ANNUAL REPORT

FOR THE YEAR 1973-74

Pakistan Science Foundation
Islamabad

PAKISTAN SCIENCE FOUNDATION

FIRST REPORT
1973-74

LETTER OF TRANSMITTAL

Islamabad

Dear Mr. Minister:

I have the honour to transmit herewith the first Annual Report of the Pakistan Science Foundation for the Fiscal year 1973-74 alongwith its audited accounts adopted by the Board of Trustees for submission to the National Assembly as required by the Pakistan Science Foundation Act III of 1973.

Respectfully,

Z.A. Hashmi

DR. Z.A. HASHMI
Chairman, Pakistan Science Foundation

Shahzada Saeed ur Rashid Abbasi
Minister of State for Science &
Technology, Government of Pakistan
ISLAMABAD.

The Pakistan Science Foundation

Chairman

Dr. Z.A. Hashmi, M.Sc., D.V.M., D.Ag., D.Sc., F.P.A.S.

Executive Committee

Dr. Z.A. Hashmi	Chairman
Dr. S.M. Qureshi	Member (Science)
Mr. Hafizuddin Ahmad	Member (Finance)

Board of Trustees

Three whole-time Members appointed by the President:

(1)	Dr. Z.A. Hashmi	Chairman
(2)	Dr. S.M. Qureshi	Member (Science)
(3)	Mr. Hafizuddin Ahmad	Member (Finance)

(Mr. Muneeruddin acted as the Member Finance w.e.f. 20.8.73 to 22.9.73)

Sixteen part-time Members appointed as follows:

(4) Chairman, National Science Council, Ex. officio (Dr. M.S.H. Siddiqui)

Four Scientists nominated by the National Science Council:

(5) Dr. M.A. Kazi, Chairman, University Grants Commission, Islamabad.

(6) Mr. Ashfaq Hasan, Member (Technical), CDA, Islamabad.

(7) Professor S. Marghoob Ali, Head, Department of Chemistry, University of Peshawar, Peshawar.

(8) Professor N.M. Talpur, Head, Department of Mathematics, University of Sind, Jamshoro, Hyderabad.

Eleven Eminent Scientists nominated by the President:

(9) Professor Abdus Salam, Chief Scientific Adviser to the President.

(10) Dr. Salimuzzaman Siddiqi, University of Karachi, Karachi.

(11) Dr. M.S.H. Siddiqui, Chairman, Pakistan Council of Scientific & Industrial Research, Karachi.

(12) Mr. Munir Ahmad Khan, Chairman, Pakistan Atomic Energy Commission, Islamabad.

(13) Lt. Gen. M. Ayub Khan, Chairman, Pakistan Medical Research Council, Khyber Medical College, Peshawar.

(14) Mr. Manzur Ahmad, Additional Secretary, Government of Pakistan, Islamabad.

(15) Dr. M. Aslam Khan, Chief Scientist and Scientific Adviser to the Ministry of Defence, Defence Science Organization, Rawalpindi.

(16) Mr. Sarfraz Khan Malik, Joint Secretary, Economic Affairs Division, Islamabad.

(17) Dr. M. Yaqoob Bhatti, Animal Husbandry Commissioner and Joint Secretary, Ministry of Food and Agriculture, Islamabad.

(18) Mr. Abdul Manan Khan, Director-General, Geological Survey of Pakistan, Quetta.

(19) Dr. M. Afzal Kazi, Dean Faculty of Agricultural Engineering, University of Agriculture, Lyallpur.

Functions

The functions of the Foundation as defined in the Pakistan Science Foundation Act III of 1973 are as follows:-

(i) the establishment of comprehensive scientific and technological information and dissemination centres;

(ii) the promotion of basic and fundamental research in the universities and other institutions on scientific problems relevant to the socio-economic development of the country;

(iii) the utilization of the results of scientific and technological research including pilot plant studies to prove the technical and economic feasibility of processes found to be promising on a laboratory scale;

(iv) the establishment of science centres, clubs, museums, herbaria and planetaria;

(v) the promotion of scientific societies, associations and academies engaged in spreading the cause of scientific knowledge in general or in the pursuit of a specific scientific discipline or technology in particular;

(vi) the organization of periodical science conferences, symposia and seminars;

(vii) the exchange of visits of scientists and technologists with other countries;

(viii) the grant of awards, prizes and fellowships to individuals engaged in developing processes, products and inventions of consequence to the economy of the country; and

(ix) special scientific surveys not undertaken by any other organization and collection of scientific statistics related to the scientific effort of the country.

