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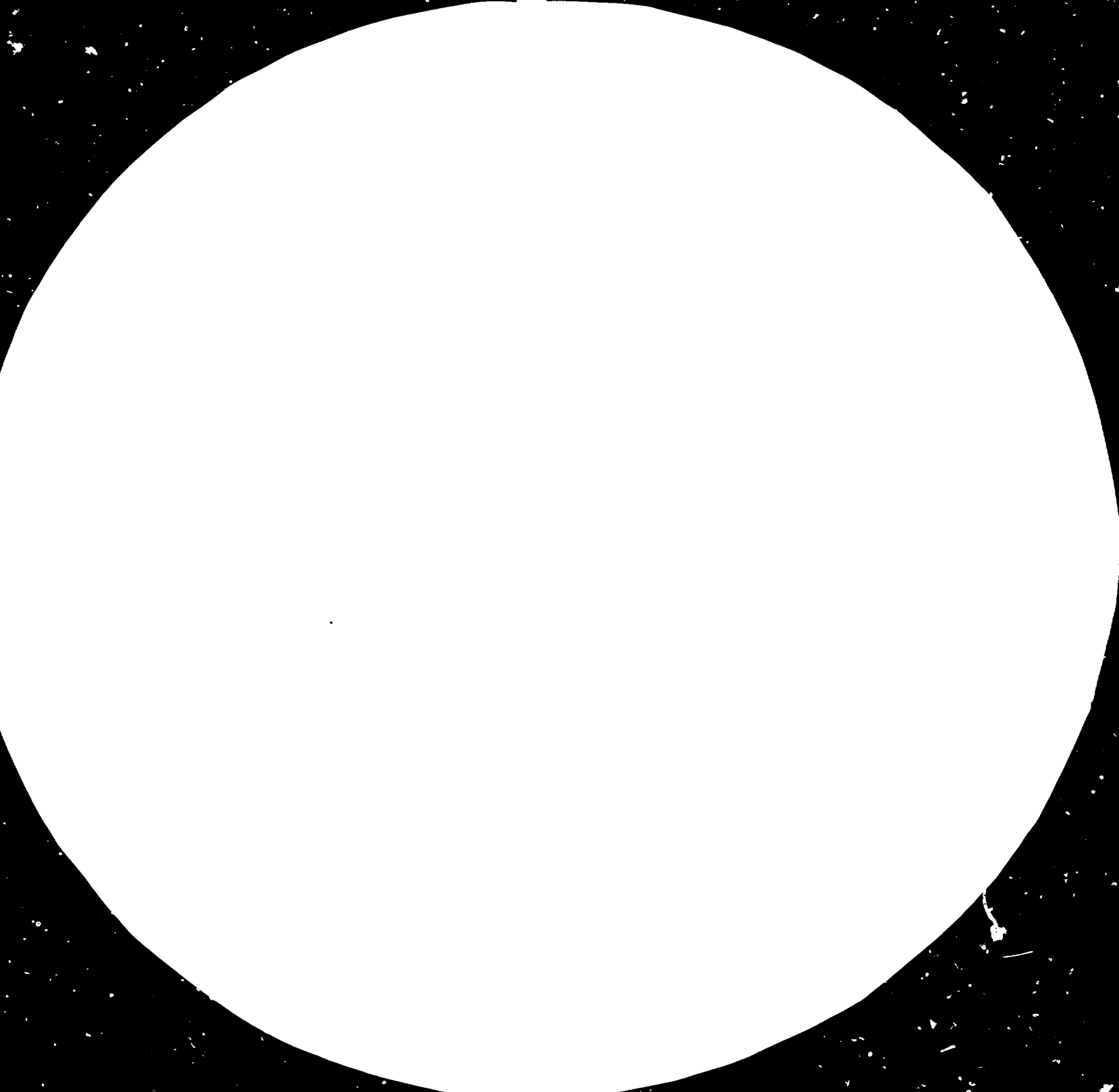
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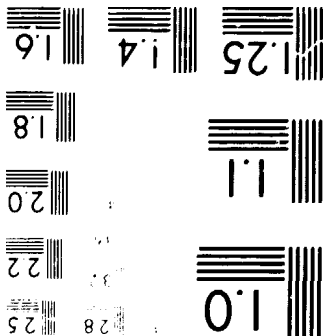
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7 June 1983

ENGLISH

**Ministerial-Level Plenipotentiary Meeting on  
the Establishment of the International Centre  
for Genetic Engineering and Biotechnology**

**Madrid, Spain, 7-13 September 1983**

REPORT\*  
of the  
SELECTED COMMITTEE

appointed according to the decision of the  
High-Level Meeting on

THE ESTABLISHMENT OF THE INTERNATIONAL CENTRE  
FOR GENETIC ENGINEERING AND BIOTECHNOLOGY (ICGEB)

(Belgrade, Yugoslavia, 13-17 December 1982)

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Madrid, Spain, 7-13 September 1983

REPORT  
of the  
SELECTED COMMITTEE

Corrigendum

Page 21, paragraph 89 (a), line 2

For Part II read Part I

Page 23, paragraph 91, line 8, and paragraph 93, line 1

For Part II read Part I

V.83-57317

LETTER OF TRANSMITTAL FROM THE SELECTED COMMITTEE  
TO THE EXECUTIVE DIRECTOR OF UNIDO

13 May 1983

Dear Dr. Khane,

The members of the Selected Committee, set up according to the decision of the High-Level Meeting, held in Belgrade, 13-17 December 1982, wish to submit their report through you for circulation to the governments participating in the Ministerial-Level Plenipotentiary Meeting.

The Selected Committee has considered the replies to the questionnaires received from Belgium, Cuba, India, Italy, Pakistan and Thailand. It has visited these countries and has obtained much additional information relevant to the establishment of the International Centre for Genetic Engineering and Biotechnology.

The Selected Committee has been asked to carry out an extremely difficult task and it is fully aware of the limitations of the methods it has used and of the amount of information which it has been able to consider from each country. Even considering these limitations it feels sure of the judgements which it has been able to make. These are offered as advice to facilitate the Plenipotentiary Meeting and the Selected Committee hopes that this advice will be useful.

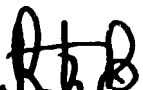

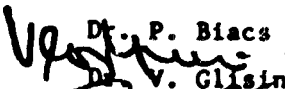
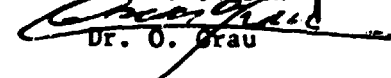
The experience which the Selected Committee has gained substantiates completely the proposal to establish the ICGEB. In every country visited the Selected Committee has found examples unique to each country of the way in which genetic engineering and biotechnology can benefit the developing countries.

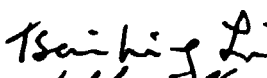


The Selected Committee wishes to dedicate this report to Dr. Cesar Vasquez, member of the Selected Committee, who was our close friend and colleague for too short a time until his tragic death from a heart attack on 19 April 1983. Physician, molecular biologist, administrator, he was a gifted man speaking several languages, knowledgeable in history, music, art and literature. A charming, humorous and courteous conversationalist, he was energetically devoted to the cause of science in his country and in developing countries. He was so committed to the idea of the ICGEB and to the mission of the Selected Committee that he did not think to pay proper attention to his own wellbeing. So it occurred, this great loss to his family and many friends with whom we mourn.

We wish also to record our thanks to the many people who have helped us in this project. We have received many kindness and none of us will ever forget the opportunity which we had to see so much and to make so many fascinating acquaintances.

Yours sincerely,

D. McConnell 

Dr. R.O. Barrow   
Dr. P. Biacs   
Dr. V. Glavin   
Dr. O. Grau 

Dr. T.P. Li   
Dr. S. Normark   
Dr. S. Saono 

CONTENTS

	<u>Page</u>	<u>Paragraph</u>
INTRODUCTION	1 - 4	1 - 17
I. DESCRIPTIONS OF THE OFFERS	5 - 19	18 - 83
- Belgium: Regional Government of Wallonia	5 - 7	18 - 29
- Belgium: Regional Governments of Brussels and Flanders	7 - 9	30 - 37
- Cuba	9 - 10	38 - 45
- India	11 - 13	46 - 54
- Italy	13 - 15	55 - 63
- Pakistan	15 - 17	64 - 73
- Thailand	17 - 19	74 - 83
II. METHODS OF EVALUATION	20 - 22	84 - 90
III. CRITICAL EVALUATION OF THE OFFERS	23 - 25	91 - 98
- Belgium	25 - 27	99 - 110
- Cuba	28	111 - 115
- India	29 - 31	116 - 122
- Italy	31 - 32	123 - 126
- Pakistan	33	127 - 129
- Thailand	34 - 35	130 - 134
IV. SUMMARY AND CONCLUSION	36 - 37	135 - 139
ANNEX I	Plan of Action of the Selected Committee	38
ANNEX II	The Members of the Selected Committee	39 - 40
ANNEX III	Itinerary of the Selected Committee	41 - 51
ANNEX IV	Documents Provided to the Selected Committee by UNIDO	52
ANNEX V	Communications received by the Selected Committee	53 - 55
ANNEX VI	Offers from Bulgaria and Tunisia	55 - 58
ANNEX VII	Elements Discerned Within the Information Submitted to the Selected Committee	59 - 61

## INTRODUCTION

1. UNIDO convened a meeting of eminent scientific experts in Vienna from 4-6 February 1981 to consider the importance of the science and technology of genetic engineering and biotechnology for developing countries (document UNIDO/IS.259). After extensive consultation in developing and developed countries this group of scientific experts produced a report (document UNIDO/IS.254) which proposed that an International Centre for Genetic Engineering and Biotechnology (ICGEB) be established to facilitate the transfer of knowledge in these fields to the developing countries.

2. A High-Level Meeting on the Establishment of the International Centre for Genetic Engineering and Biotechnology was convened in Belgrade, Yugoslavia, from 13 to 17 December 1982, attended by representatives of 35 countries, and recommended that the ICGEB be established with the additional emphasis that special steps would be required to link the ICGEB to the developing countries through a network of affiliated, and national centres (document ID/WG.382/7).

3. The High-Level Meeting requested that offers to host the ICGEB be made in the form of answers to a questionnaire to be prepared by UNIDO. It decided that a Selected Committee should be established to prepare a report to advise on these offers. The Plan of Action of the Selected Committee was described in the report ID/WG.382/7, paragraphs 54-61 (Annex I).

4. The Terms of Reference of the Selected Committee were described in paragraphs 62 of the same report:

- "(a) The mandate of the Selected Committee is within the framework of the consensus reached in the meeting.
- (b) The Selected Committee is required to seek additional information and examine in detail information from the host governments, UNIDO and other sources about the suitability and advisability of accepting the offers submitted.
- (c) For this purpose, it will examine the details of the offers received in regard to:
  - (i) physical facilities, including the site and location;
  - (ii) scientific infrastructure and supporting services;
  - (iii) availability of scientific and technological and administrative personnel including language services;
  - (iv) finances and ability to attract membership and other sources of finances; and
  - (v) legal and other privileges to retain an international character.



- (d) The Selected Committee will visit the countries to ascertain all the details in (c) above and to acquire first-hand information about the submitted offers.
  - (e) In order to assist the Ministerial-Level Plenipotentiary Meeting to reach a decision, the Selected Committee will offer a critical and objective analysis on the merits and demerits of each case. Therefore, the Selected Committee will be advisory in character to the Ministerial-Level Plenipotentiary Meeting."
5. The members of the Selected Committee are given in Annex II.
  6. The Selected Committee convened at UNIDO in Vienna from 14-18 March 1983. It examined the replies to questionnaires received from Belgium (a) Regional Government of Wallonia, (b) Regional Government of Brussels, (c) Regional Government of Flanders, Cuba, India, Italy, Pakistan and Thailand. The offers from Brussels and Flanders were subsequently combined.
  7. The Selected Committee then followed an itinerary prepared by the UNIDO Secretariat visiting each of the countries listed above which had made an offer to host the ICGEB. It also visited Sweden which had expressed strong interest in the ICGEB at Belgrade and had then invited the Selected Committee to visit Sweden to discuss further details of its possible contribution. The Selected Committee visited New York to discuss the ICGEB with some of the experts who had prepared the report UNIDO/IS.254 proposing the establishment of the ICGEB. The details of the itinerary are in Annex III.
  8. The Selected Committee received from the UNIDO Secretariat copies of the relevant UNIDO reports and documents (Annex IV).
  9. On its return to Vienna on 7 May 1983 the Selected Committee received additional information from Belgium, Cuba, India, Italy and Pakistan relating to items discussed during the visits to these countries (Annex V).
  10. The Selected Committee noted two offers to host the ICGEB received in Vienna from Bulgaria and Tunisia after 20 February 1983, the deadline for submission of the questionnaire to UNIDO set by the Belgrade meeting (see ID/WG.382/7, paragraph 57), and after the Selected Committee had left Vienna on 20 March 1983 on its itinerary. It has not been possible to consider these offers in detail but they are summarized in Annex VI. The Committee was grateful for the interest taken by these two countries.
  11. The Selected Committee noted an offer from Egypt to host an affiliated centre. It was not within the brief of the Committee to consider this but it acknowledges the interest shown by Egypt as further evidence that developing countries perceive the ICGEB as an important element in the acquisition of new technology and wish to be associated with it.

12. The Selected Committee has greatly appreciated the unique opportunity offered to it to meet the working scientists in their own laboratories in so many countries. The Selected Committee has often been impressed by the quality of the science being conducted, sometimes under difficult circumstances and essentially in isolation from the international scientific community. The value of this science is increasingly recognized by the relevant authorities and wide support is being given to the fundamental areas of molecular biology, microbial genetics, biochemistry, and fermentation processes, which have in some cases formerly been neglected. Recombinant DNA technology (genetic engineering) which has grown out of these fundamental sciences is now being used in some laboratories in developing countries though the efficiency of the projects is not usually high. It has been difficult to assemble the necessary numbers of experienced scientists to form a "critical mass" and it has often been difficult to arrange for sufficient support in terms of materials, technical support, information flow, buildings etc. However, the potential of genetic engineering and biotechnology is widely known at high political levels and there is a keen appreciation of the need to increase the efficiency of the research and development groups in this field. All developing countries visited have started programmes in genetic engineering and biotechnology. These activities in the developing countries show in the first place the need for the ICGEB and in the second place that the ICGEB will be able to construct and act as a resource centre for a network of affiliated regional and national centres.

