight. There was no fire blight but at first we did not do a complete survey. Still I think having fire blight in one place in a continent like Australia, could affect other apple producing areas. They were considering it to be very dangerous. I think this is an extreme.

143. On the other hand going back to orchards, it's a matter of negotiation. You can make a requirement that an orchard has to be free of fire blight for five years and subject to careful inspections held by qualified people which can identify or detect the pathogen unambiguously. There are many things in between when you ask me for my personal opinion. The risk even when food is picked from a papaya plant orchard is low that this will spread fire blight. I think we discussed that issue many times in the last and in this meeting. But politically it might not be so easy. People say you have fire blight and there might be fruit with fire blight, so it's dangerous. I think these negotiations have to be done between the parties and scientifically it might be difficult to define fire blight in a large orchard because it's hard to detect when its occurring. I know from the institute I am with now, usually there are 10-20 strikes per year in an orchard, maybe two hectares, which is not that big but still its not easy to look at everything. Is that a fire blight orchard or not? Of course the people say that they will remove the branches and the people are wondering where the fire blight is coming from. They always blame the hawthorn hedges and something else outside. This is of course the discussion we are not really having. When infested host plants are not in the orchards they are somewhere else. Back to the answer, I think the chance for blighted orchards to introduce fire blight by a fruit is low.

Chair

144. Thank you very much. So can we go on to the second question ?

145. In its comments on the experts replies to the questions Japan indicates in paragraph 9 that in light of the Japanese environment the most likely pathway scenario will be in surburban areas where most of the population live but not inside the orchards. Does this statement by Japan alter your previous replies regarding the likelihood of completion of the pathway for the introduction of fire blight into Japan through importation of mature symptomless apple fruit from the United States.

Dr Smith

146. Well Mr Chairman, first of all, I would say that this most likely scenario is one which applies not only in Japan, but almost in every case where fire blight has spread from one country to another. Although the authorities have tried to monitor the situation in orchards and detect the first signs in orchards, it's not in the orchards that they were found. They were found in gardens, parks, along motorways. These places are not normally inspected. It is easier for fire blight to appear and to start multiplying to form quite an outbreak without being noticed under those conditions. But this, I must say, applies to a situation where fire blight is spreading naturally by insect or by wind over a relatively short distances from infected plants. In that respect it is not the same scenario as the introduction from fruits entering by intercontinental trade. I don't think that the basic question whether an infected fruit provides inoculum which a vector could transfer to a susceptible host is much altered by the question whether that susceptible host is an apple tree in an orchard or whether it is a Cotoneaster growing in a garden.

Chair

147. Thank you very much. Dr Hayward.

Dr Hayward

148. Mr Chairman, well first of all I think I agree almost entirely with what Dr Smith has said. I recall in 1964 around Kew Gardens, Richmond and the Hampton Court Gardens there was a lot of fire blight on Cotoneaster in private gardens. I don't think that will be much different from the situation in

the Japanese environment, so I wonder whether the Japanese environment is quite as unique as is being presented to us. Regarding the previous statement by Japanese or to your previous replies regarding the likelihood of completion of the pathway for the introduction of fire blight to Japan through importation of mature symptomless apple fruit from the United States, I don't think I would alter my conclusion. The completion of the pathway has not been demonstrated from discarded fruit.

Chair

149. Thank you very much. Dr Hale.

Dr Hale

150. I really have very little to add to that because I think the key thing there is mature symptomless apple fruit. We do not at this point have any evidence to suggest that mature symptomless apple fruit from the United States or from anywhere will in fact complete a pathway for the disease.

Chair

151. Thank you. Dr Geider

Dr. Geider

152. I think basically the Japanese concern is somehow justified. There is actually spreading of fire blight from urban areas, private home gardens, or parks with ornamental orchards. We have that in Heidelberg. It was known that there are areas in parks with fire blight which are the source for infection to orchards. Now the next question is how does fire blight come to these places. I would, of course, agree with Dr Hale in saying that there is a very low risk of adding a little bit more. That means that we are not only considering the fruit. If an insect is going into a flower or an apple or pear tree, it can also go to a flower of Cotoneaster or something else. All fire blight host plants are exposed to this risk, but I think we still have this agreement about the risk of these apples, especially since we are saying that mature symptom-less apples are not defined and not known, the risk in this case is extremely low.