The Foundation shall also -

(i) review the progress of scientific research sponsored by it and evaluate the results of such research;

(ii) maintain a National Register of highly qualified and talented scientists of Pakistan, including engineers and doctors, in or outside the country and to assist them,in collaboration with the concerned agencies in finding appropriate employment; and

(iii) establish liaison with similar bodies in other countries.

PREFACE

In presenting the Foundation's Report for the first year of its existence I have endeavoured to outline the programmes and fields of activity in which it was possible to achieve some progress. It would also be appropriate to mention here three constraints which the Foundation faced and which in a way determined its performance.

(1) Work-Space: The constraint of work-space has been of paramount importance. During the first five months of its existence the Foundation had to make do without any accommodation; the skeleton staff worked in a few rooms vacated in the Chairman's residence. With great difficulty a small residential house was later acquired, in which were housed the administrative, accounts, finance and the scientific personnel of the Foundation. This prevented the Foundtation from building up the requisite strength of professional staff with resultant inadequacies of knowledge necessary to operate over the entire complex field of science and technology.

(2) Scientific/Technical Staff: There are inherent difficulties in finding scientific and technical staff to undertake hitherto unattempted tasks in the field of scientific and technological planning, co-ordination, financing and promotion. Of bench scientists and engineers there is formally no lack in the country, but the Foundation will have to be manned by men who combine a social perspective and commitment with a wide ranging grasp of the sciences and technologies which are deployed for economic development, welfare of people and the preservation of human environment. In the search for this kind of talent, many will have to be called out but not all would remain and the Foundation will have to find the right type of talent by trial and efforts in the next few years. The Foundation has, therefore, been trying to recruit staff out of (1) deputationists from the

universities/ provinces who could go back to their parent organization if they did not quite adjust to the special needs and requirements, (2) the scientists' pool people who work for some time in the Foundation before they get assigned to a university, research institute or industry. Our attempts to obtain persons on deputation by writing to provincial governments and the universities have yielded no results. This situation would hopefully improve later, as the Foundation in its present stage of development is only an embryo organization with a very small cadre and hence restricted in terms of career opportunities. Of the fourteen pool scientists only two have remained with us, the others have been deputed to work with the universities and the establishments. Similarly out of ten N.D.V.P. volunteers, only two remain with us.

The scientific staff for many months comprised only the Chairman. He was later joined by the Member Science, Professor S.M. Qureshi. Towards the close of the year under report, the Chairman and Member Science assisted by a few dedicated transients - the pool scientists and N.D.V.P. volunteers, totalling about six persons in all, shouldered the entire work of the Foundation.

(3) Age: The Foundation was only one year and one day old at the close of the year under report and the age factor was bound to be reflected in the size of its achievements. It must also be borne in mind that the Foundation in accordance with its charter would not establish its own research establishment and thus in respect of R & D it is not a performing agency. Beside providing some critical services, its major task is to foster creative activity in the research establishments/universities and edeavour to improve the quality of research work as also to try and relate it to the socio-economic needs of the country. It is, therefore, dependent upon the universities and the research establishments for the quality of research and it would obviously need sustained effort over a considerable time

to achieve these objectives by improving the capability of scientific establishments and stimulating the scientific workers to achieve greater excellence.

