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I am honoured to be invited to address this International Convention on Biotechnology 2002. The life sciences are going to play a powerful role in the social and economic life of the human race. And Malaysia, which is bountifully endowed with biological resources by virtue of its tropical rain forest with its flora and fauna, is very keen to play a part and to contribute to this area of human knowledge and its application.

2. Like most of the sciences, biotechnology is not new. Even as far back as 500 B.C. the Chinese used molds from fermented soybean curd as an antibiotic to treat boils. The complete sequencing of the human genome under the Human Genome Project was an international effort to map all human genes. This was launched in 1990. When the first draft of the human genome sequence was completed and announced in February 2000 by Celera Genomics, the Biotechnology Revolution truly began. The complete sequencing of the Human Genome has opened the door to many new fields of studies including interaction of genes with genes, genes with proteins, protein with protein etc. This has facilitated rapid advances in genomic medicine, personalised medicine and gene therapy, and consequently in introducing vast economic opportunities and potentials.

3. Modern advances in Biotechnology has been made possible by the tremendous advances in I.T. of which the powerful super computers are the most significant. The millions of calculations required to work out the structure of the DNA would have taken decades without the powerful computative capacity of the ever more powerful computers. We have now advanced to the stage where we can simulate the movements and the reactions of the molecules as they interact chemically. With this we are set to design, study and simulate the various properties of new chemical structures which can play a role in overcoming the diseases and ensuring the health of living creatures including we humans.

4. Truly we are living in a very exciting age. Already animals are being cloned and some are trying to clone humans. It seems that we can now produce any number of Einsteins and also numerous Hitlers. The ethical scientist may not want to do this but there will be crooked scientists working under crooked regimes who may flood the earth with uncontrollable monsters. It seems like the stuff of science-fictions but it can become a reality if we do not keep a tight grip on the direction that biotechnology takes. It is fine to produce specific organs for transplanting in human bodies but we should not try to play God and think of populating this earth with creatures which may destroy us in the end.

5. And so before we go further the ethics of the life sciences must be spelt out by the international community and enforcement agencies set up. Admittedly, we have not been too successful in controlling nuclear science. But imagine how many countries would be having nuclear weapons today if there had been no control at all.

6. Today we live in fear because we suspect that some people have the capacity to produce biological weapons of mass destruction. We may have a war on our hands because this fear may lead us to react unwisely and actually precipitate the war which we want to avoid. There is no guarantee that those who wish to stop the use of biological weapons may not unleash the same. We must remember that the atomic bombs were dropped seemingly in defence by those who wish to stop a war.

7. I don't mean to dampen the enthusiasm of the participants at this convention. All I want to do is to point out the need for us to understand the need for some control if these new sciences are going to benefit us.

8. Malaysia has a lot to offer to the biotechnology industry. We are one of the twelve countries in the world with mega-diverse bio-resource. Our flora is estimated to contain about 12,500 species of flowering plants and more than 1,100 species of ferns. Our marine ecosystem is rich in a variety of life forms while the coral community is considered to be the most diverse in the world. One can view Malaysia as having a large reservoir of assets that has yet to be tapped. These assets require exploration and intensive studies in terms of research and development in order to make available to the rest of the world the benefits of biotechnology, such as cheaper and more efficacious drugs derived from natural resources, better therapies and higher crop production with improved

nutrients, taste and quality.

9. Malaysia's foray into biotechnology is not new. We have been involved in biotechnology research and development primarily in the agricultural sector. Our research activities at the Malaysia Agricultural Research and Development Institute (MARDI), University Putra Malaysia (UPM), Universiti Kebangsaan Malaysia (UKM), Universiti Sains Malaysia (USM) etc. have yielded some positive results. However, it is quite clear that these efforts are insufficient relative to the vast potential and opportunities available in biotechnology. We need to establish biotechnology as another pillar in the development of our knowledge-based economy. Comparatively speaking, our R&D has not resulted in many new patents being registered, much less new enterprise being launched. This situation reflects the inadequacies within the country which has not matched the resources and potential of Malaysia. As much as we would like to keep our resources to ourselves, we have to admit that we need collaboration with foreign scientists and enterprises even, in order to exploit and benefit from what we have.

10. We have of course started to train the necessary manpower but it is unlikely that we will have enough. Researchers are a special breed of people. They need a lot of patience and deep interest in their studies and work. While they can probably make a lot of money from their research, it remains for others to believe in the potential of their results and to be willing to invest large sums of money over a prolonged period before any return can be expected. Researchers must therefore accept the need to share their discoveries with entrepreneurs and investors. A formula for sharing must be institutionalised so that the researchers get a fair return on their work.