Chair

153. Thank you very much. Now we shall go on to the next one.

154. Does available scientific evidence demonstrate that in order to control the accidental contamination of harvested apples by *E. amylovora*, processing facilities must be able to reliably identify the origin of apples.

Dr Smith

155. Well, Mr Chairman, the International Plant Protection Convention requires that the integrity and security of consignments subject to a phytosanitary certificate should be assured by the National Plant Protection Organization of the exporting country. What do we mean by the accidental contamination of harvested apples? The objective is to prevent the mixing of uncertified contaminated fruit into batches of uncontaminated certified fruit. This is not a question of movement from fruit to fruit, but of the presence of contaminated fruit. If contaminated fruits, which would have to be immature, could accidentally enter consignments for export, then they would pose a problem. Then the consignment would not be composed of mature symptomless fruits, as it is supposed to be. To avoid this, you have to be able to reliably identify the correct origin of every part of the consignment, or in other words, the integrity of the consignment.

Chair

156. Thank you. Dr Hale

Dr Hale

157. Mr Chairman, again, I think that has been expressed very well. I find this question rather difficult to answer to be perfectly frank. I would have thought that processing facilities do in fact have an identification system for the origin of fruit which they process. Whether the available scientific evidence shows that this is necessary is another question. I would have thought that the practice is needed for other reasons as well, and I frankly find this question rather outside my experience. I can only talk from experience within New Zealand and the processing facilities do reliably identify the origin of apples. In fact, every case of apples, and in many cases each apple is identified and can be identified back to an orchard. If you look at a lot of New Zealand apples in the market place, they will have a sticker on them which has a number on which actually relates back to the orchard from where those apples came. I think that the processing facilities do reliably identify the origin of apples and I'm sure that in most cases the US has a similar system. I'm certain that US apples which come to New Zealand, for example, can be identified back to the processing facility and the orchard involved. This is not to do with disease situations in particular, but it is usually to do with supermarket traceability of those particular items of fruit.

Dr. Smith

158. The need to maintain the integrity of consignments does not, of course, necessarily relate only to one pest, fire blight, and whether the apples are going to New Zealand, Japan or wherever. They are not being certified only for one pest. The whole procedure of phytosanitary certification is, in any case, required for exported apples. I don't see any alternative.

Chair

159. Dr Geider, do you have anything to add ?

Dr Geider

160. The question reminds me about BSE habits developed in Europe and especially in Germany that you can trace back all meat to the farmer. Even if that can be done, what does it help ? Will you say we are now proving that we somehow got fire blight out of one apple or detected a few *E. amylovora* cells in an apple are now doing something to the orchard ? Do you want to prove that they have fire blight and they are not allowed to export anymore or what would be the consequence ? The question is a little bit difficult scientifically. Probably things can be traced back but even if you do that there are very rare occasions that an apple can be associated with fire blight.

Chair

161. Thank you very much.

162. In Japan's written response to a question posed by the Panel on post harvest requirements Japan states that it has been suspected, for a long time, that healthy fruit can be infected with fire blight bacteria from contact with infected fruit (a) are you aware of scientific evidence demonstrating that healthy apples can be infected through contact with infected fruit, (b) if such evidence exists does it suggest that all apples could become infected or that only damaged apples are susceptible to infection through contact with infected fruit and (c) is there any evidence that such spread of infection has occurred through trade in apple fruit.

Dr. Smith

163. I am not aware of any scientific evidence demonstrating that healthy apples can be infected with fireblight if in contact with infected fruit. If it is possible, I would think that for biological reasons which have been well demonstrated in a number of studies, damaged fruits are much more likely to be infected than undamaged ones. I don't think there is any evidence at all that there has been a spread of infection through trade in apple fruit.

Chair

164. Thank you very much. Dr Hayward.

Dr Hayward

165. Mr Chairman, if this question had been concerned with pears rather than apples then the answers might be different. (c) is there any evidence that such spread of infection has occurred through trade in apple fruit, I have no evidence that that spread has occurred. (a) are you aware of any scientific evidence demonstrating that healthy apples can be infected through contact within infected fruit, I am not aware of any such evidence. So the answer to (b) is not necessary.