Inspite of the constraints mentioned above, there is little doubt that the Pakistan Science Foundation within the brief span of a year has emerged as a key institution for science promotion in the nation. The credit for this goes not only to the small band of dedicated workers in the employ of the Foundation but also the large number of distinguished scientists in the universities, research establishments and organizations who gave generously of their time by serving on the various committees, panels and boards of the Foundation and acted as reviewers of research proposals. Their cooperation is gratefully acknowledged as also the valuable guidance and support received from the Ministry of Science and other governmental and non-governmental organizations and agencies concerned with the promotion of science in the nation.

Z.A. Hashmi

DR. Z.A. HASHMI
CHAIRMAN

C O N T E N T S

INTRODUCTION

The creation of the Pakistan Science Foundation, as the lead agency in the nation for the financing of science and technology, is a landmark in the forward march of the nation. It is a recognition of the crucial role of science and technology for change and progress, and is amongst the more important measures instituted by the Government to create a thriving scientific and technological tradition in the country.

2. The Foundation is also the fulfilment of a long-standing demand of the scientific community. The scientists have worked under painfully difficult conditions - the lack of funds and facilities for scientific work, the under-utilization and the mis-utilization of highly trained specialists, the inadequacy of the information and documentation services, the isolation of the scientific workers from the current of modern scientific thought and the lack of appreciation by society of the vital role of science in development, to mention only a few. A science organization with the requisite authority and financial resources, such as, the Pakistan Science Foundation, was badly needed to help the scientists overcome some of these handicaps.

3. The creation of the Pakistan Science Foundation as a fully autonomous body, with the statutory provision that 18 out of the 19 members of its 'Board of Trustees' shall be 'eminent scientists', is a clear evidence of the trust that the Government have reposed in the men of science and in their ability to utilize effectively the resources placed at their disposal for ensuring the health of science, the advancement of knowledge, the welfare of the people and the security and progress of Pakistan.

4. The Pakistan Science Foundation was established on June 30, 1973, under the Pakistan Science Foundation Act No.III of 1973 (Annexure I), "to promote and finance

scientific activity having a bearing on the socio-economic need of the country". Under the Act the Foundation has been entrusted with the following functions :-

(a) (i) the establishment of comprehensive scientific and technological information and dissemination centres;

(ii) the promotion of basic and fundamental research in the universities and other institutions, on scientific problems of national significance relevant to the socio-economic development of the country;

(iii) the utilization of the results of scientific and technological research, including pilot plant studies to prove the technical and economic feasibility of processes found to be promising on a laboratory scale;

(iv) the establishment of science centres, clubs, museums, herbaria and planetaria;

(v) the development of learned bodies, scientific societies, associations and academies, engaged in spreading the cause of scientific knowledge in general or in the pursuit of a specific scientific discipline or technology in particular.

(vi) the organization of periodical science conferences, symposia and seminars;

(vii) the echange of visits of scientists and technologists with other countries;

(viii) the grant of awards, prizes and fellowships to individuals engaged in developing processes, products and inventions of consequence to the economy of the country; and

(ix) special scientific surveys not undertaken by any other organization and collection of scientific statistics related to the scientific effort of the country.

(b) The Foundation shall also :-

(i) review the progress of scientific research sponsored by the Foundation and evaluate the results of such research;

(ii) maintain a National Register of citizens of Pakistan who are highly qualified and talented scientists, including engineers and doctors, in or outisde Pakistan, and to assist them, in collaboration with the agencies concerned, in finding within Pakistan employment most suited to their genius; and

(iii) cultivate liaison with similar bodies in other countries.

5. As will be seen from the statement of the functions entrusted to the Foundation its responsibilities are wide-ranging. These include five broad areas of activity: (i) research support and building institutional capability for scientific work; (ii) the establishment of a national scientific information system; (iii) promotion of the public understanding of science and assistance in creating organizations and institutions for moving scinece in society; (iv) utilization of the results of research and the transfer, generation and application of appropriate technology; and (v) utilization of the scientific man-power and arresting the flight of talent from the country.