13. The Selected Committee, considering the main tasks of UNIDO, has seen at first hand the need to transfer the powerful science of genetic engineering and biotechnology to developing countries. In each developing country it has been made aware of research projects which are unique to that country which would benefit from association with the ICGEB. At the same time in the advanced countries it has noted the gathering speed of the genetic engineering and biotechnology research and development programmes. The need to establish the ICGEB is even greater now than it was two years ago when the idea was conceived. It is therefore important that the potential member countries of the ICGEB assess the urgency of this matter and note that the choice of location of the ICGEB will crucially affect the speed with which the Centre can begin to help the developing countries in a useful way.

14. The Selected Committee wishes to acknowledge the large amount of work on the ICGEB project carried out by the staff of UNIDO and the expert advisers. They had prepared the ground with great care and made the task of the Selected

Committee that much easier, The Selected Committee wishes in particular to thank Dr. José M. Costa Lafarga, staff member of UNIDO, who accompanied the Committee throughout its journey and as Secretary to the Committee contributed much to its work.

15. The Selected Committee was set a most difficult task and it is aware of the shortcomings of the process of assessment which it has been able to adopt. It has not been able to assess matters related to the legal aspects (Section V of the Questionnaire) since these require specialised knowledge of international and national law. It has endeavoured to clarify some of the general legal matters in discussion and has provided UNIDO with the pertinent information. The UNIDO staff may be able to present an analysis of the legal aspects for consideration by the Plenipotentiary Meeting.

16. Expecting the legal aspects the Selected Committee believes it has been able to make good assessments of the other factors referred to in the Questionnaire. In some cases final proposals have not been made with respect to Physical Facilities (Section I, Questionnaire) or Financing of the Centre (Section IV, Questionnaire) and these are noted. The Committee is confident that it has been able to assess accurately the major requirements for Scientific and Technical Infrastructure (Section II, Questionnaire), Personnel (Section III), Government Policy Support (Section VI) and Provisional Arrangements (Section VII).

17. The process of assessment, which was decided for the Selected Committee, had its obvious defects. The Committee hopes that the shortcomings of the process will be seen in the light of this report which has a unanimous conclusion. It has been produced with the express purpose of facilitating the next stages in the foundation of the ICGB to which the Selected Committee is strongly committed and which it wishes to support in every way possible.

## I. DESCRIPTIONS OF THE OFFERS

### Belgium - Regional Government of Wallonia

#### Physical facilities

18. A provisional building is offered on the campus of the Catholic University of Louvain in the new (1968) university town of Louvain-la-Neuve, situated between Brussels and Namur, 18 miles SE of Brussels. This building of 2,700 m<sup>2</sup> is close to the Cyclotron and is now occupied by the Department of Radio-chemistry.

19. In a second phase a building of 2,500 to 3,000 m<sup>2</sup> including the pilot plant and complementary facilities will be built in 18 months at the Scientific Research Park of Louvain-la-Neuve. The authorities indicated they were willing to negotiate about the size and site of the new building and whether the provisional building would be part of the final complex.

#### Basic infrastructure

20. The site offered, being centrally located in Europe, has a temperate climate. It has excellent facilities for national and international transportation, means of communication and all the basic services and social requirements. Private housing in Louvain-la-Neuve and its surroundings is available. There are also student hostels and hotels close to the proposed site.

#### Scientific infrastructure and supporting services including manpower

21. The local scientific infrastructure is based on the large new university with 13,000 students in many well equipped faculties. The university has a genetic engineering group with 30 people (17 Ph.Ds.). A university library and IBM 370 computer with many terminals is available. Near to Louvain-la-Neuve there are many other universities and research institutes, a chemical engineering pilot plant and a biogas laboratory. The university campus is near several research-based industries (30 companies in 140 ha) including Monsanto Agricultural Laboratories. Technical services and supply of radio isotopes (Institute of Radio-Elements) are available locally.

22. Technical level personnel for the ICGB can be recruited from vocational and technical schools. The number of universities or other third level graduates produced in this region is very high including scientists and technologists from many faculties including science, medicine, agriculture and engineering. Administrative staff with good knowledge of languages is available.

23. Research in genetic engineering and biotechnology (GEB), in the Walloon Region, is carried out in several university departments of biochemistry, molecular biology, genetics and process engineering in various universities, especially at Louvain-la-Neuve and Liège. A number of scientific and industrial associations and the Ministry of New Technologies of the Walloon Region are strongly encouraging this activity. Several agricultural research centres, especially at Gembloux are applying molecular genetics methods to yeast and plants and have experience in plant tissue culture.

24. Activity in the field of genetic engineering is concentrated on aspects of public health, food production, biogas and bio-alcohol energy production.

#### Capacity to transfer knowledge to developing countries

25. International activity is based on scientific agreements with a number of countries including some developing countries in Africa. The university attracts students from a wide range of developing countries.

#### National and local commitment

26. Local commitment for the ICGB is strong from both the Walloon Regional Government and from the Catholic University of Louvain, but the national commitment has not been clearly indicated as of this moment by the national Government.

27. The Walloon proposal offers to provide all the scientific equipment listed in UNIDO document ID/WG.382/4 having an estimated value of US\$ 9.53 million of which the Catholic University of Louvain will supply in kind the equivalent of US\$ 1.32 million while the remainder will be provided by the Walloon Government "with an obligation to purchase equipment from Belgian manufacturers or suppliers". The ICGB must guarantee free access to the scientific equipment of the pilot plant, up to a maximum use of 20 per cent of the real functioning time of this equipment.

28. Five to ten scientists from universities of the Walloon Region, clerical personnel and manual workers may be seconded to be associated with the ICGB, representing a potential contribution of US\$ 3.78 million for a five year period. For operational activities US\$ 0.5 million would be devoted to training researchers from developing countries and US\$ 1 million to co-operative research programmes between the ICGB and the Walloon scientific community.

29. The value of land, building and utilities is estimated to be US\$ 4 million bringing the potential overall contribution of the Walloon Government to an estimate of US\$ 18.8 million. The Walloon authorities are willing to discuss these provisions further.

Belgium - Combined Offers of the  
Regional Governments of Brussels and Flanders

Physical facilities

30. The permanent facilities offered for the ICGB, are at Meylermeersch, close to the Hospital Erasmus of the Free University of Brussels (ULB) with an area of 25 ha. There is the possibility of extending the area to 44 ha. An alternative site of similar size is available at Jette, close to the hospital of the Vrije Universiteit Brussel (VUB). Both sites are on the perimeter of Brussels. The size of the buildings to be offered cannot be decided until there is clarification of the overall financial provisions and costings.

31. Provisional facilities amounting to 2,700 m<sup>2</sup> laboratory space have been offered in a new building located at the Vrije Universiteit Brussel (VUB) Hospital at Jette.

Basic infrastructure

32. The proposed site at Meylermeersch is located 25 minutes driving time from Brussels International Airport. It is beside a highway linking it directly to the European highway system. Both bus and train services are available close by. It is conveniently located for communication with several research institutes and universities of the Brussels region. Private housing is available and there is a large number of international hotels in Brussels. Health facilities are well developed (the Hospital Erasmus has 750 beds and is modern), and there are good recreational facilities.

Scientific infrastructure and supporting services including manpower

33. Scientific infrastructure is offered by both the Flemish and French parts of the Free University of Brussels. Their microbiology and biochemistry laboratories are joined with the Food and Biotechnology Research Institute of CERIA-COOVI, where there are 20 researchers in a genetic engineering group. CERIA-COOVI has a biotechnology unit and pilot plant with 40 staff. The university and CERIA-COOVI libraries contain all major journals in genetic engineering and biotechnology. A CDC 7600 computer is available. There are several other universities (Ghent, Leuven) and major research centres (Institute of Tropical Medicine, Antwerp) with high reputations ready to co-operate with the ICGEB.

34. Personnel for the ICGEB could be recruited from many third level institutions including universities and vocational and technical schools. Ten schools provide education in various foreign languages in Brussels. Administrative staff with good knowledge of foreign languages is available.

35. The fields of genetic engineering and biotechnology are well established in Flanders and the Brussels Region. University departments in plant genetics, molecular biology, molecular genetics, immunology, cellular genetics and physiology are found in various universities and there is good collaboration between them. Universities offer special courses in molecular biology, biophysics, biochemistry and applied tropical molecular biology. Technical and agricultural faculties offer biotechnology, applied microbiology and mariculture. Priorities for the application of GEB are in agriculture, veterinary science, tropical medicine, enzyme engineering in food technology and mariculture.

Capacity to transfer knowledge to developing countries

36. International activity is based on 21 bilateral conventions with developing countries and 22 agreements with international agencies and research institutions. Belgium has a policy of welcoming foreign students and trainees (ca. 2000 yearly). EURATOM provides broad experience in international co-operation.

#### National and local commitment

37. The combined offers of the Flanders and Brussels Regional Government provide financial means for costs including land, buildings, equipment and accommodation for foreign researchers from the account of the regional budgets for a total value of US\$ 9.5 million. A contribution of US\$ 27 million from the National Government is being jointly solicited by the Flanders and Brussels Regional Governments. The local commitment for the ICGB is strong, but the national commitment is not clear.

#### Cuba

##### Physical facilities

38. Permanent facilities: An area of 48 ha of land is offered, located in the Cubanacan District of Havana where most of the embassies and some research institutions are situated. Buildings will be provided with 17,000 m<sup>2</sup> total floor space as required. The site is a few minutes drive from the downtown area and 25 km from the International Airport of Havana.

39. Provisional facilities: these will be located in various departments of the National Scientific Research Centre (CNIC), the Biological Research Centre (CIB), the National Centre for Agricultural and Animal Health (CENSA) and the Institute of Experimental Chemistry and Biology (IQBE).

##### Basic infrastructure

40. Cuba is served by a number of airlines which connect it to several countries in Central and North America as well as Europe. The Cubanacan District of Havana has a continuous and stable supply of water, gas, electricity, postal and telecommunication services. Housing for the ICGB personnel and fellows/trainees will be provided by the Government of Cuba. Schools with English as the medium of instruction are available. In the centre of the town area, a number of recreational facilities, including museums, theatres and sports facilities, can be found. Shopping area and medical services are available.

##### Scientific infrastructure and supporting services including manpower

41. A number of research institutions engaged in GEB research and development activities are located very near the permanent site, e.g. the Biological



Research Centre (CIB), and the National Scientific Research Centre (CENIC), while others such as the National Centre for Agricultural and Animal Health (CENSA) and the Institute of Experimental Chemistry and Biology (IQBE) are located some distance from the Centre.

42. The Havana University, with various departments related to GEB, is in the centre of town area, whereas the Technical University which has a Food and Biotechnology department with a small fermentation unit is outside Havana. A computer centre serving a number of government institutions is in the centre of town area, while the Central Library for Biological Sciences is located in the same building as the Academy of Sciences Headquarters. The number of personnel engaged in various GEB research and development activities is around 200, of which 20-30 directly deal with genetic engineering.

#### Capacity to transfer knowledge to developing countries

43. Cuba has bilateral and multilateral co-operation programmes in science and technology with a number of countries in Central America and Europe. It also provides fellowships to students from other developing countries to study in various higher educational institutions in Cuba.

#### National and local commitment

44. Financial: the total cost for capital investment would amount to US\$ 8,483,000 which comprises US\$ 1,920,000 for the 48 ha of land, US\$ 6,300,000 for the buildings and US\$ 263,000 for the hostel. This cost will be met in local currency. Some operational costs will also be provided in local currency.

45. Involvement of the country in GEB: There is a great awareness in the country of the importance of GEB. This is reflected in the inclusion of GEB programme in the National Development Programme. Strong commitment on the development of GEB was expressed not only by the scientific community but also by several ministers, and the Head of State. Details of the discussions were confirmed by a written document sent to UNIDO Headquarters, Vienna, received on 28 April 1983, which showed the willingness of the Cuban Government to do everything possible to support the location of the ICCEB in Havana.

India

Physical facilities

46. Permanent facilities offered for the ICGEB include two sites in Gurgaon, a developing satellite town SW of New Delhi in Haryana State, near to Delhi Airport (20 km, 30 min. drive). The two sites for establishing the Centre are site No. 1 in an area intended for industrial development and site No. 2 nearer to Gurgaon city. Land and building space will be 12 ha as a campus and buildings of 17,000 m<sup>2</sup> total floor space, plus staff housing.

47. Provisional facilities for the ICGEB would be provided in existing laboratories of the Faculty of Environmental Sciences at the new campus of the J. Nehru University, New Delhi, on the outskirts of New Delhi.

Basic infrastructure

48. New Delhi has an international airport and it is served by road from all parts of the country. There is a stable supply of water, gas and electricity, and telecommunication services are available. New Delhi has several hotels of international standard. Social amenities like English language schools, sports and cultural facilities, shopping areas, and medical services are available in New Delhi.

Scientific infrastructure and supporting services including manpower

49. New Delhi has many universities, research institutes and laboratories available to support the development of genetic engineering and biotechnology. Biology departments of the Delhi University, J. Nehru University, All India Institute of Medical Science, Indian Agricultural Research Institute and the Biotechnology Department of the All India Institute of Technology offer education, research training or specialization in those fields. There are 17 research institutes, and more than 25 universities which have projects in GEB in India.

50. Sufficient trained manpower is available to undertake some research in genetic engineering and biotechnology, and universities are offering training courses in the field of biotechnology and allied fields. The National Biotechnology Board has drawn up an integrated long-term training programme involving universities and research laboratories. Funds have been channelled to promote biotechnology research and development among Indian scientists in

the country and to involve Indian scientists abroad. The Council of Scientific and Industrial Research has decided to set up an Institute for Microbial Technology in Chandigarh in 1984 in connection with the Punjab University linked by a network with other institutions.

Capacity to transfer knowledge to developing countries

51. The Government of India attaches considerable importance to technical co-operation with developing countries, and offers educational research and training facilities as well as expertise and know-how for industrial development. Their experience in international co-operation is indicated by the International Crop Research Institute for Semi-Arid Tropics, Hyderabad, and the Regional Centre for Technology Transfer, Bangalore. The Government of India has established a National Information System for Science and Technology (NISSAT) as a promoter of technology transfer within the country as well as from one country to another. India has bilateral and multilateral co-operation with many countries in the field of science and technology.

National and local commitment

52. There is a strong commitment to establish the Centre on the part of the National Biotechnology Board, the Department of Science and Technology, the Government of India as well as the authorities of Haryana State and Gurgaon City. Construction of services and buildings for the Centre can be completed in two years.