Chair

166. Thank you very much Dr Hayward.

Dr. Hale

167. I think that Dr Hayward has a very good point there. We are not talking about pears, we are actually talking about apples in this case. If we were talking about pears we may be looking at something quite different. I am not aware of any scientific evidence demonstrating that healthy apples can be infected through contact with infected fruit, and therefore my answer to (c) is no, I have no evidence that such spread of infection has occurred through trading apple fruit.

Chair

168. Thank you. Dr Geider

Dr Geider

169. Well at least I would say that if this is a problem, this experiment could easily be done in the lab. Just take an apple which is not artificially inoculated and just bring it into contact with other apples. Then you could find out whether you could spread it on to the next apple. From my point of view apples for export are not really in contact with each other, they are separately packed into paper pouches. If there is little risk that this can theoretically or even experimentally happen it might not occur in practice.

Dr. Smith

170. Mr Chairman, on this point I am not quite sure about commercial practice in apple packing houses. The question relates to contact with infected fruit, and for me contact means one apple touching another apple. Another scenario is when both those apples are immersed in a liquid, such as a disinfectant or a fungicide dip. There are, in packing houses treatments, in which either apples are immersed or alternatively they are misted with a spray of water. Then the possibility of contamination is obviously greater. We come back to the fact that we are talking about the movement from the surface of one apple to the surface of another. The evidence for movement of epiphytic populations surviving on one apple to the surface of another apple is pretty small. The more important pathway is for bacteria to move from inside one apple to the inside of another apple. That pathway is normally closed, unless the apples are damaged.

Chair

171. In that case I will go on to the last question. The Panel recalls that the scientific experts have previously been asked to comment on the availability of scientific evidence supporting post harvest treatment of apple fruit. The Panel notes that Japan has asserted that Japan's post harvest requirement such as packing facilities, disinfection requirements are normal requirements in any process. To what extent do Japanese post harvest treatments e.g. surface disinfestations, disinfection of packing facilities, separation of fruit destined for Japan represent commonly accepted commercial practice. To what extent are these types of treatment normally identified in phyto sanitary certificates accompanying apple exports. If apples were sourced from a severely blighted orchard would this alter your responses to previous questions related to scientific evidence supporting post harvest treatment. Dr Smith I think this is probably more in your field.

Dr Smith

172. Surface disinfestation of apples is not worldwide, I would say, a regularly accepted commercial practice. It's not quite clear what is meant by disinfection of packing facilities and how this is distinct from just normally keeping them clean and in good condition. Do you have to disinfect them after every batch of fruit goes through them or do you have to disinfect them once a month? There are many possible options as to how and when packing facilities are disinfected. Separation of fruit destined for export is a common practice, not necessarily for commercial reasons, but because it's required for phytosanitary certification It is normal to require treatments to be identified on phytosanitary certificates accompanying exports, though this is more often for fumigations than for disinfections. The question about apples sourced from a severely blighted orchard makes no sense. You should never take apples from a severely blighted orchard. It is simply not a feasible commercial practice.

Chair

173. Dr Hayward

Dr Hayward

174. Mr Chairman I am not competent to answer question (b). I am simply not sufficiently familiar with phytosanitary certificates which accompany apple exports. To go back to the beginning the preamble, packing facilities and disinfection requirements, I would have thought that all packing facilities expect a certain level of sanitation and this would be a normal requirement. Now that's a pretty vague statement but I would have thought that some level of sanitation is a normal requirement. (a) Why would we treat mature symptomless apple fruit by any disinfestation process, say a chlorine solution or something of that nature? There is no evidence of an epiphytic population, even less after storage at low temperature following the work of Hale. The only site on the apple fruit, mature symptomless fruit which Dr Hale has identified, is the calyx. The calyx is a protected site and a surface disinfestation process is not going to be effective because the calyx will not be reliably penetrated by the solution you are using to treat it.