11. In the Eastern tradition knowledge is not usually shared. We know how various herbs are used in the treatment of diseases but there are hardly any record of the formula or the recipe. Frequently the recipe dies with the practitioner. At best the children of the practitioner inherit the recipe with the injunction not to reveal to anyone but their children and children's children.

12. The testing of the efficacy of the concoction is also not done, certainly not systematically and scientifically. No attempt is made to identify the actual active ingredient, the dosage, the side-effects and the contra indication.

13. Although we are now trained in science, some of

the old culture of secrecy and belief in magic even remains. This is unfortunate because there are sufficient evidence that the old medicaments are often effective. As a trained practitioner of modern medicine I should not be saying this but I used to suffer from chronic intractable cough accompanied by running nose and lung infection. What we call modern medication took a long time to stop the cough. But persuaded by a Chinese friend, I took Chinese medicine and the cough stopped. When I had another attack I tried the medicine again, and again it worked. I tried to find out what the medicine is made of and I was told that it was tiger's milk. Obviously there is no willingness to divulge the secret.

14. So far no attempt has been made to analyse it, to identify the active ingredient, to test, and to produce on a truly commercial scale. In fact it was hinted that it would be given only to deserving people free of charge. One should appreciate being selected but one cannot help feeling that so many people are being deprived of this effective treatment.

15. Some of this quaint ideas about what is proper and what is not still remains within the culture of Asian people. We have a need to discard most of them if we want to see the world benefit from our scientific researches and the enormous biological resources we have been endowed with.

16. But we also do not want to see the kind of avarice as shown by the big drug companies. Admittedly, they spend huge sums of money on research and development. Not all that they discover at great expense are worth anything at all. Once in a while they would come across a fantastic cure. They would try not only to recover the cost but to make huge profits for themselves by pricing their drugs beyond the reach of those most in need of treatment.

17. The treatment of HIV / AIDS is a case in point. Clinging rigidly to their proprietary rights they refuse to let others produce the drug unless huge royalties are paid. Governments of the poor countries are forced to protect these rights, maintain the high prices and see their own people suffer and die for lack of treatment. Millions of sufferers will die as the drug companies make billions for their healthy owners and shareholders. Lives apparently are not so important as intellectual property and the returns on investments.

18. We agree that large sums of money are needed for research and developments. But surely there must be

more transparency as to the cost and the recovery. How long should a copyright be protected and what percentage of profit should be legitimate and morally right?

19. Clearly neither the Asian model nor the Western model is ideal. With so much that can be done in the field of biotechnology, it is again important that the question of ethics be given serious consideration. The whole world must benefit from the researches that can be done in the life sciences. The promise is great. While we should ensure a fair return, we should not be so profit oriented that we forget our social obligations.

20. There is now a huge outcry over Genetically Modified agricultural food products. There may be some basis for this fear of Genetically Modified products. But Genetically Modified food holds great promise for the starving people in this world. While we should not test the Genetically Modified products on these hapless people, we must expend a lot of money on verifying the harmful effects as quickly as science will allow us. It would be unfortunate indeed if millions must die because the rich have decided to reject Genetically Modified food in favour of the more costly normal products.

21. Malaysia is conscious of its wealth of resources in the field of biotechnology. We are not so selfish that we will deprive the world of the wonders that can be developed from these resources. But we must benefit fairly from the assets that God has bestowed on us. This is an opportunity for Malaysia to develop to become a developed country. We should welcome collaboration in research under conditions which will allow us a fair share of the benefits.

22. In the Eighth Malaysia Plan, biotechnology has been identified as a major initiative in the promotion of science and technology, research and development and technological innovation to support Malaysia's overall strategy for sustainable growth in the knowledge-based economy.

23. The main implementation vehicle for the Biotechnology development programme is BioValley Malaysia. This project is intended to be a catalyst and testbed for the development of Malaysia's biotechnology industry.

24. BioValley Malaysia will have world-class facilities and infrastructure. It will be designed to enable the co-location of a critical mass of researchers, industry workers and entrepreneurs in an environment created to facilitate networking, sharing

of information and ideas and the development of commercial activities pertaining to biotech. It will incorporate research, commercial, educational, recreational and residential facilities including a zone catering specifically for manufacturing. Moreover, with the project location in the MSC, we envisage this will foster closer and greater interactions between industries involving information technology and biotechnology.

25. We are embarking on a long journey and have taken the first few steps on that journey. We invite all of you to join us in this journey and help us in achieving our aspiration to make Malaysia one of the key biotechnology hubs in the world while reaping the great potential benefits from our greatly diversified bio-resources. This, in short, is Malaysia's Biotechnology Agenda.

26. On that note, I declare this International Convention on Biotechnology 2002 open.