53. The total amount offered for capital investment is valued as US\$ 21.5 million and is offered mostly in kind. It comprises 15 ha of land valued at US\$ 3.5 million, 17,000 m<sup>2</sup> of buildings valued at US\$ 6.0 million, staff housing at US\$ 3.5 million, building improvements (air conditioning, heating, independent power supply etc.) at US\$ 3.0 million, and other buildings (guesthouse, hostel, conference facilities etc.) at US\$ 2.5 million. There is also a sum of US\$ 3.0 million offered for equipment which includes a provision for foreign exchange. India also offers to provide an in kind contribution of US\$ 6.4 million towards operational costs over five years and US\$ 2.7 million in foreign exchange for the purchase of chemicals and spares.

54. The National Biotechnology Board has had a broad commitment and explicit policy to encourage research and development in genetic engineering and biotechnology and to promote, coordinate and monitor the progress in this field since 1982. Priority areas have been identified in the long-term plan based on national need, available expertise and infrastructure in GEB and related fields. The Government of India has already taken initiatives to promote biotechnology by integrating the policy of Council of Medical Science, the Council of Scientific and Industrial Research, the Indian Council of Agricultural Research and the Department of Science and Technology. There are private industries and public sector industries also engaged in such activities.

### Italy

#### Physical facilities

55. Permanent facilities: two options are offered:

- (a) 40 ha in the Scientific and Technological Research Area, located 7 km from Trieste where all the buildings required as in UNIDO document ID/WG.382/4 can be constructed. Close by land has been offered for the installation of the Synchrotron, a facility of the European Science Foundation.
- (b) Several large buildings with a total surface of 12,000 m<sup>2</sup> located on the waterfront close to the railway station to be remodelled according to UNIDO requirements.

56. Provisional facilities: a provisional building would be available in four weeks as well as laboratories in the University of Trieste and then, in accordance with the selected permanent site the following possibilities are offered:

- (a) Five buildings in the Scientific and Technological Research Area totalling 4,000 m<sup>2</sup>, plus cafeteria, conference rooms and restaurant.
- (b) Some of the buildings at the waterfront that will be used as permanent facilities can be remodelled immediately.

Basic infrastructure

57. Housing for the ICGEB personnel and fellows/trainees can be found within a radius of 2-10 km from the proposed location on purchasing or rental basis. Trieste is connected to other Italian and European cities by highways as well as domestic airlines and ocean lines. Electricity, water and gas supply as well as telephone and telegraph facilities are already available.

58. A number of international schools, from primary to pre-university level, including the International School of Trieste, cater to the international community in Trieste. These are run by the regional authority or by the international community itself. In Trieste and its surroundings many parks, sports facilities, cultural facilities, and medical services can be found. The landscape and the mediterranean climate are attractive.

Scientific infrastructure and supporting services including manpower

59. GEB research activities are carried out in the University of Trieste and the University of Pavia, about 400 km away, as well as in Rome, Naples and Bari in Southern Italy. Most of the relevant research in Trieste is conducted in the departments of biochemistry, microbiology, chemistry and biology. A fermentation plant is available at the Compagnia di Ricerca Chimica (CRC) located 25 km from the proposed site. Computer facilities and libraries are to be found in the University of Trieste as well as in the International Centre for Theoretical Physics (ICTP), a few kilometers from the proposed ICGEB sites. Altogether about 500 scientists in Italy are engaged in GEB research and development activities, and out of this number 200 are directly involved in genetic engineering.

60. The importance of GEB has been recognized by the scientific community for some time, for example as a new technique to study the fundamentals of hereditary diseases. The overall importance of GEB has recently been officially confirmed by the Italian National Research Council by the formulation of a 5-year programme in this field. In the field of biotechnology, a number of projects have been started by ASSORENI (the scientific research association of the Italian corporation ENI), such as the cloning of bacterial genes in plant cells and the use of bacteria in oil recovery.

Capacity to transfer knowledge to developing countries

61. Italy has several bilateral and multilateral programmes in science and technology. It provides scholarships and fellowships to students from the developing countries to study in Italian higher educational institutions. The University of Trieste has bilateral agreements for the exchange of PH.D students and scientists.

National and local commitment

62. Strong commitment for supporting the setting up of the ICGER in Trieste has been expressed by the scientific community, the provincial government of Friuli-Venezia Giulia, the municipal government of Trieste, the University of Trieste and the central Government in Rome.

63. The total budget offered of Lire 28.27 billion is equivalent to about US\$ 19.5 million and can be used according to the priorities of UNIDO. This amount would cover:

- (a) The cost of equipment and staff for three years; or
- (b) The total cost of the permanent buildings and the land in the Research Area; or
- (c) The cost of modernizing the port facilities plus US\$ 9.5 million for equipment plus US\$ 1.57 million for operational costs.

Pakistan

Physical facilities

64. Permanent facilities: Land covering an area of 15 ha for the laboratory complex, residential colony, guest house, international hostel and field experiments, near the new campus at Punjab University, Lahore, and adjacent to the Islamic Centre is offered. Duration for completion of permanent structures for laboratories is about two years.

65. Provisional facilities: approximately 200 m<sup>2</sup> are offered in the existing laboratories in the Department of Zoology at the new campus of Punjab University at Lahore.

Basic infrastructure

66. Lahore has an international airport 8 miles from the proposed site and it is served by road and rail from all parts of the country.

67. There is a stable supply of water, gas and electricity, and telecommunication services are available. Lahore has several hotels of international standard. Schools for foreigners exist including the American International School, English medium schools and colleges. Recreational and other facilities exist. it has beautiful parks, historical museums and theatres.

Scientific infrastructure and supporting services including manpower

68. About 30 scientists (post M.Sc. level) involved in molecular biology, biochemistry and biotechnology are working in Punjab University, Lahore. number of research institutes and centres in the three major universities of Pakistan. Scientific manpower is mainly concentrated in areas related to genetic engineering and biotechnology, such as molecular biology, biochemistry, microbiology etc. Manpower specifically trained in genetic engineering and biotechnology is lacking. Libraries, a microcomputer with display for training, reproduction facilities, electronic and instrument services are available. A pilot plant for leaf protein extraction etc. exists. Fine chemicals, enzymes and radio-labelled materials are obtained from suppliers in Europe and USA. There is a large number of scientific suppliers in Lahore but it is more economical to purchase equipment and chemicals directly from overseas. Some supporting technical staff for ICGEB can be met by the vocational and technical schools in Lahore.

Capacity to transfer knowledge to developing countries

69. Pakistan offers training facilities to semi-trained manpower from developing countries in the Middle East, Far East and Africa and under special agreements is involved in the setting up of sugar, cement, textile and paper mills in developing countries.

70. Most of the research results are presented in national journals. An international seminar on Phage Mu is planned later in the year.

National and local commitment

71. There is a strong commitment for the Centre by both the national and regional governments as well as the authorities of Punjab University and the Pakistan Atomic Energy Commission. This was clearly demonstrated in our meeting with the president, General Mohamad Zia-ul-Haq.

72. Financial contributions: Capital cost for land, laboratories, residential colony, building improvements and equipment totalling about US \$17.2 million will be provided in kind. There is no provision for equipment not presently available in the enzyme production laboratory. Operational costs for the first 5 years totalling US \$8.2 million will be provided in kind. There is no provision for chemicals and spares.

73. Involvement of Genetic Engineering and Biotechnology in the Country: There is a growing awareness in both government and industry about the potential of genetic engineering and biotechnology. A Centre for Advanced Studies in Molecular Biology was recently established to organize training courses and is expected to produce yearly 25-30 trained personnel for work in genetic engineering and biotechnology. A National Institute for Research in Genetic Engineering and Biotechnology has also been set up to promote and coordinate research in genetic engineering and biotechnology.

Thailand

Physical facilities

74. Permanent facilities: It is proposed to locate the ICGEB on the Salaya Campus of Mahidol University, about 17 km from the centre of Bangkok, transit time approx. 30 min. to be reduced by about half on the completion of a new bridge. The land offered is approx. 5.3 ha with the proviso that the Centre could share some facilities, e.g. conference and sports facilities on the campus. Next to the Centre will be the proposed centre for vaccine development. Duration for completion of permanent structures for laboratories is about two years.



75. Provisional facilities: these will be provided at Salaya in the existing laboratories in the Institute of Nutrition of Mahidol University, amounting to approx. 2,000 m<sup>2</sup>. The laboratories would be furnished and equipped to the specification of the ICGEB within six months.

#### Basic infrastructure

76. The Bangkok International Airport is approximately 50 km from the proposed location. There are regular international flights from Bangkok to many destinations. Bus and train services are available from Bangkok to the Salaya Campus of Mahidol University; in addition waterway transport is available.

77. Salaya has a continuous and stable supply of water, gas, electricity, postal and telecommunication services are available (telephone, cable, telex etc.). Five guesthouses (total 15 rooms), and an international hostel with 51 rooms will be available for rent at nominal, subsidized rates. In addition, private housing of international standard at reasonable cost is available in the vicinity and in Bangkok. The Rose Garden, about 10 km from the Centre offers excellent accommodation for international visitors. Visitors can choose to stay in Bangkok and commute to the Centre.

78. There are several primary and secondary schools in Bangkok with English, French or Japanese as the medium of communication.

79. Sports facilities (golf course, tennis courts, gymnasium) are available and there is a large Buddhist park adjacent to the proposed location. Shopping areas and medical services are available in Thonburi and other areas of Bangkok near to Salaya.

#### Scientific infrastructure and supporting services including manpower

80. There are a number of Thai institutions including universities, engaged in genetic engineering and biotechnology R+D. Of these about 75 per cent are in the Bangkok metropolitan area. There are about 50 scientists working in the area of molecular genetics, genetic engineering and biotechnology. Mahidol University, Chulalongkorn University, Kasetsart University and the King Mongkut Institute of Technology have departments related to GEB. The Thailand Institute of Scientific and Technological Research (TISTR) has large fermentors for alcohol production. There is a plant for preparing rhizobium inoculum in the Department of Agriculture laboratories. There is an undergraduate science library within the Salaya Campus of Mahidol

University in addition to scientific and technical libraries at the Phya Thai Campus of Mahidol University, Chulalongkorn University, Thai National Documentation Centre and the Department of Science Service. There is a computer centre located at the Faculty of Science of Mahidol University. This will be linked up with the Salaya Campus. Reproduction services are available. There are several suppliers of fine chemicals, enzymes and radio-labelled material. An airmail order takes about two to four weeks to arrive. The Salaya Campus has the National Laboratory Animals Centre which can supply various experimental animals including inbred strains.

Capacity to transfer knowledge to developing countries

81. Thailand has numerous bilateral and multilateral co-operation agreements with other countries in the field of science and technology. Mahidol University is involved in the UNDP/World Bank/WHO Special Programme for Research and Training in Tropical Diseases. Thailand is a member of the Association of South-East Asian Nations (ASEAN) which has active collaborative programmes in science and technology, industry, mining, energy, food and forestry. Thailand participates actively in the Colombo Plan Programme. Under the Thai Aid Programme, about 1000 scholars from developing countries receive training and undertake various projects within Thailand annually.

National and local commitment

82. Financial contribution: Money for land, buildings I and II, building improvements and equipment totalling US\$ 4.8 million is in local currency. In addition an undertaking was made to build building III, and a small residential complex for visiting researchers and a cafeteria. The contributions towards the operational costs, US\$ 1.155 million, are also in local currency.

83. The Thai Government has a firm national commitment to GEB. Biotechnology has been cited in the 5th National Plan as holding special importance for future economic and social development. In addition, departments of biotechnology have been formed in various universities. A subcommittee for GEB of the National Research Council has been set up to promote and coordinate the progress of GEB in the country.

## II. METHODS OF EVALUATION

84. The Selected Committee has examined the offers from six countries with the aim that the objectives laid down by the High-Level Meeting in Belgrade, December 1982, should be fulfilled.

- (a) "An International Centre for Genetic Engineering and Biotechnology of high excellence should be established soonest possible with activities covering inter alia training, research, application and information etc., taking into account the proposals in the UNIDO documents on these subjects". (ID/WG.382/7, page 19, para 3).
- (b) "It is most desirable to set up such a Centre in a developing country provided that such a country can meet the conditions envisaged in the UNIDO reports and can provide an attractive environment for scientists." (ID/WG.382/7, page 19, para 4).

85. As said in documents UNIDO/IS.254 and ID/WG.382/7, if the Centre is to be successful it must be capable of attracting a significant number of outstanding experienced scientists. There is considerable difficulty in obtaining such scientists under the present conditions when there is great demand for genetic engineers and biotechnologists, but if the working conditions are good then sufficient qualified staff can be appointed. Such scientists decide to join research centres on the basis of:

- (a) the local scientific infrastructure;
- (b) accessibility to the international scientific community;
- (c) the social situation and amenities; and
- (d) the prospects of being properly supported in their work for a reasonable period of time.

86. The scientists appointed to the ICGEB will have a genuine interest in the transfer of this science and technology to the developing countries and so will be influenced by the commitment of the host country in this respect, and by the prospects for successful implementation in developing countries.

87. The Selected Committee was directed to examine the details of the offers in regard to:

- (a) physical facilities including the site and location;
- (b) scientific infrastructure and supporting services;

- (c) availability of scientific, technological and administrative personnel including language services;
- (d) finances and ability to attract membership and other sources of finance; and
- (e) legal and other privileges to retain an international character (ID/WG.382/7).

88. These five areas were developed as a series of questions under seven headings in the Questionnaire (ICGEB/SC/1). The Selected Committee considered the replies to the Questionnaire many of which were amplified and verified during the site visits, and it gathered much additional information. It was not, however, able to consider the legal aspects of the offers. The Selected Committee did not have legal expertise.

89. The facilities offered by each country have been analyzed under six general headings (see Annex VII) for further details):

(a) Finance

The Selected Committee has recorded in Part II the total value of each offer and the commitments made to develop certain aspects of these offers by some countries. The offers in each case provide land and buildings and in some cases additional facilities such as a housing colony, hostel etc. The costs of these items and the amount of land and buildings offered vary greatly between countries, and most of the costs can be met by local currency or in kind. In contrast, most of the costs of research equipment, salaries and research materials must be met from foreign exchange. These costs are estimated (ID/WG.382/3) to be in total about US\$ 45 million over five years, including US\$ 9.5 million for equipment. It is therefore an advantage if a prospective host country can make a significant contribution to this foreign exchange component either as a national contribution or by attracting international support.

(b) Physical facilities including the site and location

The Selected Committee has visited each prospective site. It has considered the basic question of whether the amounts of land and buildings offered are sufficient to meet the UNIFO requirements described in ID/WG.382/4 and these data are provided in Section B. The land requirements (44 ha) in that document make allowances for a housing colony and for future expansion. Accordingly, the Selected Committee discussed in each country the land requirements of the ICGEB particular to that location. It has taken into account the need to construct an attractive institution with the character appropriate to its role as a major independent international research centre with a particular role in transferring science and technology to developing countries.