Dr Hale

175. I would agree entirely with that. That is exactly what I was going to say. I was going to mention that surface disinfestation does not remove *E. amylovora* from the calyx of the fruit. It is a protected site and it is very difficult to actually wet that site with any surface disinfestation. We have tried that and it just doesn't work. We did some work on surface disinfestation which has actually not been published but was done with one of our Japanese colleagues who came to work with us in New Zealand. Putting fruits which had been surface inoculated with *E. amylovora* through water was just as good as putting it through chlorinated water in removing any bacteria from the surface of the fruit. However, it does not represent commonly accepted commercial practice to attempt to surface disinfest

fruit. Disinfection of packing facilities, whilst this is normal practice – certainly in the packing facilities within New Zealand – I don't believe it needs to be made a mandatory situation or regulation. Separation of fruit destined for Japan is not a major problem at all. Certainly within the packing facilities that I have been involved with in New Zealand, we can separate fruit destined for just about any market anywhere in the world. Ninety five per cent of the apple fruit which is produced in New Zealand is in fact exported to markets all over the world. It is separated in the process of packing for the destination by requirements which may be "small fruit", "large fruit", the colour and type of fruit, the variety and so on. That is not a major issue.

176. To what extent are the treatments normally identified in phytosanitary certificates accompanying apple exports? I believe that there is some identification in phytosanitary certificates for exports of apple fruit for treatments for insect pests, but I am not aware of any necessarily for diseases. As for apples sourced from a severely blighted orchard- our experience is that surface contamination is not a problem. The only area where the bacteria would reside would be in the calyx and that would not be affected by any of the disinfestation treatments.

Chair

177. Thank you very much. Dr Geider.

Dr Geider

178. I think I pointed out last time that I am personally a little bit concerned about chlorine treatment of apples because chlorine has certainly other effects including some effects on human health. I agree with the others that it might not help to get sterile surface of apples where everything is fine. I think it is a goodwill action that you say "I have done something and you should feel safe now", and for those reasons we should seriously consider if this is by legal requirements like for peas where there is a certificate describing certain measurements for treatments if this is good for the consumption and if this is good for the apples. For those reasons I would even say that Japan should be cautious in not asking too much to do with the apples otherwise there will be other problems. Of course, we should not take suspicious apples and use them for export.

Chair

179. Well thank you very much. That completes the questions from the Panel for the experts. Thank you for your replies and your patience in dealing with that. Before proceeding further I would like to know whether either of the parties would like to ask any additional questions to the experts. United States.

United States

180. Mr Chairman, if it would be alright with the Panel we would request just a few minutes to digest what the experts have said in response to your questions in order to determine whether and if we would ask some follow-up questions.

Chair

181. Just a few minutes. We'll remain in the room.

United States

182. Thank you Mr Chairman. The United States has one follow-up question which we would like to address to Drs Geider and Smith. While we understand from a policy perspective the answer that you have given regarding severely blighted orchards and the harvesting of the apple fruit from those orchards, we were hoping that you could discuss the scientific evidence as it relates to mature apple

fruit harvested from severely blighted orchards and discuss how your opinion is based on that evidence.

Dr Smith

183. Mr Chairman, I am not quite sure how I understand that question. I can take it by analogy with Europe. Apples are freely traded between European countries and so are pears, and fire blight is widespread in many European countries but fire blight is also controlled in commercial orchards. The level of commercial fireblight control does not assure complete freedom from fire blight, and some infection most probably persists which is not seen. It would not be possible to market successfully apples or pears from severely blighted orchards. I think it is simply not realistic to address the question of fruits from severely blighted orchards. I'm not sure that it is even necessary. The key question is just how little fire blight it is advisable to have in production orchards. I don't think that it is easy to give a scientific answer to this question, because as with all questions of setting a tolerance in relation to regulated pests and international trade, tolerance is mathematically linked to the level of protection that the country wants. A country which sets a relatively low level of protection will accept a high tolerance and vice versa. It's negotiable.

Dr Hayward

184. I think the question, Mr Chairman, was to Dr Smith and Dr Geider.

Chair

185. Well that's true but you will certainly be given the opportunity to comment.

United States

186. My question Dr Geider was in light of your statement that you did not believe that commercial apple fruit should be taken from a severely blighted orchard. I was hoping to get a sense of what scientific evidence vis-à-vis the completion of the pathway from mature apple fruit harvested from orchards or on what scientific basis you would premise a conclusion that mature apple fruit should not come from a severely blighted orchard.