6. The performance of the above-quoted functions has to be reviewed in the context of the personal and social goals of our people. Apart from the basic idiological and political goals, the major socio-economic goals may be summed up as follows: (i) the creation of a modern nation-state and the modernization of society - the support and promotion of science itself thus becomes a major goal; (ii) economic growth, greater production, provision of basic necessities and an increasingly higher standard of living for the people; (iii) the creation of a social order free from tensions and conflicts - in

traditional economics this would mean a high level of employment while keeping domestic inflation and the balance of payment difficulties within bound; (iv) the prevention of the degradation and destruction of human environment and the depletion of natural resources and (v) the right of every citizen to a full development of his personality and to share equally and freely in scientific advancement and its benefits. The Science Foundation's work is basically linked with the achievement of these goals.

7. These goals are translated into physical terms in the National Development Plans. The processes of planned development during the Fourth Plan period were interrupted, after the traumatic experience of the dismemberment of the nation. The Fifth Plan is still on the anvil but once the Plan programmes and targets are firmed up, the Pakistan Science Foundation's programmes would be even more specifically oriented to provide the necessary scientific support. It must, however, be clearly understood that scientific activity is often long term in nature and should hence be related to trends rather than specific projects.

8. The subsequent portion of this report attempts to high-light the activities and programmes developed by the Foundation for carrying out its statutory functions and the progress achieved during the first year (1973-74) of its existence.

CHAPTER - I

ACTIVITIES AND PROGRAMMES

The activities and programmes undertaken by the Foundation for the performance of its statutory functions during the year under report are out-lined below :

I. The establishment of comprehensive scientific and technological information and dissemination centres:

Scientific and technical information is an integral part of the research and development process and must be made easily accessible to the scientists, technologists, planners and administrators of development programmes and entrepreneurs to enable them to derive the maximum benefit from the vast treasure houses of world science and technology. The world is spending nearly $ 100 billions annually on research and development and the results of this huge investment are published and are available to any people who can create the institutions to reach out and obtain information pertinent to their requirements through the international scientific and technological information net-works. The development in the country of S and T Information System with the capability of deploying modern documentation and retrieval technology including computerization linked with the world scientific information net-work is thus a major aim of the Pakistan Science Foundation.

Government have approved a project for the establishment of a national information net-work, the 'Pakistan Scientific and Technological Information Centre (PASTIC)', estimated to cost Rs.1,01,70,056 for development and a recurring expenditure of Rs.1,57,90,051 during the development period. It is a five years project and envisages a national centre at Islamabad with four sub-centres at

Karachi, Lahore, Peshawar and Quetta. The National Centre of PASTIC will have the following facilities :-

(i) The National Science Reference Library;

(ii) The Documentation Services;

(iii) The Scientific and Technological Information Transfer Services;

(iv) Facilities for Scientific Publications; and

(v) Facilities for Compilation of Scientific Statistics.

Work is under way in the Foundation in respect of the following major tasks for the implementation of the scheme :-

1. Arrange for foreign training facilities - commitments for nearly 20 professional staff members of PASTIC.

2. Arrange to obtain technical assistance from aid-giving agencies to provide expert advice on the establishment of the national and the provincial centres.

3. Arrange links with the United Nations Information Service in Science & Technology (UNISIST) - the projected UNESCO global scientific and technological information system.

4. Arrange links with other important science information and documentation centres, such as, the Medical Literature and Retrieval Service (MEDLARS), the Agricultural Information Service (AGRIS), the National Technical Information Service (NTIS), the Chemical Abstracts Service (CAS) System etc.

5. Establish contacts with universities/institutions in the advanced countries which have outstanding programmes of research and training in this field, such as, the Cornell University, the Massechusetts Institute of Technology and with the National Science Foundation of the U.S.A., which support a large number of research & development programmes in the field.

6. Obtain technical assistance and commodity aid from international sources.

7. Assist universities and other major research centres to develop mechanisms which would enable them to utilize the facilities to be developed at PASTIC, as also facilities available from international centres.

8. Select the sites for the national and provincial centres of PASTIC.

9. Develop comprehensive inventory of library holdings in the nation in respect of science and technologies.

The Government of Pakistan, with assistance from the United States have constituted a Joint Pakistan-American Science Review Team to study and, interalia, make recommendations on the structure and functions of PASTIC and to suggest programme priorities. The Foundation has also constituted an advisory panel which advises the Foundation on the above mentioned and other related matters.