(c) Professional scientific infrastructure

The Selected Committee has sought to assess as accurately as possible the quality and efficiency of the relevant scientific infrastructure of each country. If these are high, the ICGEB can be founded and function according to the five year work programme described in UNIDO document ID/WG.382/2 and within the financial framework summarized in UNIDO document ID/WG.382/3.

(d) Prospects for the ICGEB to benefit all developing countries

The fundamental responsibility for relating the ICGEB to developing countries will lie with the ICGEB. This relationship can be facilitated or hindered by the existing patterns of activity and structures within the host country. Accordingly, the Selected Committee has sought evidence of the bona fide interest of each potential host country in the transfer of science and technology to all developing countries including expressions of interest in establishing a network of affiliated centres.

(e) Social infrastructure

The social infrastructure of the host country will have a strong influence on the willingness of excellent scientists from developing and developed countries to join the permanent staff of the ICGEB. The society must be capable of integrating visiting scientists and their families regardless of colour, class, creed or political belief.

(f) The commitment of the host country to the idea and spirit of the ICGEB

(i) The ICGEB will need the assured support of the local and national scientific, administrative and political structures; and

(ii) must not be a cause of serious controversy within the host country.

90. The kinds of evidence which have been used in coming to its conclusions about the suitability of the different countries as hosts for the ICGEB are described in Annex VII.

### III. CRITICAL EVALUATION OF THE OFFERS

91. The Selected Committee, composed of eight scientists trained in genetic engineering, microbiology, biochemistry or biotechnology, spent between five and ten working days in each country. It has worked intensively with scientists, administrators and politicians in each country, endeavouring to obtain information on the location of the ICGB in addition to that provided in the answers to the Questionnaire. The kinds of qualities sought by the Selected Committee have been described in Annex VII. Some essential basic factual information has been described in Part II.

92. The Selected Committee draws attention to two overriding considerations in respect of the foundation of the ICGB: finance and support from the international scientific community.

#### Finance

93. The financial details of the offers are outlined in Part II of this report and in some cases national representatives have stated that these are likely to be increased. The offers in each case provide land and buildings and in some cases additional facilities such as a housing colony, student hostel etc. The amounts of land and buildings offered vary greatly between countries and most of the costs are to be met by local currency or in kind. Copies of some communications are in Annex V.

94. The financial matters will perforce be taken up between the interested governments. The Selected Committee has indicated in Annex VII the elements within the financial offers which have been described in the answers to the Questionnaire and which have been discussed with the national authorities. It draws attention to the advantage of flexibility within the financial offers, and independence from national regulations, including foreign exchange controls and importation restrictions. These are important provisions since a large proportion of the costs of the scientific equipment, salaries and research programmes will require foreign exchange, and much of the equipment and materials will be imported no matter where the ICGB is located.

95. In the case of each offer made it is important to try to distinguish the amounts offered in kind. These need to be explored further. As understood these may have the effect of not allowing sufficient flexibility or independence to the ICGB in making decisions about the disposition of its

resources, and to this extent would properly be discounted to some degree. This is not only related to whether the contributions are measured in local or exchangeable currency, but to the degree of control allowed to the ICGEB in disbursing them. This factor affects the independence of the ICGEB in contracting for the acquisition of land, buildings, equipment and supplies and in choosing and supervising its employees. The Selected Committee makes these comments as advice for the negotiations which must take place at a later stage in the process of establishing the ICGEB.

96. Since it is open to the host country and the member countries to arrange for adequate financing through future negotiations the Selected Committee, in advising about the location of the ICGEB, has not taken into consideration the total amount of the financial contributions offered by each prospective host country. It has, however, sometimes commented on the degree of commitment which it has observed amongst scientists, administrators or politicians which will be reflected in the final financial value of each offer.

#### Support from the international scientific community

97. The Selected Committee has analyzed the qualities of the scientific infrastructure of the prospective host countries. It is extremely difficult to found and establish a "centre of high excellence" in genetic engineering and biotechnology. The number of such centres in the world is small and they are located in areas where there is a concentration of facilities supporting science with high technical demands and where there has been a strong tradition of research and development in biochemistry, molecular biology, molecular genetics and fermentation sciences. The successful establishment of the ICGEB demands sine qua non support from the international scientific community and in particular that a large number, approximately 50, excellent scientists of international reputation drawn from many different backgrounds be attracted to the ICGEB. This places a high premium on the pre-existing scientific infrastructure and its international linkages and on the ease with which the scientists may expect to adapt scientifically and socially to the circumstances of the proposed location. The criteria applied, though essential for the success of this project, are unusually stringent and must not be taken as a commentary on the overall scientific activity of a location or a country.

98. On this question of the scientific infrastructure the Selected Committee being composed of scientists who understand the field of GEB believes that it has obtained sufficient information including observations made in each country to make an accurate assessment of the capacity of each country to host the ICGEB as envisaged in the documents UNIDO/IS.254 and, as decided by the Belgrade Meeting, ID/WG.382/7. Concerning this question the Selected Committee, feeling a deep responsibility for the future of the ICGEB, considered it necessary to advise the Plenipotentiary Meeting as clearly as possible.

Critical evaluation of the Belgian offers

99. The three regions in Belgium (Brussels and Flanders and Wallonia) each submitted an independent offer to host the ICGEB. Subsequently, the Brussels and Flanders regions agreed to combine their offers (Annex V). Therefore, as it stands the Walloon region proposes the Centre to be located in Louvain-la-Neuve whereas two sites in Brussels are proposed in the combined Brussels and Flanders offer.

100. Belgium has a very high density of universities and research institutes many of which are carrying out outstanding scientific research in fields of relevance for genetic engineering and biotechnology, such as molecular biology, cell biology, microbial genetics, biochemistry, immunology and fermentation processes.

101. Moreover, many research groups are doing excellent research in areas directly related to problems in the developing world such as parasitic diseases, plant genetics, food and biogas production. A broad scientific network therefore already exists between Belgian scientists and scientists working in both developing and developed countries.

102. Within Belgium, the Selected Committee believes that Brussels is preferred as the location of the ICGEB rather than Louvain-la-Neuve. There are several reasons for this choice. If it is in Brussels centrally located within Belgium the ICGEB will stand to benefit maximally from the whole Belgian scientific infrastructure. Brussels has the attraction of a capital city of somewhat over 1 million people, it houses a large international community and has many facilities for housing, education, medical care, recreation and culture. It has excellent communications and transport facilities are excellent both national and international. Moreover, the



Selected Committee believes that the potential to develop the ICGB as an independent and prestigious research centre is greater in Brussels than in Louvain-la-Neuve where it is proposed to be closely integrated with the Catholic University of Louvain (UCL). The facilities of Louvain-la-Neuve are in many ways excellent but are more appropriate for the purposes for which they were designed that is the development in a new small town of the undergraduate and graduate teaching and research programmes and residential facilities of a university of 13,000 students. The two locations offered in Brussels are independent of the local institutions but are convenient to many research centres, universities and hospitals.

103. Belgium is well-located in respect of the average distances between it and all developing countries. Brussels is connected by direct flights to many countries. There are many international companies, agencies and organizations in Brussels.

104. Two sites have been proposed in the combined offer from the Brussels and Flanders Region. These are in Meylermeersch and Jette on the outskirts of Brussels. Both sites are, according to the view of the Selected Committee, acceptable in terms of size and location. However, the proposed location in Meylermeersch is closer to CERIA-COOVI Research Institute and the Free University of Brussels' facilities at Rhode St. Genesse, both of which are carrying out advanced research in the fields of GEB. It is well-located to draw support from all parts of Belgium.

105. There are numerous sophisticated research projects using recombinant DNA technology applied to animal cells, yeast, *Escherichia coli* and *Bacillus subtilis* being carried out within 50 km from the site of Meylermeersch. This region centred on Brussels has one of the highest concentration of this kind of science anywhere in the world. The research presently being conducted in Brussels and Ghent on the molecular genetics and genetic engineering of plants, a crucial part of the proposed activities of the ICGB, is certainly at the forefront of its field in the world. Another vital research area for the ICGB concerns parasites. Internationally highly recognized work is currently being conducted in Brussels on the molecular biology of trypanosomes and malaria. This research has strong connections with the Institute of Tropical Medicine of Antwerp, which has considerable experience in field activities in developing countries. These are just two examples from a substantial range of relevant projects being carried out in Belgium

106. The proposed provisional building in the university campus of Vrije Universiteit Brussel (VUB) in Jette satisfies the needs of the ICGEB in its initial phase. The building is nearly complete.

107. The scientific operation that is planned to be carried out by the ICGEB is exceedingly complex in theory and advanced in technical requirements. In terms of scientific manpower however, the size of the planned ICGEB is not very large. Its research activities and the speed by which the Centre could be in full operation will therefore, to a large extent, depend on the scientific framework in which the ICGEB will be inserted. It is the strong view of the Selected Committee that, of all sites in all countries examined, those proposed by Brussels and Flanders best satisfy the scientific criteria.

108. The Selected Committee regrets that the Belgian regions have been unable to present a unified offer, and is concerned about the lack of expressed national commitment. The Selected Committee has only been assured about the financial contribution from the respective regions but has no clear picture as to the extent of financial support of the national Government. The regional Governments of Brussels and Flanders have undertaken to request this support (Annex V). The Selected Committee feels that an expressed scientific and political support from all Belgian regions for an ICGEB being located in Brussels would increase the speed by which the Centre could be in full operation. It would also increase the scientific, national and international network of which the ICGEB would be a part.

109. The present financial value of the offer from the Brussels and Flanders regional Governments is not on its own impressive given that Belgium is a highly developed country. A substantial national contribution is therefore required in order to facilitate the establishment of the ICGEB there.

110. In conclusion, an ICGEB located in Brussels, would, if properly supported, be able to attract highly qualified scientists and would, due to the already existing scientific network, be able within a short time to be fully operational at a high scientific level.

Critical evaluation of the Cuban offer

111. The Cuban offer to locate the ICGB in Havana in close association with the Centre for Biological Research in the suburb of Cubanacan was attractive in that this research centre is undertaking an active research and development programme on interferon using standard procedures to produce interferon from leucocytes and is in the course of cloning interferon genes to enable production in microorganisms. This demonstrates the potential and national commitment for research in molecular biology and recombinant DNA in Cuba, and the increasing commitment to integrate Cuban science into a wider international network.

112. The Selected Committee was interested to learn about the research programme on the molecular genetics of human haemoglobinopathies which has involved extensive studies of the Cuban population. With the recent developments in the application of cloned DNA probes it should be possible to extend this programme and greatly reduce the incidence of these diseases in Cuba. This will be possible because of the highly integrated and well developed system of medical care.

113. There is a keen understanding of the opportunity to add value to biomass through biotechnology especially the residues and by-products of the major agricultural and marine food sources. These research programmes, including UNDP programmes Cuba 9 and Cuba 10 will provide valuable information and support for the ICGB.

114. There is, however, not yet sufficient experience in universities and other research institutions outside the Centre for Biological Research in the fields related to genetic engineering. The base in the pure sciences of molecular biology, biochemistry and molecular genetics is not sufficiently developed, and the general scientific infrastructure is inadequate to attract a sufficient number of qualified scientists to the ICGB if it were located in Cuba.

115. The financial offer of Cuba provides for the land and buildings. Essentially, all foreign exchange costs for the ICGB will have to be met by contributions from the members or through negotiations between the Cuban authorities and other countries or agencies.

Critical evaluation of the Indian offer

116. The offer from India has been made in the context of a growing commitment to develop genetic engineering and biotechnology. A Long-Term Plan for Biotechnology has been produced by the National Biotechnology Board of the Department of Science and Technology which has the overall responsibility for the ICGB project. It proposes to locate the ICGB in the developing town of Gurgaon near New Delhi in the vicinity of the International Airport.

117. India has a large number of universities and institutes undertaking research in the fields of biological, medical and agricultural science, much of which is directly related to the needs of developing countries. There are several such research centres in the area of New Delhi including the All India Institute of Medical Sciences (AIIMS), the Indian Institute of Technology (IIT), the Jawaharlal Nehru University (JNU), the Indian Agricultural Research Institute (IARI) and Delhi University. The Selected Committee visited laboratories in these institutes, it had seminars and discussions with researchers from New Delhi and with a group assembled from other parts of India, and it had available a series of reprints of Indian scientific papers. In New Delhi it was very interested in the work on fermentation processes at the IIT and in the record of the IARI in classical plant breeding. Otherwise it was concerned by the rather small amount of advanced research in the area of New Delhi in the basic sciences of biochemistry, molecular biology, and molecular and microbial genetics. Work is being carried out in these fields elsewhere in India including outstanding work on the structure of DNA at the Indian Institute of Science at Bangalore. These molecular and genetic studies are, however, being carried out in many institutes distant from New Delhi and so could not contribute much to the ICGB at the proposed location in New Delhi. The ICGB could draw on the experience in classical plant breeding of IARI and could be linked with the cellular immunology group at AIIMS (soon to move to the new National Institute of Immunology) and the fermentation group at IIT but these links would not compensate for the apparent dearth of the most relevant sciences in New Delhi.

118. In addition, the Selected Committee notes that taking into account the size of the Indian scientific establishment and its many contributions to science in general, there is very little activity in India in genetic

engineering per se. The rapidly moving fields of molecular biology, biochemistry and molecular genetics which have given rise to genetic engineering require a large range of high quality but relatively small scientific equipment obtained from international sources and this must be well maintained. They also require a large range of fine chemicals and biochemicals and radio-isotope labelled materials and these are obtained on a day to day basis from international suppliers. The Selected Committee was concerned that these elements had not been available in India and that the importation and clearance systems for them were not yet sufficiently developed to support an institution like the ICGB. It noted that the National Biotechnology Board has taken account of the difficulties faced in getting a regular supply of active enzymes and high activity radiochemicals and that support is being given to the development of indigenous sources of fine chemicals and enzymes. This is a laudable objective but there is the problem that the prosecution of the molecular biological sciences have been delayed while the capacities for home production are being developed. These factors may have contributed to the difficulties in attracting some Indian scientists from abroad to permanent posts in India, despite major efforts on the part of the Indian authorities.

119. The Selected Committee was interested in discussing the organization of undergraduate courses in biology. On the basis of what was learned, it seemed that these are rather heavily weighted to the classical areas of zoology and botany. These are not a satisfactory basis for the development of good post-graduate and post-doctoral research programmes and this was reflected in discussions with researchers about genetic engineering which suggested that opportunities for critical exchanges of views and discussions about this field were limited.