Dr Geider

187. There is maybe no strict scientific basis to say that this is something that you should not do. On the other hand there are practical reasons. I think it is what we say a good practice so its good orchard practice not doing that, and its also in terms of practical approaches in harvesting fruits, a very common practice not to take the apples from severely damaged trees. I understand in New Zealand, there are cases where so called severely blighted orchards occur. It is not worthwhile the effort to go for the fruits and first you can always say that a farmer who is really willing to sell everything to make a little bit of money, will do that. I think in this big commercial activities this might not really be the case, but it can happen. Of course when you ask me as a scientist if there are really limits that so many strikes would prevent any apples to take them to export, it's hard to say. I think I have no experience seeing these apples but there is some experience saying they are, in some cases, more infected in the calyx than apples from other orchards without fire blight. That would of course be very biased to have this precaution not to take the apples from the blighted orchards, but maybe this is the only reason I have. It's good commercial practice to obey limits of phytosanitary ordinance.

Dr Hale

188. I would like to make a small comment. I don't want people here, from Japan or the United States to think that New Zealand has a large number of severely infected orchards. In the commercial production of apples we perhaps see severe infection maybe in half a dozen orchards over a period of

ten years. The orchards are usually those which have been neglected by growers. The situation really is that a number of exporting companies now have their own representatives that are inspecting orchards all the time during the year, not only for fire blight but for anything. There are spray diaries which have to be kept up to date to show that all the fungicides, insecticides and so on have been applied only when required, because we operate under an integrated fruit production system. We are not using the old conventional calendar spray programs so the growers and the representatives of the export companies are very closely monitoring all orchards all the time. Now that's the situation in New Zealand. I don't know how that relates to other parts of the world, but I'm sure that in the major apple producing countries that's the case. I just wanted to make sure that you didn't think that we in New Zealand have severely infected orchards and that we are harvesting fruit from them. In most cases, the severely infected orchards where we did experimental work, were neglected orchards and the numbers of mature symptomless fruit were very small. As Dr Geider has just pointed out I would suggest that it would not be economic to even harvest those fruits, never mind export them.

Chair

189. Thank you. Do you have any comments Dr Hayward?

Dr Hayward

190. Not much. If we accept all sides of the evidence about mature symptomless fruit it should still be possible to harvest fruit from a severely blighted orchard without risk. It's a matter of definition how to define a severely blighted orchard. Does that mean every tree with 75 strikes per tree or does it mean an orchard in which there are some trees which have 75 strikes per tree?

Dr Hale

191. Can I give a quick answer to that as I am probably the culprit at suggesting that a severely blighted orchard had 75 plus strikes on average, 75 plus strikes per tree. I would blame my colleague, Professor Sherman Thomson actually for coming up with that, but because I was the senior author on the paper it's been put down to me. It was a definition that we came up with for the purposes of our work just to show a relative sort of figure. It isn't really a definition at all, so we don't want to get to hung up on that situation.

Chair

192. Can I just seek some clarification. You suggested that the severely blighted orchards were neglected orchards, does that mean that given a bit of attention they can become again productive less severely infected.

Dr Hale

193. For the pear orchard I would say no. If it was an apple orchard, yes they can be brought back into production again. So if it’s a neglected orchard it usually means that the treatment will be the use of a chainsaw.

Dr Smith

194. I would like to add the point; Mr Chairman, that a neglected orchard is neglected not only with respect to fire blight, it's also neglected with respect to codling moth and everything else. So fruits for export cannot be taken from such orchards. This is an academic argument.

Chair

195. Does that respond to the US question.

US

196. Yes Mr Chairman. Thank you.

Chair

197. Do you have any other questions.

US

198. We do not have any more questions.

Chair

199. Thank you very much. Can I ask Japan if you have any final questions for the experts.

Japan

200. Just one question. We understand that all the experts agree to some extent that mature, symptomless or mature healthy apples are the ones to be exported to Japan, and there is an issue of export control, or quality control, or export inspection, how tight it is, and without tight exporting inspection or tight export control we may never be getting what we want. You might recall the last time we met, we presented the fact that some American apples were found to have a codling moth larva in Taiwan, and you might also recall that the discussion took for the first time in the past 25 years. So now we have discovered in 2004 once again some of the American apples were found to have a codling moth larvae destined to Taiwan. Those shipments definitely have been exports certified as well as inspected by the United States. That took place in 2004 and that previous case was in 2002. Therefore it is not in a once in a twenty-five experience but taking place once in two years or maybe every year – I am just guessing.