PASTIC has been established around the nucleus of the Pakistan Scientific and Technical Documentation Centre (PANSDOC) which was transferred to the Foundation with effect from 1st January, 1974. Since the approved project envisaged the National Centre at Islamabad and four provincial sub-centres, the PANSDOC facilities were declared as the Karachi Sub-Centre of PASTIC and a Project Director was appointed at Islamabad to arrange for the establishment of the National Centre.

The work accomplished/underway in respect of the implementation of the Project is as follows :-

1. Land has been acquired in Islamabad for PASTIC building.
2. Pending the construction of permanent buildings, the PASTIC's National Centre has started functioning

on a modest scale in Islamabad in a rented building. A Project Director with nucleus staff has been appointed.

3. Two hundred foreign Information Centres have been contacted for information transfer services and the evaluation of their replies is being made.

4. Contacts have been made with agencies which have materials particularly relevant to Pakistan, such as, the Arid Zone Information Centre in Arizona.

5. Lists of scientific and technical books and periodicals have been prepared for procurement.

6. Adhoc committees are workding for preparing further lists of books, periodicals and other information materials, such as, computer tapes and discs.

7. Negotiations have been completed with the U.S. National Technical Information Services (NTIS) to supply us the U.S. research reports and documents at concessional rates.

8. Negotiations are in progress with commercial organizations specialized in information transfer.

9. The British Council in Islamabad was contacted for the supply of back issues of scientific journals available at the British Council Library.

10. Expert assistance programme for the development of PASTIC has been finalized and request has been made to the Scientific & Technological Research Division to obtain assistance from the International agencies, such as, the Colombo Plan Technical Assistance programme, United Nations Development Programme (UNDP), and Netherlands Assistance Programme.

11. Fellowship and training programme has been chalked out and request has been made to the government to obtain assistance from international agencies.

12. The Reprography equipment for the National Centre was selected, quotations were called for and purchase orders will be placed as soon as Foreign Exchange release orders are received.

13. Quotations for the library furniture have been called for and are being processed.

14. The following publications are under preparation :-

i) Pakistan Science Abstracts.

ii) Directory of Pakistan Scientific and Technical Periodicals.

iii) Union Catalogue of Scientific and Technical Periodical holdings in Pakistan libraries.

iv) Directory of Scientific and Technical Institutions of Pakistan.

v) Directory of Scientific and Technical personnel of Pakistan.

vi) Directory of Current Scientific Research Projects in Pakistan.

15. A proforma for surveying the needs of users of Scientific and Technical Information has been circulated to individuals and institutions engaged in scientific and technical research to evaluate the users' needs for organizing services.

16. PASTIC has been made the focal point for UNESCO's UNISIST Programme and for the United Nations Environment Programme.

17. Arrangements are underway for mutual co-operation of U.S.A. National Technical Information Services (NTIS) with PASTIC.

18. Arrangements are being made to hold a National Seminar-cum-Workshop on Scientific and Technical Information in 1974-75.

19. Patents : Arrangements have been completed with the Pakistan Patent Office for transfer to the Foundation the specifications of about 1½ million patents from the advanced nations. The information is being classified. This information is of great importance to the researchers, innovators and entrepreneurs, but is at present not readily available.

II. RESEARCH SUPPORT

a) The promotion of basic and fundamental research in universities and other institutions on scientific problems relevant to the socio-economic development of the country :

Progress in science can not be sustained, if basic and fundamental research, its main-spring, is permitted to go dry. It constitutes the foundation on which the super-structure of science is built in a society and research capability and competence acquired. The universities are traditionally the recognized centres par excellence for such research. The Pakistan Science Foundation has, therefore, accorded a high priority to the support of basic and fundamental research, in particular at the universities.