120. The Selected Committee was made aware of the international research organizations, the International Crop Research Institute for Semi-Arid Tropics (ICRISAT) in Hyderabad and the Regional Centre for Technology Transfer in Bangalore but was unable to visit them for reasons of time and distance.

121. India has many successful programmes in science and technology but the areas immediately relevant to genetic engineering and biotechnology have not been emphasized. The effect of this is that the scientific infrastructure in these fields is not sufficient to support the establishment of the ICGB nor to attract a sufficient number of outstanding scientists.

122. The provisional facilities for the ICGB have not been clearly described but the Selected Committee did not see how they could be located in the existing laboratories in New Delhi which are not usually of international standards. The proposed site at Gurgaon is remote from the limited existing facilities and as a growing town, 20 km from New Delhi, it does not yet have a social infrastructure which could readily integrate a multinational community which would place high premiums on extensive educational, cultural, medical and other social services and amenities. For these reasons it is too early to locate an institution like the ICGB in India.

Critical evaluation of the Italian offer

123. The city of Trieste, in collaboration with the region of Friuli-Venezia Giulia, the University of Trieste and the National Government, has prepared a detailed offer to locate the ICGB in Trieste. The financial offer comprising 28,720 million Italian Lira, now equivalent to about US\$ 19.5 million and which may be used at the discretion of the ICGB, is being offered by the "Research Area in Trieste", a local authority charged with the development of research institutions and research based industries in the Trieste region. There are several different possible sites including one in the "Research Area", a few kilometres behind Trieste in the nearby limestone hills. While beautiful, this is a bit remote from the residential, educational and other facilities of the town. Other, perhaps more attractive locations have been offered, one on the waterfront and one close to the International Centre for Theoretical Physics. Appropriate, relatively large provisional buildings could be made available quickly. In general, there are several good options for the location of the ICGB in Trieste.

124. Trieste is a relatively small city with two major advanced educational institutions, the University and the International Centre for Theoretical Physics. If the ICGB is located in Trieste, it will be prominent as a major independent research institution. The authorities and people of the city have had an excellent experience with the International Centre for Theoretical Physics, a centre which serves developing countries very successfully, and this feeling is completely reciprocated by the international body of staff and students of the ICTP. This international community has been successfully integrated in Trieste. This good record mutually acknowledged is a major part of the explanation for the deep commitment in Trieste to the

ICGEB project. This commitment from the region has been supported by the competent national authorities which have stated that they would provide financial support for research programmes related to developing countries in the ICGEB and possibly in affiliated centres (Annex V). Representatives of the Italian scientific and industrial communities have also supported the proposal from Trieste.

125. Although the Italian scientific and industrial infrastructure in genetic engineering and biotechnology is overall quite strong and there are several new oriented projects in genetic engineering, the expertise is rather widely dispersed and is not strong in the area of Trieste. The nearest active centre of genetic engineering is in Pavia, 400 km distant. The authorities at the University of Trieste which has some groups active in biochemistry and molecular biology are aware of the deficiency in genetic engineering and are considering proposals to establish several tenured posts in genetic engineering in the near future. In overall terms, the scientific infrastructure is not outstanding but is adequate for the foundation of the ICGEB. A sufficient number of excellent scientists could be attracted to work in Trieste.

126. The geographic location of Trieste has advantages and disadvantages. It is strategically located with respect to all developing countries but international communications are complicated by the fact that the nearest international airports are Milan, Rome, Zürich and Vienna. There are, however, good national air-services from Trieste Airport and excellent road and rail services to all parts of Europe. Although it does not lie on major routes of international science, it is well sited for those travelling across Europe north to south, east to west or vice versa. In terms of the social infrastructure, Trieste has many charming features, including a very good climate, a beautiful location on the Adriatic Sea, it is close to several major cultural centres including Vienna, Salzburg and Venice and the opportunities for winter and summer recreation in the mountains or on the coast are outstanding.

Critical evaluation of the Pakistani offer

127. The Pakistani offer provides the opportunity of establishing the ICGEB on the new campus of the University of the Punjab at Lahore to which several scientific and technological departments have moved in recent years. This location would be close to the Centre for Advanced Studies in Molecular Biology recently founded at the University and which now involves faculty members from the Departments of Zoology and Botany as well as members of the staff of the Pakistan Atomic Energy Commission (PAEC) at Faisalabad. There is a group of scientists with good experience in molecular biology, especially DNA repair, and some valuable projects are well under way on the reclamation of salt affected land, the biodegradation of cellulose, and the utilization of heavy oil residues for generating biomass. However, some of these developments are relatively recent and have not yet given rise to a strong scientific infrastructure including library and laboratory facilities especially in the universities in the essential fields of molecular biology, biochemistry, microbial and molecular genetics and immunology.

128. The biology courses in the universities are not well-suited to provide the appropriate technically qualified staff for the ICGEB although the special training programme to be run by the Centre for Advanced Studies in Molecular Biology will help to fill this deficiency in the future. There is furthermore a strong national commitment to emphasize technical education at all levels, and the University of Punjab is developing as a promising centre of science and technology. The PAEC laboratory at Faisalabad is a model to be followed in the further growth of the scientific and technological infrastructure in the country. The considerable potential in agriculture was illustrated by the work described at the National Agricultural Research Centre. Much of the work being pursued in Pakistan could be further developed in association with local fermentation-based industry.

129. It is recognized, of course, that the new programme will take some years to have the kind of effect needed to entertain the establishment of an institution such as the ICGEB. At the present it would not be possible to attract a sufficient number of experienced scientists if the ICGEB was to be located in Lahore due to the present state of the relevant scientific infrastructure and due to the difficulties of assimilating a large multi-national scientific community which would place very heavy demands on the facilities of the site.



Critical evaluation of the offer from Thailand

130. The offer from Thailand reflects the deep awareness of the relevance of genetic engineering and biotechnology as expressed by the Thai Government as well as by the scientific and administrative communities. Well-qualified Thai scientists who have gained excellent experience abroad have returned to Thailand and have been successfully integrated along with some foreign scientists into the national programme of GEB and have good working conditions. There are good projects of interest to developing countries, e.g. on malaria, thalassaemia and contraception and basic research in molecular biology and biotechnology is well orientated and concentrated including work on rhizobia inocula and bio-alcohol. The density of good quality science is reasonably good in the Bangkok area and the connections between the universities and research institutes are good. The capacity of the scientists to communicate their research results is high and they are well-integrated into international scientific networks with good momentum and potential for further expansion.

131. The basic facilities of the laboratories, libraries, buildings and scientific equipment are good and they are well-maintained. There are adequate systems for importing reagents. The proposed location of the ICGB at the Salaya Campus of Mahidol University is adequate and the existing provisional building is good and can be occupied as soon as it is furnished. The Asian Institute of Technology (AIT), which has a good reputation in technical education showed the ready integration of foreign scientists and engineers as well as their families into the Thai society and also is evidence of the commitment of the Thai Government to sustain such institutions once established. There are good facilities for international communication and good opportunities for cultural activities, recreation and vacations.

132. Although the scientific infrastructure is good in quality and the existing core of scientists has potential, the number of scientists is small and the relevant disciplines of science have not been fully developed, e.g. microbial genetics, cell biology, enzymology, and the chemistry of biomolecules. Because the core of well-qualified scientists is small, it cannot cover the full range of disciplines. The academic environment of the proposed location needs to be developed. Although AIT is a good model for successful implantation of an international teaching institute in Bangkok, it is not necessarily a complete indication for a very high level research institute. The present financial support offered to the ICGB by Thailand is limited and will need to be increased through negotiation with other interested countries if it is to meet the minimal requirements of the ICGB.

133. The Centre could be established in Thailand and function at a certain level as an international research institute. The question remains however, whether it would be able to attract as many good foreign scientists to the permanent staff for periods longer than two to three years which would be necessary to enable it rapidly to become a centre of high excellence.

Overall assessment of the offers

134. The Selected Committee has felt an obligation to apply stringent criteria to the offers especially in regard to the advice on the capacity of the ICGEB to attract a sufficient number of good scientists if located in a particular country. In this regard each country had certain qualities but it is the unanimous opinion of the Selected Committee that only three countries have scientific infrastructures with a sufficient range and combination of qualities to provide a base for the foundation and development of the ICGEB as a "centre of high excellence". Since these countries are not offering the same or even similar facilities and do not have infrastructures offering the same combination of qualities, the ICGEB will take on different characteristics and will take different lengths of time to become effective depending on where it is located as indicated in the critical evaluation on each of these three countries.

## VI. SUMMARY AND CONCLUSION

135. The Selected Committee has fully examined proposals from six countries offering to locate and support the ICGEB. Eight locations have been visited including three in Belgium.

136. There are three countries which have sufficient merits to offer good prospects for the foundation of the ICGEB. These have different strength. The strength of Belgium lies in its outstanding and concentrated scientific infrastructure which would guarantee adequate support from the international scientific community. The strength of Italy lies in the profound commitment of the people of the city of Trieste and of the region Friuli-Venezia Giulia as evident in the financial and other details of the proposal and in the record of support for the International Centre for Theoretical Physics. The strength of Thailand is that it has a good quality but limited scientific infrastructure in the relevant sciences, and a gathering momentum. It has the capacity to assimilate an international scientific teaching institution vide the Asian Institute of Technology.

137. The Selected Committee advises, the ICGEB could be established in Belgium, Italy or Thailand. In Belgium the best location would be Meylermeersch, Brussels, adjacent to the new Hospital of the Free University Brussels (ULB). In Italy there are a number of good sites in Trieste. In Thailand the new Salaya Campus of Mahidol University is a good site.

138. The two major factors which are essential for the foundation of the ICGEB as a centre of high excellence are:

- (a) the support it will receive from the international scientific community in genetic engineering and biotechnology;
- (b) the financial and political support it will receive from the host and member countries.

Additionally it must be located in an environment which is conducive to the transfer of the science and technology of GEB to the developing countries. Without these three qualities the ICGEB will not become established as a useful institute to serve the needs of developing countries.

139. The Selected Committee advises that the ICGB could not be established in the other three countries essentially because of the insufficient scientific infrastructure related to the fundamental sciences underlying GEB and the judgement that it would be not possible to attract a sufficient number of good scientists to these places.

Vienna, 13 May 1983

Dr. David McConnell

~~David McConnell~~

Dr. Susono Saono

~~Susono Saono~~

Dr. Tsai-ping Li

Tsai-ping Li

Dr. Peter Biacs

Peter Biacs

Dr. Robert O. Barrow

Robert O. Barrow

Dr. Oscar Grau

~~Oscar Grau~~

Dr. Vladimir Glisin

Vladimir Glisin

Dr. Staffan Normark

Staffan Normark

ANNEX I

Plan of Action of the Selected Committee

The plan of action of the Selected Committee was defined by paragraphs 54 to 61 of the Report of the High-Level Meeting on the Establishment of the International Centre for Genetic Engineering and Biotechnology at Belgrade, Yugoslavia, 13-17 December 1982 (Report ID/WG.382/7).

"54. A Selected Committee chosen by the meeting will prepare a full report based on information solicited from interested countries, from site visits and from discussions with potential host countries. The report will be submitted to the Ministerial-Level Meeting which is responsible for making the final decisions about selecting a host country and completing all the legal and other formalities for the establishment and early functioning of ICGEB.

55. The Selected Committee will consist of: a nominee of the Governments of China, Hungary, Indonesia, Mexico (in the event of Mexico not submitting a name - Argentina), Nigeria, Sweden and Yugoslavia and one expert selected by the UNIDO Secretariat from among the UNIDO experts at the meeting. UNIDO will act as a secretariat for the Selected Committee. The persons nominated by the Governments should be objective and of a high scientific standing with a broad vision and understanding of biotechnology and genetic engineering.

56. The Selected Committee may meet with the UNIDO experts in the course of its work to be more fully briefed on the background to the establishment of the ICGEB.

57. The UNIDO Secretariat will prepare a detailed questionnaire which will be sent before 31 December 1982 to candidate countries for completion and return on or before 20 February 1983.

58. The replies from the countries to the questionnaire, and any additional information provided, will be made available to the Selected Committee. The Selected Committee may have a short meeting to examine critically and analytically the data received. If needed, further information may be solicited from the countries.

59. After completing the preparation, discussion, analysis and review of information, the Selected Committee will start visiting the countries. The visits would be quite short in duration, intended by inspection and discussion on the spot to supplement and clarify the information already supplied.

60. The Selected Committee will prepare a detailed report of its findings including merits and demerits of the several locations offered from its point of view of realizing the objectives of the Centre.

61. The report shall be circulated two months before the date of the meeting to Governments participating in the Ministerial-Level Plenipotentiary Meeting. As necessary, additional clarification from candidate governments may be obtained by the UNIDO Secretariat. The Ministerial-Level Plenipotentiary Meeting will establish its own procedures for reaching a final decision about selecting the host country and entering into final negotiations for the operational requirements of the Centre."

ANNEX II

The Members of the Selected Committee

The members of the Selected Committee were nominated according to the decision of the Belgrade Meeting by the Governments of Argentina (representing Latin America), Nigeria (representing Africa), Indonesia (representing Asia), Sweden (representing Western countries), Hungary (representing Eastern countries), Yugoslavia and China. One member was selected by UNIDO from the group of experts at the Belgrade Meeting. A UNIDO staff member, Dr. José M. Costa Lafarga, accompanied the Selected Committee as Secretary.

Nominee of the Government of Argentina

1. Dr. Cesar Vasquez (deceased 19 April 1983)  
Director of Centre for Animal Virology  
Consejo Nacional de Investigaciones Científicas y Técnicas  
Serrano 661  
1414 Capital Federal  
Buenos Aires, Argentina  
  
Research interests: biophysics of macromolecules and animal virology.

Dr. Oscar Grau (replaced Dr. Vasquez)  
Facultad de Ciencias Exactas  
Universidad Nacional de La Plata  
Calles 47 y 115  
1900 La Plata, Argentina  
  
Professor of Biochemistry and Microbial Genetics  
Research interests are the molecular biology of bacteriophages and arenaviruses.

Nominee of the Government of China

2. Prof. Tsai-ping Li  
Director  
Laboratory of Molecular Genetics  
Shanghai Institute of Biochemistry  
Academia Sinica  
320 Yo-Yang Road  
Shanghai, China  
  
Molecular biologist, studying the structure and function of eukaryotic genes.

Nominee of the Government of Hungary

3. Prof. Dr. Péter Akos Biacs  
General Director  
Central Food Research Institute  
Herman Otto ut. 15  
1022 Budapest, Hungary  
  
Biotechnology, biochemistry and industrial microbiology.