201. Obviously I think the experts have put much emphasis on the quality of export control so that counts out any immature apples or infested apples or whatever which may cause problems. My questions are directed to Dr Hayward and Dr Hale in particular. The level of security or the cruelty of export inspections and the management, or more generally quality control as a whole in the production site or post harvest management will be a very important factor as phytosanitary measure against the introduction of fire blight. Would you agree with me from a scientific point of view ?

Dr Hayward

202. Chairman, I can't accept that there is such an entity as a mature symptomless infected fruit. I can't accept that that's been proven, I can't accept that there is anything more than an extremely low probability that the pathway from that hypothetically latently infected fruit, that the pathway could be completed from that entity to a Cotoneaster, a quince or to a pear or to an apple. That's the part I find difficult. The overall probability is the product of the two probabilities. The probability of the infected fruit and then the probability of the completion of the pathway, and the product of those is to me, it is vanishingly low.

Dr Hale

203. I have nothing more to add to that. I think you've summed it up perfectly. You have the two parts to the argument, one of which is the latently infected fruit and mature, symptomless, infected fruit which I don't believe that there's any proof that this actually happens in nature. Then there is no proof of a completion of a pathway. Export quality controls ensure that the consignments of apples

you are dealing with are mature and symptomless and without controls you can't be sure of that. So that if you are relying on the idea that they should be mature and symptomless, that has to be established, it has to be verified. It is an exemplary measure in itself ensuring that they are mature and symptomless. The simplest phytosanitary measure of all is a phytosanitary inspection of an exported consignment to determine whether or not the fruit are symptomless.

Chair

204. Very good. In that case I believe we may conclude our question and answer session. The secretary of the Panel will prepare a summary of all the information provided by the experts both in written responses to the questions and oral responses in today's meeting. Each of the experts will be asked to review this summary and to confirm that it accurately reflects his views. The summary will be part of the Panel's report on this dispute.

205. Before closing our proceedings I would like to invite the experts to make any final comments if they so wish.

Dr Smith

206. I will just reassert what I said a moment ago, which is that the experts conclude that there is a low probability that any mature symptomless fruit exported from the United States should be latently infected with fire blight. There is a low probability that even if such fruit (even for that matter fruit that showed symptoms) reached Japan, that fire blight will be transmitted to hosts. If that is so, the main risk and the main phytosanitary concern is to ensure that only mature symptomless fruits are exported. Adequate phytosanitary measures to ensure that are needed.

Chair

207. Thank you. Dr Hayward do you have any final comments.

Dr Hayward

208. Mr Chairman, possibly a couple of comments. I would have liked a little more time to think about the Panel's questions but I guess that the circumstances meant that we had to do it this way. To go back to question 1 I am not entirely clear about the publications of Azegami I and II, Tsukamoto I and II, but perhaps this is not a critical issue. Publications have the greatest impact when they are put out into the international arena. An international journal will have 50-100 or even more associate editors. I am not meaning to diminish the status and quality of the Journal of General Plant Pathology, but if you can get your work accepted by an international journal with the widest spectrum of referees from the widest range of background, then you really have something which you can show to the world and say "this is our work and it stands up no matter who judges it". Mr Chairman I've probably said too much.

Chair

209. Thank you very much. Dr Hale.

Dr Hale

210. Just before I sum up, I would just like to add to what Dr Hayward has just said and the fire blight community worldwide is a very strong community. There's a lot of work that has been going on regarding fire blight for many years. It's the most studied bacterial disease and on a three yearly basis we have an international workshop on fire blight. The eleventh one will be coming up in the year 2007 to be held in Portland, Oregon, and the last one was last year in July in Bologna, Italy. I would like to encourage the researchers from Japan to actually present the work that they are doing at future workshops. There was one of your colleagues from Japan at the meeting but there was no