At the same time, it is recognized that science, engineering and technology are basic tools for the uplift of societies. Pakistan faces formidable challenges in all

spheres of national life and the scientists and technologists carry the onerous responsibility, as agents of change and development, to be sensitive to national needs and orient some considerable proportion of their work to the solution of socio-economic problems. In the present predicament of the nation, it is, therefore, incumbent on the scientific community to pursue the traditional objectives of science in the broader frame-work of responsiveness to social needs. Fourteen 'Expert Panels' were constituted to advise the Foundation on the problems faced by the nation in the major areas where scientific research and technological innovations can assist in providing solutions. 'Relevance to socio-economic development' has not, however, been interpreted in a restrictive sense and the accent of the PSF remains on quality research. There would be no curb on the creative impulses of the scientific workers.

The Pakistan Science Foundation research support has taken four main forms :-

i. Organization of Integrated Research Programmes.
ii. 'Grants' for research projects submitted by individual or groups of scientists in the universities and research institutions.
iii. 'Institutional Support' - provision of equipment, literature, staff training facilities, etc., to build institutional capability for conducting research.
iv. Support for participation in regional and international research programmes.

(b) <u>Organization of Integrated Research Programmes</u>:

The Foundation's work (a) encompasses all the scientific disciplines and (b) is aimed at increasing economic productivity and the well-being of people. It is thus so wide in scope that for practical purposes, in view of its limited

resources, it would be necessary to concentrate on a limited number of high-priority projects and programmes.

Most developing countries have discovered the futility of scattering financial grants, by organizations such as the Science Foundation, for a multitude of isolated research projects on marginal and less important problems. Enough resources on a sustained nation-wide basis, both in manpower and in scientific hard-ware, should be brought to bear on carefully selected research schemes and prgrammes for getting any worthwhile results. This should involve coordination in planning, management, funding and logistics. Programmesof this type, effectively organized under the leadership of competent national coordinators, also readily take advantage of and secure assistance from the international scientific programmes, international and regional research centres and other components in the global research net-work.

A major task before the Foundation, therefore, has been to identify high-priority areas in which co-ordinated programmes could be launched. The various committees and the advisory and expert panels of the Foundation keep under constant review such lists, as also the advice received from various agencies in government and industry, in particular, from the National Science Council and the Planning Commission.

It is obvious that the integrated programmes would take considerable preparation to launch, as they involve inter-institutional and inter-disciplinary collaboration, as well as considerable cost. In view of the limited financial resources at present available with the Foundation, it is also not possible to undertake the financial burden involved except for one or two model programmes. The role of the Foundation during the year under report has thus been mainly that of a catalyst - developing schemes, stimulating inter-agency collaboration and support from Government and aid-giving

agencies. Plans are advanced to undertake coordinated programmes in the following fields:-

(1) Non-conventional sources of energy.
(2) Medicinal plants.
(3) Arid Environment studies.
(4) Coarse-grain Production.

(c) Grants for research projects submitted by individual research workers or groups of scientific workers.

The Foundation soon after its inception invited research proposals from various agencies - the universities, research councils and other research establishments. 194 proposals were received in the year 1973-74; the requests for funds totalling about Rupees seven crores. The proposals were reviewed for scientific merit and relevance to national needs, by experts in the field, according to the criteria laid down by the Foundation. The criteria for research grants are:-

(a) the competence of the designated scientific personnel to carry out the research;
(b) institutional facilities and support from scientific colleagues;
(c) the scientific merit of the proposed research; and
(d) the social and economic benefits likely to accrue. The proposal is reviewed by one or more experts and is then placed before technical and other committees of the Foundation. -- 29 research proposals costing over Rs.48 lacs were selected for financing in the first phase of the Foundation's research support programme. Brief write-ups of the approved research proposals are given below:-

(1) BIOLOGICAL SCIENCES:

PU-Bio(22)

(i) Ecopathological studies in plantations and natural forests of Punjab:

Our timber needs are growing at a fast rate. Unfortunately our forest resources are extremely limited. These must be conserved on a progressively sustained basis. There is complete lack of accurate information on quantitative assessment of losses due to disease and other causes. The project aims at studying: (i) the damage caused by various disease organisms, (ii) the nature of forest species, the growth conditions, environmental and pathological factors which determine regeneration and composition of the stand.