Nominee of the Government of Indonesia

4. Dr. Susono Saono  
Head  
Botanical Research Centre (Treub Laboratory)  
National Biological Institute  
The Indonesian Institute of Sciences  
The Botanical Garden, LBN-LIPI  
Jl. Ir. J. Juanda 18  
Bogor, Indonesia
- Agricultural/Soil microbiology, nitrogen fixation, agricultural wastes utilization, traditional food fermentation.

Nominee of the Government of Nigeria

5. Dr. Robert Oritsegbesimi Barrow  
Department of Medical and Natural Sciences  
Federal Ministry of Science and Technology  
P.M.B. 12793  
109 Western Avenue  
Iponri - Lagos, Nigeria
- Research in microbial biochemistry including microbial surface antigens. Presently with responsibilities for national co-ordination and management of scientific research.

Nominee of the Government of Sweden

6. Dr. Staffan Normark  
Professor of Medical Microbiology  
Department of Microbiology  
University of Umea  
S-901 85 Umea, Sweden
- Molecular geneticist, studying the structure, function and evolution of bacterial genes involved in drug-resistance and disease.

Nominee of the Government of Yugoslavia

7. Dr. Vladimir Glisin  
Professor of Molecular Embryology  
Faculty of Multidisciplinary Studies  
University of Belgrade  
Slobodana Penezic-Krcuna 35  
Belgrade, Yugoslavia
- Molecular biologist studying molecular bases of cell differentiation.

Nominee of UNIDO from the group of scientific experts attending the High-Level Meeting at Belgrade

8. Dr. David McConnell  
Department of Genetics  
Trinity College  
University of Dublin  
Lincoln Place Gate  
Dublin 2, Ireland
- Molecular genetic investigation on the structure and function of prokaryotic and eukaryotic genes.

ANNEX III

Itinerary of the Selected Committee

AUSTRIA

13-20 March 1983

UNIDO Headquarters, Vienna, briefing of members of Selected Committee and analysis of replies to questionnaire.

SWEDEN

21 March 1983

Stockholm

Morning:

- (a) Visit to Karolinska Institutet, Scientific Seminar on Current Research Activities presented by Drs. Carl-Göran Hedén, H. Jörnwall, E. Ljungqvist, G. Magnusson, N. Ringertz, A. Rosén, T. Illéni, T. Holme.
- (b) Lunch hosted by KABIGEN's president, Prof. B. Åberg, and discussion on technology transfer and industrialization.

Afternoon:

- (a) Visit to National Microbiological Laboratory and Scientific Seminar presented by Drs. M.U. Tiru, S. Lövdal and U. Bjare.
- (b) The chairman of the Selected Committee, D. McConnell, is received by the Prime Minister of Sweden, Mr. Olaf Palme, who was accompanied by Dr. Niblaeus, Under-Secretary of Science and Technology, and Mr. R. Bouveng, Ministry of Industry.

22 March 1983

Uppsala

Morning:

Visit to Biomedical Centre (BMC) and the Pilot Plant (Prof. Poroth), Scientific Seminar presented by Drs. U. Pettersson, I. Chatto Padhaya, K. Nordström and Lindberg.

Afternoon:

- (a) Visit to Swedish University of Agricultural Sciences, Lunch at the University hosted by Mrs. Görel Oscarsson, Chief Administrator, with scientists and Mr. Lars Anell, Head of SAREC (Swedish Agency for Research in Developing Countries) attending.
- (b) Visit to some university laboratories and Scientific Seminar presented by Drs. C.J. Bränden, H. Ljunggren, B. Morein, B. Henningson and T. Nilsson.
- (c) Dinner at BMC.

23 March 1983

Uppsala

Morning:

Visit to BIOCELL, a research company, and Pharmacia Diagnostics



Afternoon: Meeting of the chairman of the Selected Committee, D. McConnell, with Dr. Niblaeus, Under-Secretary of Science and Technology, and Mr. R. Bouveng, to discuss Swedish support to the ICGEB project.

BELGIUM (Walloon Region)

24 March 1983

Louvain-la-Neuve

Evening: Reception offered by representative of Walloon Region, Mr. Wathelet, Minister of New Technologies, and Mr. P. Renotte, on behalf of Mr. A. Damseaux, Minister in Charge of Foreign Relations.

25 March 1983

Brussels and Louvain-la-Neuve

Morning: Meeting at the Foreign Affairs Ministry of the National Government with Mr. L. Buisse, First Counsellor, and other officials of the National and Walloon Governments.

Afternoon: Visit of Université Catholique de Louvain-la-Neuve

- (a) Meeting with Mr. Woitrin, General Administrator of the University;
- (b) Visit University facilities and Scientific Seminar presented by Drs. Delcour, Crichton, Rouxhet, Bouharmont, Goffeau and Degand.

26 March 1983

Brussels

Morning: Meeting with Mr. P. Rousseau, Adviser to Minister Wathelet, and discussion on the technical aspects of the project.

28 March 1983

Liège, Gembloux and Namur

Morning: Visit to Université de Liège, Scientific Seminar presented by Drs. J. Martial, W. Verley, J.M. Chuysen, O. Dideberg and J.M. Frere.

Afternoon: Visit to Facultés Universitaires Agronomiques de Gembloux

Evening: Meeting in Namur with scientists from Université de l'Etat de Mons, Facultés Politechniques de Mons, Facultés Notre-Dame-de-la-Paix à Namur, Fondation Universitaire Luxembourgeoise.

29 March 1983

Fleurus/Brussels

- Morning:
- (a) Visit to the Institute of Radio-Elements at Fleurus.
  - (b) Visit to Université Libre de Bruxelles at Rhodes St. Genese and Scientific Seminar presented by Drs. R. Thomas, A. Bollen, A. Rauquoy and J. Germain.

Afternoon: Visit to the Faculty of Medicine - Université Catholique à Louvain-la-Woluwe.

Evening: Reception hosted by Mr. M. Wathelet, Minister of New Technologies, Walloon Region, with participation of members of the scientific community.

USA

31 March 1983

New York

Meeting at UN Headquarters with Drs. A. Bukhari, A. Chakrabarty, S. Narang and R. Wu, UNIDO experts who had played a major role in the establishment of the ICGER and the proposed work programme.

CUBA

1 April 1983

Havana

Evening: Welcome dinner hosted by the Vice-President of the Cuban Academy of Science, Dr. Ismael Clark-Aznar.

2 April 1983

Havana

Morning: Meeting at the Cuban Academy of Science, the following persons were present: Dr. Wilfredo Torres Yribar, Presidente de la Academia de Ciencias, Dr. Ismael Clark-Aznar, Vicepresidente de la Academia, Dr. Manuel Limonta, Director del Centro de Investigaciones Biologicas, Dra. Rosa Elena Simeón, Directora del Centro Nacional de Sanidad Agropecuaria, Dr. Juan Kouri, Director del Centro Nacional de Investigaciones Científicas, Dr. Luis Herrera, Vicedirector del Centro Nacional de Investigaciones Científicas, Dra. Maria Teresa Cornide, Genetista, Asesora del Presidente de la Academia, Dra. Gisela Alonso, Fisióloga Vegetal, Asesora del Presidente de la Academia, Dr. Rubén González, Director de Relaciones Internacionales de la Academia, Lic. Sergio Jorge Pastrana, Jefe del Departamento de Colaboración de la Academia, Sr. Pedro Morales, Director en el Comité Estatal de Colaboración Económica. Lic. Ileana Yarza, Especialista en el Departamento de Colaboración de la Academia, Sra. Georgina Fajardo, Especialista en el Comité Estatal de Colaboración Económica, Sr. Rafael Rodriguez, Jefe de Protocolo de la Academia.

Afternoon: Lunch hosted by the State Committee for Economic Co-operation headed by Mr. Pedro Morales.

4 April 1983

Havana and San Juan

Morning: Visit to National Centre for Scientific Research (CNIC), Director Dr. Juan Kouri.

Afternoon: Visit to the National Centre for Plant and Animal Health (CENSA), and Scientific Seminar presented by Drs. Rosa Elena Simeón, Director, R. Gonzalez, L. Tablado, L. Bel, L. Aznar and E. Fuentes.

5 April 1983

Havana

- Morning:
- (a) Attend a test of via satellite computer communication.
  - (b) Visit Institute of Experimental Chemistry and Biology (IQBE), and Scientific Seminar presented by Drs. C. Vallin, E. Garcia, L. Montero and J. Leon.
  - (c) Visit to the Biological Library of the Academy of Sciences.
- Afternoon:
- (a) Colloquium at CNIC
  - (b) Visit Centre for Biological Research (CIB) and Scientific Seminar presented by Drs. M. Limota, Director, L. Herrera Martinez, P. Lopez Saura, E. Penton Arias, A. Aguilera Rodriguez, V. Ramirez Albajes.

6 April 1983

Bonaventura and Havana

- Morning:
- Visit to UNDP projects at the Cuban Institute for Sugar Cane, and discussion with its Director, P. Lopez Guzman;
- Cuba-9, paper for newsprint from bagasse;
  - Cuba-10, Single Cell Protein (SCP) production.
- Afternoon:
- (a) Visit to a computer centre in Havana;
  - (b) Discussion with Cuban authorities headed by Dr. W. Torres Yribar, Minister President of the Academy of Sciences on details of the Cuban offer to host the ICGB.
  - (c) Meeting with the Head of State, Mr. Fidel Castro
  - (d) Farewell cocktail party.

7 April 1983

Havana

- Morning:
- (a) Visit to the University of Havana.
  - (b) Visit to the Instituto Superior Politécnico "José Antonio Echevarría", and discussion with Prof. R. Alarcón Ortiz, Rector, Prof. J. de Llano Feliu, Vice-Rector, Prof. R. Boué Montero, Dean, Faculty of Food and Chemical Processes.

#### ITALY

9 April 1983

Rome

- Morning:
- Meeting at the Ministero della Ricerca Scientifica e Tecnologica (Ministry for Scientific and Technological Research). Participants: Dr. Italo Rocca, representing the Minister and Vice-President of Research Area Trieste, Prof. Arturo Falaschi, University of Pavia, Prof. Paolo Budinich, Director of the International School for Advanced Studies of Trieste, Prof. Paolo Fusaroli, Rector of the University of Trieste, Prof. Paolo Neri, of Institute ISVT SCLAVO, Prof. Enrico Proceddu, University of Bari, Eng. Livio Zeller, representing FAST, Prof. Scarascia Mugnozza, Director of CNR Committee for Agriculture,

Prof. Carmine Alfredo Romanzi, Rector of University of Genoa, and Chairman of Italian Rector's Conference, Prof. Gusmani, Rector of University of Udine, Prof. Calzolari, University of Trieste, Prof. Roda, University of Udine, Prof. Romeo, University of Trieste, Prof. Pocchiari, Director of the Institute of Research, Ministry of Health, Prof. U. Ratti, University of Rome, Engineering, and Director of the International Relations Bureau, Minister for Scientific and Technological Research (MRST), Prof. A. Tomassi, Vice-Director of the International Relations Bureau (MRST).

Presentation of the structure, objectives and financing of Italian research programmes in GEB.

10 April 1983

Duino

Afternoon:

Meeting at Duino Castle site of the Foundation for the Progress and Freedom of Science. Topic "UNIDO Centre and International Centre for Theoretical Physics (ICTP): International Aspects".

Participants: Prince Raimondo della Torre e Tasso, Prof. Abdus Salam, Director ICTP, Prof. P. Budinich, Director ISAS, Prof. P. Fusaroli, Rector, University of Trieste, Prof. Romero, University Trieste, F. Anzellotti, President, Research Area Trieste, F. Marinuzzi, Ambassador, L. Stasi, Member of Board, Research Area, D. Fazio, General Director of University Education (in Ministry of Education).

11 April 1983

Trieste

Morning:

(a) Meeting with Italian authorities responsible of Trieste's offer:

- presentation of Research Area Trieste
- discussion of documents
- presentation of alternative sites.

(b) Visit to "Stazione Maritima", offered as provisional building for ICGB.

(c) Visit to Mayor of Trieste, Mr. Manlio Cecovini.

(d) Visit ICTP (International Centre for Theoretical Physics).

Afternoon:

(a) Visit to the site Area di Ricerca

(b) Exhibition of projects for future development of Area di Ricerca.

12 April 1983

Trieste

Morning:

Meeting at the Rector's office with the Minister for Scientific and Technological Research, Mr. Pier Luigi Romito, and representatives of local authorities and of scientific and industrial regional communities.

Afternoon:

Visit to University of Trieste laboratories and Scientific Seminar presented by Drs. G. Graziosi, E. Ferrero, G.L. Sottocasa, C. Monti-Bragadin, S. Paoletti, F. Quadri-foglio and G. Costa of the universities of Trieste and Udine.

13 April 1983

Pavia

- (a) Visit to "Compagnia di Ricerca Chimica" located in S. Giovanni al Natisone about 40 km from Trieste.
- (b) Visit to Istituto di Genetica Biochimica ed Evoluzionistica in Pavia, Scientific Seminar by Dr. G. Milanese, F. Sala, S. Spadari, A. Galizzi, L. De Carli, C. Morandi, U. Bertazzoni, M. Mottes (V. Sgaramella), O. Ciferri, S. Santachiara, F. Nuzzo and S. Riva.

14 April 1983

Rome

Morning:

Visit National Research Council, Istituto di Biologia Cellulare (IBC), Seminar presented by Drs. Levi-Montalcini, Tochini-Valentini, Colombo, Donato Gioli, Ortella and Caccino (IIGB, Naples).

Afternoon:

Lunch hosted by the Direttore Generale delle Relazioni Culturali, Foreign Affairs Ministry, Minister Plenipotentiary, Mr. Alessandro Cortese de Bosis.

PAKISTAN

16 April 1983

Islamabad

Morning:

Meeting with Minister of Education, Dr. Mohammed Afzal and discussion of Pakistani offer.

Afternoon:

- (a) Lunch with Minister of Education, Dr. Mohammed Afzal, and Minister of Industries, Mr. Elahi Buksh Soomro.
- (b) Meeting with the President of Pakistan, General Mohamad Ziu-al-Haq.
- (c) Meeting with the Chairman of Pakistan Atomic Energy Commission, Dr. Munir Ahmad Khan.
- (d) Dinner hosted by the Minister of Industries.

17 April 1983

Islamabad

Morning:

- (a) Meeting with Additional Secretary, Ministry of Foreign Affairs, Mr. Abdul Sattar.
- (b) Meeting at Ministry of Food and Agriculture.
- (c) Visit National Agricultural Research Centre, Director, Dr. G.R. Sandhu, and scientific discussion with Drs. A. Quershi, S.M. Mugal, T. Hassan and A. Ali.