presentation of any of the work that had been going on. I think it is very important that we as research workers in the area of plant pathology and in particular fire blight, exchange our views, and have the opportunity to exchange our views not only on a formal but on an informal basis by posters and by oral presentations at these international workshops which are held on a three year basis. I would like to really encourage you in future to make sure that the sort of work that you have been talking about, and you're starting to publish now, is in fact aired at these international workshops. We are not talking about a disease which comes up and appears on an irregular basis. This disease has been around for a long time, and we have a lot of people who are actively working in this area. I would really just like to thank the Panel for inviting me, and of course the other experts as well, to this meeting so that we can, in fact, hear the views on a personal basis particularly from Japan and also from the United States. For me, it really has not changed my views from those of two years ago, but I think we should not neglect the fact that there is some good research work which is going on in Japan and elsewhere in the world as well. If we can possibly get some collaborative work on some of these areas, I don't think it has to be under the auspices of ISPP, as I am sure that there is enough goodwill within various communities working on fire blight to be able to continue and perhaps do some further work in these areas. However, at this stage, my feeling is that we have no proof that mature symptomless apple fruit can be latently infected. We have no proof that a pathway can actually be completed. So, just as Dr Geider and the Japanese delegation mentioned, research is an ongoing process. I agree with that, but again the research work must be critically peer reviewed before it can actually stand up and persuade us, the experts, to start to change our minds. That's all I have to say.

Chair

211. Thank you very much. Dr Geider.

Dr Geider

212. Just to catch up with the last point of course I personally agree with the opinion of Dr Hale and Dr Hayward that all papers should be peer reviewed and try to submit it to high quality journals. Of course it does not guarantee that the value of the content is therefore the truth in science. It is a small selection but it is not that it is the end of the story. I think the reason that we are here is the concern from Japan to catch fire blight in the country and I think there was one point made - maybe it was in the New Zealand statement – although it is a little bit risky to do this research in Japan of course you can never say I don't know whether there are high risk facilities with labs completely isolated and then whatever. However on the other hand we are humans, we carry bacteria on our hands even if we wash them. There is always the risk that you can carry some out. Therefore I am not completely in agreement with your opinion that the Japanese should join the fire blight community by presenting a lot of old research. This is a little bit too far and too risky. Of course, I said in my comments there should be cooperation with other countries which have fire blight and which have facilities that can do many experiments without a risk level because the fire blight is there anyhow. We should keep in contact to discuss at least projects, and finally we might even get to some joint venture in doing something against fire blight. So this is possible, although we should not be urged to do fire blight research by all means, including for political and scientific means.

213. Another point is to summarise quickly the scientific background we have discussed. *E. amylovora* is an arial pathogen which means it can only survive in certain areas of plants and it does not survive in soil or in other environments. Even on surfaces of fruits and plants it's really epiphytic. For those reasons it's a very special pathogen. I wonder how it still survived so long in nature, but it has ways this is of course what Dr Goto was referring to. The research is not finished we still have a lot of questions regarding pathogens and we may answer some of them. Back to the purpose of the meeting, I think we agree in some point that the contamination of fruit especially of apples for export is low to zero, but of course this could still mean something, when it's not zero. However on the other hand if deposited fruit is a source of fire blight bacteria it can be asked further and can be experimentally answered to some extent. I was referring to at least a lot of practical

concerns to dissect the fruit for all pathogens and to find out what is going on in rotting fruit. It is a lot of things. It starts with a pathogen and then others come up. Then at the end its an array of micro organisms. I think this could happen with fire blighted rotting fruit. It's difficult to describe what cannot be easily resolved. There could at least be some attempts to dissect the micro organisms and to find out how does *E. amylovora* propagate in this environment if it is removed by others, and my opinion is it is probably replaced by many other bacteria like in the leaf spots of soybeans. At the end of course as always in science there is no absolute zero statement that nothing can happen and we really have to think that fire blight can be spread by many other events and whatever you do you can import wood with just some sort of bacteria, although I think that treated wood can also be contaminated, but my most concern is about personal imports which could carry the disease and finally it could even be things in parcels or what we did in the old days of bacteriophages we extracted letters from colleagues to get the bacteriophages. So there are sources and there are fruits, pears and especially apples is one of them but there are many others.

Chair

214. Thank you very much. On behalf of the Panel may I now thank our four experts, Drs Geider, Hale, Hayward and Smith for agreeing to serve as the experts on this Panel and for giving us the benefit of your wisdom and expertise. The Panel has benefited greatly from your written answers , the oral replies that you have given today, and the other comments that you have given us. So before closing I would just like to remind the parties that we will be meeting separately with them on Thursday of this week in Room F. It will be in the afternoon at 15.30 in this room – that's half an hour later than we had originally envisaged – 15.30 for the final meeting. Are there any other matters to consider? I don't see that anyone is rushing to take the floor. I would just finally like to thank our experts once again and wish them Bon Voyage. The meeting is now closed.