The proposed studies will help in working out: (i) rot indicators, (ii) the extent of loss and rate of spread and (iii) adopting the necessary remedial measures as suited to the occasion and the site.

PU-Bio(38)

(ii) Collection and study of vertebrate fauna of Pakistan:

A complete collection of fresh water fishes of Pakistan is not available in any museum.

The work under this scheme envisages collection, preservation, study and classification of all the fresh water fishes of Pakistan, and to establish a national fresh water fishes reference museum, both for the students and research workers.

PU-Bio(40)

(iii) Ecology of some avian and mammalian pests:

Noxious birds and rodents cause considerable damage to crops, particularly fruit trees, vegetables and food grains. It has been estimated that 130,000 tons of wheat alone is eaten by parrots, house sparrows and crows in the province of Punjab.

Killing of noxious birds by shooting, trapping and poison-baits attempted in the past have not been effective and no scientific studies have been made to prevent such losses.

This project aims at reducing the pest birds and rodent populations by evolving a combination of ecological and chemical devices. This would involve studies of their behaviour, life-cycles, ecology and reactions to various chemical and physical stimuli and thus evolve integrated control programmes which are effective and feasible.

PU-Bio(50)

(iv) A survey and control of the diseases of silk-worms:

The rearing of silk-worms is an important cottage indu-stry with tremendous development potential and nuclii of the industry exist in the Punjab, NWFP, Baluchistan and Azad Kashmir. One of the main limiting factors in the development of this industry is the high incidence of bacterial, protozoan and viral diseases causing great morbidity and mortality in the worms. These diseases have not been studied systematically and as such effective measures are not possible for their control and prevention.

The scheme envisages detailed studies in the etiology of various silk-worm diseases, their seasonal incidence and the extent of damage caused in the Districts of Hazara, Parachinar, Swat, Chitral, Azad Kashmir, Changa Manga and Quetta, where work on sericulture is in progress.

While the proposed studies would constitute a survey of the incidence and distribution of the pathogens they would also help in adopting suitable remedial measures for the prevention and control of important diseases of silk worms This will assist in the reduction of huge losses of the silk-worms and

in rehabilitating and promoting the silk-worm industry.

PU-Bio(31)

(v) Studies on the taxonomy, seasonal fluctuations and ecology of the parasites of the fresh water fishes of the Munchar Lake:

Preliminary investigations indicate that the parasitic infestation (both helminthic and protozoan) considerably limits the production of fish in fresh waters thus reducing the supply of high protein foods, an essential food factor seriously short in our dietery.

Studies made in the past have been mainly confined to the taxonomy of the fresh water fishes, Little or no work has been done on the incidence, seasonal variations and effects of various environmental factors on host-parasite-relationship.

These studies would provide the scientific base for the control of the out-breaks of parasitic diseases amongst fishes, and for increasing fish production of the lakes.

SU-Bio(52)

(vi) Palynological studies of the plants growing in Sind:

Palynological studies of the plants growing in Sind were initiated at the University of Sind in 1964 involving the study of Pollen grains of about 200 plants growing in the vicinit-y of the university campus. A monograph on the family leguminosae was also published in 1970. The present study envisages the collection and preservation of pollen grains from different localities of Sind, their detailed morphological studies and classification, and the establishment of a pollen herbarium at the University of Sind.

The proposed studies, in addition to their purely scientific merit helping the botanists in

revising the classification of the flora of different localities, would also be helpful in combating hay fever and other allergic conditions caused by various pollen grains.

SU-Bio(52)

(vii) Marine molluscs of Pakistan:

Molluscs are an important source of foods of marine origin which possess a high biological value and potential for export. They have been ruthlessly exploited with the result that they are now a rare commodity. They are capable of adapting themselves to a wide range of environmental conditions and the culturing of Oyesters and Mussels has a considerable potential.