Afternoon:

- (a) Meeting with Vice-Chancellor of Punjab University - Lahore, Dr. Khairat Mohammad Ibne Rasa, and representatives of different faculties.
- (b) Dinner hosted by the Vice-Chancellor of Punjab University.

18 April 1983

Lahore

Morning:

- (a) Visit to the Centre for Molecular Biology, Dr. S. Riazuddin, Director.
- (b) Visit to the proposed site of ICGB at the new campus of Punjab University.
- (c) Scientific Seminar presented by Drs. F.H. Shah, W. Akhtar, I. Iqbal, S.S. Salah, A.R. Shakoori.

Afternoon:

- (a) Reception given by the Mayor of Lahore, Mr. Miam Shuja-ur-Raham.
- (b) Dinner hosted by the Governor of Punjab, Lt.Gen. Ghulam Jilani Khan.

19 April 1983

Faisalabad

Visit of the Nuclear Institute of Agriculture and Biology (NIAB) and scientific discussions with Drs. K. Malik and S. Riazuddin.

20 April 1983

Lahore

Morning:

Final meeting and discussion with the Vice-Chancellor of the Punjab University.

INDIA

20 April 1983

New Delhi

Evening:

Reception by Dr. S. Varadarajan, Secretary, Department of Science and Technology.

21 April 1983

New Delhi

Morning:

- (a) Visit to All India Institute of Medical Sciences and National Institute of Immunology and discussion with Dr. Sriramachari, Additional Director-General, Indian Council of Medical Research, Prof. H.D. Gandon, Director, All India Institute of Medical Sciences.
- (b) Scientific Seminar presented by Dr. N.C. Nayak, Dept. of Pathology, Dr. Satish Kumar Gupta, Dept. of Biochemistry/ NII, Dr. Ramesh Kumar, Dept. of Microbiology, Dr. Chandana Das, Dept. of Biochemistry, Dr. Indira Nath, Dept. of Pathology, Dr. Pradeep Seth, Dept. of Microbiology, Dr. N. Kochupillai, Dept. of Medicine, Dr. M.C. Vaidya, Dept. of Anatomy, Dr. S.K. Kar, National Institute of Immunology.

Afternoon:

- (a) Visit to Indian Institute of Technology, New Delhi, and meeting with Prof. O.P. Jain, Director, and Prof. T.K.Gosh, Professor-in-Charge of Bio-engineering Research Council.
- (b) Visit of Jawaharlal Nehru University, New Delhi, and meeting with Prof. P.N. Srivastava, Vice-Chancellor, and Prof H.K. Das.

22 April 1983

New Delhi

Morning:

- (a) Visit to Indian Agricultural Research Institute, discussions with Dr. H.K. Jain, Director, and Dr. Sushil Kumar.
- (b) Visit to Delhi University, discussions with Dr. H.Y. Mohan Ram, Professor, Dept. of Botany, and Dr. A.P. Joshi, Scientist-in-Charge, Centre for Biochemicals.

Afternoon:

- (a) Discussion with Dr. O.P. Gautam, Director-General, Indian Council of Agricultural Research (ICAR), Dr. N.S. Randhawa, Dr. M.V. Rao, Dr. Maharaj Singh, Dr. R.M. Acharya, Dr. G.L. Kaul of ICAR and Shri Somnath Pal, Deputy Secretary, Dept. of Agricultural Research and Education.
- (b) Discussions with Dr. G.S. Sandhu, Director-General, Council of Scientific and Industrial Research at Science Centre, and Dr. Bora, Officer-in-Charge of the Institute of Microbial Technology.
- (c) Visit to the Minister of State for Science and Technology, Atomic Energy, Space, Electronics and Ocean Development, Mr. Shiuraj V. Patil, who was accompanied by Dr. S. Varadarajan and Dr. S. Ramachandran, Biotechnology Adviser, Dept. Science and Technology.

23 April 1983

New Delhi

Morning:

Scientific Seminar presented by Drs. G.P. Talwar, N.K. Notani Sharat Chandra, Pl Balram, K.P. Gopinath, J.D. Padayatty, T.V. Subbaiah, Maharani Chakrabarty, B. Biswas, Nitya Nand.

Afternoon:

Rounding off discussion with officials of Department of Science and Technology headed by Dr. S. Varadarajan and Ministry of Foreign Affairs, Mr. Ramesh Mulye.

THAILAND

26 April 1983

Bangkok

Afternoon:

- (a) Discussion with Deputy Director-General of Department of Technical and Economic Co-operation, Mrs. Priya Osthanda.
- (b) Dinner hosted by Minister of Science, Technology and Energy, Wing Commander Thinakorn Bhandhugravi with the President of the Science Society of Thailand, Prof. Kamchad Mongkolkul and Thai scientists.

27 April 1983

Bangkok

Morning:

- (a) Visit to Mahidol University, Salaya Campus, Prof. Dr. Natth Bhamarapravati, Rector of Mahidol University, and Prof. Dr. Serene Piboonniyom, Campus Director.
- (b) Tour of various existing institutes and units, and visit to the proposed location of ICGEB and provisional facilities.

Afternoon: Visit to King Mongkut Institute of Technology,  
Dhomburi Campus and scientific discussion with  
Dr. M. Tanticharoen,  
Dinner hosted by Mahidol University

28 April 1983 Bangkok

Morning: Mahidol University, Faculty of Science; meeting with the  
Dean, Dr. S. Panym, and visit the laboratories of the  
Centre for Molecular Genetics and Genetic Engineering  
and Department of Biochemistry, Dr. B. Panijpan, Head;  
Centre for Biotechnology and Department of Microbiology,  
Dr. Pornchai Matanekasombut, Head; Computer Centre and  
Stang Mongkolsuk Library.

Afternoon: (a) Luncheon hosted by Faculty of Science, Mahidol University  
  
(b) Visit to Chulalongkorn University, Faculties of Science  
and Engineering, meeting with Prof. Charas Suwanwela,  
Vice-Rector of Chulalongkorn University, Prof. Vichai  
Hayodom, Dean of Faculty of Science, and Assoc. Professor  
Dr. Tavee Lertpanyavit, Dean of Faculty of Engineering  
and scientists from various departments.  
  
(c) Visit to Scientific and Technological Research Equipment  
Centre  
Dinner hosted by Chulalongkorn University.

29 April 1983 (a) Meeting with Dr. Krisna Chutima, Vice-Rector of Kasetsart  
University, Dr. Tongchai Kampee, Head of Microbiology  
Department, and Dr. Supapone Bhuwathanapum, Head of  
Biotechnology Department.  
  
(b) Visit to faculties of Agro-Industry, Science and Arts  
and Central Laboratory Kasetsart University.  
  
(c) Visit to Rhizobium Inoculum Production Plant, Bangkehn,  
and discussion with Dr. Samrit Chaiwanakupt, Dr. Natakorn  
Boonkerd and Mrs. Yenchai Vasuvat.

Afternoon: (a) Luncheon hosted by Department of Agriculture.  
  
(b) Visit Thailand Institute of Scientific and Technological  
Research (TISTR), Dr. Narone Chomchalow, Vice-Director  
of TISTR, and Director of Gene Bank and Dr. Poonsook  
Attasampoona, Director of Bangkok MIRCEN.  
  
(c) Visit Bangkok MIRCEN and Gene Bank.  
  
(d) Meeting with Secretary General of National Research  
Council (NRC), Dr. Choopol Swasdiyakorn.  
  
(e) Visit Asian Institute of Technology and discussion with  
international staff.  
  
(f) Dinner hosted by National Research Council.



1 May 1983

Bangkok

Morning:

- (a) Scientific Seminar presented by Drs. N. Bhamaradravati, S. Panyim, Y. Yuthavong, P. Wilairat, P. Matanekasombut, P. Foocharoen, A. Bhumiraiana, N. Boonkerd, S. Tientanacom, T.W. Flegel and V. Meevootisom.
- (b) Final meeting of the Selected Committee with Dr. N. Bhamarapravati, Dr. Charoen Vashrangsi, Deputy Secretary General NRC and Chairman of Commission on Genetic Engineering and Biotechnology of Thailand, Dr. Kamchad Mongkonkul, Vice-Rector, Chulalongkorn University, Dr. Pornchai Matanekasombut, Director, Biotechnology Programme, Mahidol University, Dr. Yongyuth Yuthavong, Assistant Dean for Academic Affairs, Mahidol University, Dr. Aphirat Arunin, Deputy Director, General Department Science Services.

BELGIUM (Flanders and Brussels Region)

2 May 1983

Brussels

Evening:

Dinner hosted by Prime Minister of Brussels Region, Mr. P. Hatry.

3 May 1983

Brussels

Morning:

- (a) Meeting with Mr. R. De Vuulf, Minister of Public Health of Flanders Government, Mr. G. Van Acke, President of the Regional Investment Society of Flanders and Co-ordinator of the offer of the Flanders Government to host ICGEB, Dr. F. Colson, Unit of Applied Research, Ministry of Flemish Community, Prof. R. Hamers, Vrije Universiteit Brussel, Dr. G. Van den Eede, Vrije Universiteit Gent and Mrs. P. Sentroul, Université Libre de Bruxelles.
- (b) Visit University Hospital Erasmus ULB and meeting with Prof. Dr. A. De Wever, Medical Manager of Erasmus Hospital, Prof. Carlier Yves, parasitology, Medical School ULB, Prof. Vray Bernard, Immunology, Medical School ULB, Ing. Vassart Alain, Mining Engineering Department and Ore Dressing Laboratories, Dr. Verlannen-Grandjean Alain, Director of Research and Development at the Lab. Oncology and Exp. Surgery ULB, Cancer Institute, Prof. Wybran, Chairman, Dept. of Immunology, ULB, Dr. D. Christophe, Leader of the Molecular Biology team of the IRIBHN, Prof. Duront, Head, Institute of Interdisciplinary Research.

(c) Visit to Meylermeersch potential location for the ICGEB.

Afternoon:

- (a) Visit to the COOVI-CERIA facilities and pilot plant
- (b) Visit to industrial reserach facilities of Amylum-Aalst

4 May 1983

Ghent

Morning:

Visit of the University Hospital Gasttunisberg and the REGA Institute.

Afternoon:

- (a) Visit to "Flanders' Technology"
- (b) Meeting with Minister G. Geens, President of Flanders Government.

5 May 1983

Ghent and Brussels

Morning:

- (a) Visit University of Ghent (RUG), meeting with Prof. Cottenie, Rector of the University, and Prof. Hoste, Vice-Rector.
- (b) Scientific Seminar presented by Professors Fiers, Van Montagu, Persoone and Sorgeloos.

Afternoon:

- (a) Visit laboratories of VUB
- (b) Discussion with Flemish officials and scientists regarding Flemish offer: Messrs. Van Ecke, Colson, Hamers, Van Montagu and Van Den Eede.

6 May 1983

Antwerp and Brussels

Morning:

- (a) Meeting with Prof. Oscar Steehaut, Rector of VUB, and inspection of provisional buildings and final site offered to host the ICGB at Jette.
- (b) Visit Institute of Tropical Medicine of Antwerp and meeting with following scientists: Prof. P. Gigase, Dr. Tony Voervorry, Dr. Eric Van Marck, Dr. Nestor van Muirvenne, Prof. Peter Piot, Prof. Stefaan Pattyn, Dr. vet. De Dekon, Prof. Brandt, Dr. Kumar, Dr. Luido van der Groen, Dr. Antoon Vandenberghe, Prof. Julius Clauwaert.

Afternoon:

- (a) Visit Institute of Cell Pathology and presentation by Prof. A. Trouet.
- (b) Meeting with Mr. P. Hatry, Prime Minister of Brussels Region, and Mr. L. Buysse, First Counsellor of Foreign Affairs Ministry of Belgium.

AUSTRIA

8-14 May 1983

UNIDO Headquarters, Vienna, preparation of final report.

ANNEX IV

Documents Provided to the Selected Committee by UNIDO

- UNIDO/IS.254 The Establishment of an International Centre for Genetic Engineering and Biotechnology (ICGEB) prepared by a Group of Experts
- ID/WG.382/1 Draft Memorandum of Understanding and Guiding Principles of the International Centre for Genetic Engineering and Biotechnology prepared by the UNIDO Secretariat
- ID/WG.382/2 Five-Year Work Programme of the International Centre for Genetic Engineering and Biotechnology prepared by the UNIDO Secretariat
- ID/WG.382/2/  
Add. 1 Selective Application of Advanced Biotechnology for Developing Countries prepared by Carl-Göran Hedén
- ID/WG.382/2/  
Add. 2 Application of Genetic Engineering for Energy and Fertilizer Production from Biomass prepared by Ray Wu
- ID/WG.382/2/  
Add. 3 Hydrocarbon Microbiology with Special Reference to Tertiary Oil Recovery from Petroleum Wells prepared by Ananda Chakrabarty
- ID/WG.382/2/  
Add. 4 Application of Genetic Engineering and Biotechnology for the Production of Improved Human and Animal Vaccines with Particular Reference to Tropical Diseases prepared by Ahmad Bukhari and Ulf Pettersson
- ID/WG.382/2/  
Add. 5 Improved Agricultural and Food Products through Genetic Engineering and Biotechnology prepared by David McConnell
- ID/WG.382/2/  
Add. 6 Bio-Informatics prepared by Carl-Göran Hedén
- ID/WG.382/3 Proposed Budget of the International Centre for Genetic Engineering and Biotechnology prepared by the UNIDO Secretariat
- ID/WG.382/4 Considerations Related to the Location of the International Centre for Genetic Engineering and Biotechnology prepared by the UNIDO Secretariat
- ICGEB/SC/1 Questionnaire for Candidate Host Countries in regard to the Establishment of the International Centre for Genetic Engineering and Biotechnology
- Replies to the Questionnaire for Candidate Host Countries of ICGEB by the Governments of Cuba, India, Italy, Pakistan and Thailand and by each of the three regional Governments of Belgium: Brussels, Flanders and Wallonia
- Draft Headquarters Agreement of the International Centre for Genetic Engineering and Biotechnology
- Draft Statutes, and Annotations, of the International Centre for Genetic Engineering and Biotechnology

ANNEX V

Communications received by the Selected Committee

in Vienna prior to the 13 May 1983 which confirm or amplify matters raised in discussions during the visits of the Selected Committee

BELGIUM

1. Telex from Mr. G. Geens, President of Regional Government of Flanders, and Mr. P. Hatry, President of the Executive of Brussels, of 11 May 1983:

"Note to the Delegation of UNIDO experts visiting Flanders and Brussels

Subject: The Proposal of the Flemish Community and the Region of Brussels with regard to the Location of an International Center for Genetic Engineering and Biotechnology.

The Flemish community and the region of Brussels, responding to a mutual invitation, agree:

1. to host the above-mentioned center - with the statute of the headquarters agreement.
2. to support the potential choice of location made by UNIDO experts between the following places: 'Meylermeersch' and 'Jette' in the 'agglomeration Brussels capital'. The latter location can immediately get operational.
3. to provide all financial means for the investment costs including: building-ground, the building itself, equipment and accommodation for foreign researchers. The total cost for the account of the regional budgets will represent 9,5 million dollars.

They commit themselves to procure jointly the political and financial support of the national government, in execution of the letter of the Minister of Foreign Affairs of March 30, 1983, the content of which is enclosed.

They are also disposed to provide, if required, additional financial means in order to finance the cooperation with 'affiliated centers', within the framework of the national development policy.

The conclusion of a definitive agreement concerning the financial contribution of the regions and the national government will only become effective if sufficient guarantees with regard to the annual financing of the center's operational costs, can be provided by the competent UNIDO authorities.

Each finance destined for the center, beared by the Belgian governments, is submitted to the normal administrative and juridical procedures which are in force in Belgium.

G. Geens, President of Flanders' Government

P. Hatry, President Executive Brussels"

2. Telex from Mr. P. Hstry, President of the Executive of Brussels, of 13 May 1983:

"We confirm the declaration made during our meeting at the Ramada Hotel on May 6th and in particular our remarks about the Belgian participation in the financing of this UNIDO project.

As Minister of the Brussels Region and member of the Belgian Government, I intend to submit to this Government the proposition of the Flemish community and the Brussels Region regarding the establishment and the implantation of an International Centre for Genetic Engineering and Biotechnology. This will allow to find the balance of funds needed to bridge the difference between the Belgian contribution to the UNIDO project which is estimated to amount to a maximum of dol. 36 m. and the amount for which the regional budgets have already been engaged, that is dol. 9,5 m.

The present communication is submitted to the qualifications included in the telex No. 712 of March 11th 1983 from the Belgian Embassy to UNIDO and in the letter of the Belgian Minister of Foreign Relations of March 30th, 1983, to the Flemish Executive."

#### CUBA

Detailed confirmation of information received in Havana from Dr. W. Torres Yribar, President of the Academy of Sciences.

#### INDIA

Copies of many scientific publications from several reserach institutes and universities, 1975 - 1983.

#### ITALY

1. Revised offer incorporating new suggestions made concerning the location of the ICGEB in Trieste, and an expression of support from the Ministry of Foreign Affairs.
2. Letter from Permanent Mission of Italy, Vienna; excerpt as follows:

"If the ICGEB will be established in Trieste, the research programs directed to developing countries would receive substantial financing by the ministry of Foreign Affairs. In due time the Italian Government will state the amount of its contribution to these activities in the main centre in Trieste and possibly in affiliated centres, if this will be the solution adopted by UNIDO."

#### PAKISTAN

Aide-Memoire from Pakistani Permanent Mission to UNIDO, Vienna, concerning legal questions. This has been forwarded to UNIDO.

ANNEX VI

Offers from Bulgaria and Tunisia

Offers to host the ICGEB were received from Tunisia and Bulgaria after 20 February 1983, the deadline set by the Belgrade meeting and after the Selected Committee left Vienna on 20 March 1983 on its mission. The Selected Committee received them on its return to Vienna on 7 May. The main features of the offers are abstracted below:

Bulgaria

1. Physical facilities

The proposed location of the ICGEB is Sofia where 20 ha of land (or more if necessary) and building of 12,300 m<sup>2</sup> of total floor space are offered. Provisional facilities are offered in an existing building allowing the ICGEB to start its activities within one month.

2. Basic infrastructure

Sofia has major international transport facilities including the railway station (6 km from the proposed ICGEB site) and the airport (5 km away) both connected with the proposed area via public transportation system. The proposed location of the Centre has all necessary services including constant supply of water, electricity, postal and telecommunication services. Housing of international standards will be provided for the Centre's staff. For temporary accommodation there are three hotels of international standards within a radius of 1.5 km of the proposed site for the Centre. Social activities include schools with instruction in English, French, German and Russian, sports, cultural and shopping areas and medical services.

3. Scientific infrastructure and supporting services including manpower

The approximate number of scientists active in R+D in genetic engineering and biotechnology and related scientific disciplines (with M.Sc. degrees or above) in the country is 300. The GEB and R+D is carried out by a number of academic and other types of research and industrial organizations. Some of the notable original results in the area of GEB are: highly effective

technologies for obtaining antibiotics (medical and nutritive), enzymes, amino-acids, organic acids, plant protection preparations, protein, cell cultures etc. In the vicinity of the proposed location of the Centre, there are scientific and technical libraries and computing facilities, The supply of fine chemicals, enzymes and radio labelled materials is carried out by a specialized foreign trade organization. Bulgaria has enough qualified personnel suitable for each category of staff: scientific, technical, auxiliary technical, administrative etc.

4. Capacity to transfer knowledge to developing countries

Very close contacts exist between the universities and the industry, aiming at technology transfer, extension service, dissemination of research results etc. For this purpose various mechanisms and forms are applied in accordance with the specific conditions. Bulgaria offers facilities for training and research work of scholars from abroad in the universities. No problems will arise in providing training facilities to all participating countries by the Centre.

5. National and local commitment

GEB are considered priority areas. A national programme for development of biotechnology has been worked out up to 1983. Various organizations are willing to provide support to the ICGB. The financial support of the Centre on the part of Bulgaria in local and convertible currency is related to the possibility of providing for the necessary participation of Bulgarian scientists and technical personnel in the activities of the Centre. The total amount provided by the Government of the People's Republic of Bulgaria during the first five years in case of satisfactory Bulgarian participation is as follows:

- (a) local currency - 15.4 million Leva, equivalent to approx. US\$ 15 million
- (b) convertible currency - US\$ 4.5 million
- (c) equipment available - about US\$ 1 million

This amount does not include the expenses for land, building, pilot plant and other amenities placed at the Centre's disposal by the host country. For the next five-year period, the People's Republic of Bulgaria considers an increase of about 25 per cent. Besides, Bulgaria is prepared to place

at the Centre's disposal an additional number of Bulgarian scientists paid exclusively by the Bulgarian Government. The active collaboration of Bulgaria with socialist, capitalist and developing countries will contribute to attract international financial support for the ICGB.

### Tunisia

#### 1. Physical facilities

Permanent facilities offered for the ICGB include three ha of land at the Faculty of Science and Technology, University in Sfax and 4,000 m<sup>2</sup> of total floor space. Provisional facilities will be provided at the Faculty of Science and Technology of Sfax University.

#### 2. Basic infrastructure

Sfax is connected with Tunis (by plane) and Monastir (by road, two hours drive), the two major international airports of Tunisia. There is a stable supply of water, gas, electricity and telecommunication services available. Two hotels, Syphax and Habrouk Palace, are listed to be of international standards. Social amenities like French and English language schools, sport and cultural facilities, shopping areas, medical services are available in Sfax.

#### 3. Scientific infrastructure and supporting services including manpower

As yet there is no research in the area of genetic engineering but a small group of researchers are working in Tunisia on the production of SCP and on the development of enzymatic electrodes. A scientific and technical library and a computer facility are in the process of being established. Tunisia has paid considerable attention to the training of top level specialists at the best European biotechnology and molecular biology laboratories.

#### 4. Capacity to transfer knowledge to developing countries

Tunisia already has experience in this area of international education co-operations. Every year, five to ten per cent of the places for students at the various university establishments in the country are made available



to foreign students, often through Tunisian fellowships. Every kind of facility is available for the use of foreigners who wish to study in Tunisia or to train at Tunisian laboratories. In its policies, Tunisia attaches great importance to the role of technical co-operation among developing countries. Recently, a meeting of the directors of the co-operation agencies of the countries of the Group of 77 was held at Tunis. Many teachers and industrial specialists are sent by the Government on official co-operation missions, especially to African and Arab countries.

5. National and local commitment

The Tunisian Government's general policy for science and technology is to strengthen the national infrastructure in research and development in fields such as biotechnology, new energy resources and others. Scientific personnel is being trained in France in GEB in order to establish a National Biotechnology Centre. In this context, commitment for the ICGEB comes in the form of provisional facilities offered by the Faculty of Science and Technology of Sfax University and through the financial support given by the Government of Tunisia. The offer includes an estimated investment of US\$ 5.7 million for land, buildings, residential facilities, and US\$ 2.0 million for equipment. The contribution for operational cost during the first five years of operation is US\$ 4.25 million. No indication is made with regard to the type of currency or method of payment.

ANNEX VII

Elements Discerned Within the Information  
Submitted to the Selected Committee

With the exceptions and qualifications noted, the Selected Committee has taken into account all of the information submitted to it in order to assess the merits of the offers from each country. The information includes the answers to the Questionnaire, additional documents received from UNIDO and the different countries, and the other information gathered during the visits to each country. The information has been assessed in respect of six headings which encompass the objectives laid down by the Report of the Belgrade Meeting (ID/WG.382/7) and in the UNIDO documents which are referred to in the report. These are:

- (a) Finance;
- (b) Physical facilities including the site and location;
- (c) Professional scientific infrastructure;
- (d) Prospects for the ICGB to benefit all developing countries;
- (e) Social infrastructure; and
- (f) The commitment by the host country to the idea and spirit of the ICGB.

(a) Finance

The quality of the offers was assessed where possible in respect to the amounts provided for:

the land including services; the buildings including the basic technical services in the building (e.g. elevators, air-conditioning, water, gas, electricity, compressed air, distilled water) and the fixed furnishings (e.g. benches, hoods, cold rooms, warm rooms); a housing colony if required; utilities; locally supplied chemicals, other consumables and equipment; supplies from international sources; locally recruited staff; internationally recruited staff; trainees from developing countries; affiliated regional and national centres.

The offers were assessed where possible in respect of:

amount available after land, buildings, housing colony and utilities have been accounted for; the amount available in foreign exchange; the amount available in relation to local costs, including services, labour, communications, transport, travel etc.; the flexibility of the offer in respect to the use of the money; the willingness to transfer the finance to

the ICGEB or an international agency; the degree of control over the financial process; the willingness to grant tax-free status to the ICGEB and its internationally recruited staff; the commitment to maintain the value of the offer irrespective of the rate of exchange of national currency; the capacity to attract financial support from other countries or agencies.

(b) Physical facilities including the site and location

The quality of the offer was assessed where possible in respect to:

the area and physical qualities of the site offered; the location of the site in relation to general services; the availability of services; the preparedness of the site for construction; the distance from transport services both national and international; the capacity to be linked to national and international communication systems; closeness to major relevant research institutions and facilities; physical attractiveness of the site; opportunities for housing, schooling and other social amenities; climate; the scale of the proposed building programme in relation to the requirements; the opportunity for the ICGEB to be constructed as an independent and attractive institution with the character expected of a major international research centre devoted to scientific and technological needs of the developing countries; provisional site and buildings including size, location, readiness for use, cost of adaptation etc.; time scale of building; opportunities for expansion.

(c) Professional scientific infrastructure

The quality of the scientific infrastructure in each country was judged where possible by:

attending scientific seminars; examining reprints, reports and theses; visiting laboratories; talking with scientists, students, technologists and technicians about their research and assessing their ability to withstand careful scientific scrutiny; observing the quality of buildings, equipment, libraries, computers, pilot plants and the general laboratories; observing how these were being used and maintained and how they were made available to researchers; observing whether seminars, journal clubs etc. were being conducted; inquiring about the number of scientists going abroad for training; assessing the efficiency and momentum of scientific research in each country; inquiring about procedures and times taken to receive chemicals and other supplies from international sources; inquiring about the time taken to obtain information by mail, by telephone, through libraries and computerized networks; inquiring about the efforts made by the country to attract their scientists who are abroad to return permanently to their home country to continue their research work; inquiring about the ability of each country to attract foreign scientists from developing countries to visiting or permanent positions; inquiring about the capacity of each country to attract graduate students, post-doctoral fellows and visiting scientists from abroad; assessing the degree of co-operation between scientists within the country; assessing the undergraduate and graduate courses in relevant fields; assessing the financial and organizational support afforded to the conduct of relevant research; assessing the research programmes and projects and the capacity to discriminate between research proposals of different quality; assessing

the overall governmental interest in genetic GEB; considering information about national and international conferences which have occurred or are being planned; assessing the impact of indigenous related science on the society and economy of the country; assessing the level of competence in the key fields of microbial genetics, biochemistry, molecular biology, immunology, cell biology and fermentation science which together provide the scientific base for GEB.

(d) Prospects for the ICGEB to benefit all developing countries

The prospects were assessed where possible by considering information on:

research programmes on-going in related fields in co-operation with developing countries; research programmes in developing countries supported by the potential host country; research programmes in fields of special interest to developing countries, e.g. tropical diseases, tropical plants, vaccines and drugs, alternative foods and energy etc.; training programmes for visiting students, post-doctoral fellows and scientists from developing countries; willingness of the scientists to travel to developing countries to conduct research and training programmes; scale of foreign aid programme and proportion devoted to educational, scientific and technological projects; the political and economic conditions attached to foreign aid programmes; the number and geographical distribution of countries connected by bilateral aid programmes; the communications network linking the host country and the developing world; the existence of other international scientific and educational institutions in the host country and their experience; the commitment by the country to the development of a network of affiliated, regional and national centres.

(e) Social infrastructure

The social infrastructure of each country was considered where possible with respect to:

the size and variety of the international community; the degree of acceptance and integration of the international community in the local society; the quality of the physical environment; the availability of housing of international standards at reasonable cost; the availability and quality of educational and medical services at reasonable cost; the availability of international schools, the availability and variety of books, newspapers, magazines, radio and T.V. programmes; the range of cultural activities including music, cinema, theatre and art; the local recreational facilities including sports, hobbies, adult education etc.; the possibility for vacations and the variety of opportunities at reasonable cost; the local, national and international travel and telecommunication systems; the job opportunities for members of the families of the ICGEB employees and of researchers visiting the ICGEB for long periods.

(f) The commitment of the host country to the idea and spirit of the ICGEB

The information about the commitment of each country to the ICGEB included:

the expressions of interest by scientists, industrialists, administrators and politicians; the willingness of institutions to co-operate in the formation of the proposal to host the ICGEB; the range of institutions involved in the formation of the proposals; public and parliamentary opinion; the magnitude of the financial offers in relation to the wealth of the country; the understanding of the balance needed for the ICGEB between independence from and integration in the local institutions.