The work proposed involves collection of molluscs from the shores and coastal waters, their identification and preservation. Studies would also be made of egg mosses which would provide a clue to the breeding of various species. The information collected would give an exact idea of the Mollusc fauna of our coastal waters, use of edible molluscs as food and in fish meal production. It will also add to the world knowledge of the Mollusc fauna of the Arabian Sea.

SU-Bio(53)

(viii) Anatomical studies of mantis shrimps:

Mantis shrimps are found in sufficient quantities in off-shore waters. These shrimps are edible but there is an unfounded local prejudice against their consumption as food. And, therefore, these are usually thrown away with fish-trash.

These shrimps, however, can be fished commercially for export. But very little information is available on the morphology, anatomy and

physiology of this group of marine species, which are quite different from decopoda crustacia.

The proposed study is expected to help in completing our inventory of crustacia species and facilitate export of these shrimps to other countries.

(2) CHEMICAL SCIENCES:

CU-CH(14)

(i) Studies in thermodynamics of interactions of solid catalysts with gases, liquids and vapours:

Catalysts play an important role in almost all manufacturing chemical processes. Many experimental techniques have been utilized to understand the interactions between the catalysts and the reacting materials.

The most important catalyst used in the hydrogenation of fats and oils in the vegetable ghee industry is the Metallic Nickle catalyst which is entirely imported involving a large amount of foreign exchange. The catalyst after use five or six times becomes ineffective and is discarded. So far no effort has been made to recover the metallic nickle catalyst or reactivate it.

The study is aimed at the evolution of processes for the re-activation of the catalyst and if this was not possible, to aim at the recovery of the precious metal from the useless base.

Another important problem is the manufacture of alkalies by the use of brine solution made from Khewra salt which contains a lot of impurities. These must be removed before the brine solution is electrolysed. At present this is being done with the use of Barium chloride which is expensive. It is proposed to replace or supplement barium chloride with calcium chloride which occurs in large quantities in Pakistan.

Preliminary studies will also be initiated on catalysts employed in the hydrocarbon and petrochemical industries.

FU-CH(19)

(ii) Chemical analysis of minerals for their commercial exploitation:

Deposits of important ores of iron, chromium, antimony, gyspsum, limestone, soap-stone, rock-salt, marble, china clay, bentonite and baryte etc. occur in Pakistan, particularly in the Northern parts of the country. Some of the industrial rocks and minerals are being exploited to a limited extent chiefly by primitive methods while others lie unexploited because of difficulties of accessibility and transport. The detailed chemical composition of these minerals is not accurately known and little or no worthwhile research has been done in this regard. It is proposed to collect samples of various minerals, particularly those occuring in workable deposits, carry out complete qualitative and quantitative analysis using chemical and instrumental techniques.

FU-CH(22)

(iii) Studies on the interaction of organic phosphates with metal ions and relations of the molecular structure to biological activity:

Metal ions play an important role in many biological reactions. Investigations made in the recent past have demonstrated the versatility of organo phosphorus compounds as ligands and are known to have toxic properties. These compounds have considerable potential use in the manufacture of new insecticides/pesticides and possibly nerve poisons.

The project aims at the extension of the investigations on organo Phosphorus compounds using different models for di & tri phosphates and their comparison with the studies on high energy molecules like ATP & ADP etc.

The result of these investigations will help in explaining the coordination ability of phosphoryl oxygen atom when attached to functional group of

different nature. This will be useful in understanding the role of phosphoryl oxygen atom in high energy molecules.

FU-CH(38)

(iv) Influence of ligand structure on the coordination properties and reactivity of transition metals:

Metal chelation is involved in many important biological processes where coordination can occur between a variety of metal ions and a wide range of ligands. In many cases, the chelating agent is complex poly-functional Ligand which can virtually encase the metal in an organic sphere. Also the metal ion is often thought to act by bringing two or more reactive molecules into a suitable geometrical orientation for reaction. The difficulties in identifying the coordination environment of a metal ion in a biological system are great and such identification usually involves comparison with known synthetic coordination compounds. A great deal of data concerning metal complexes of realtively simple ligands has been accummulated and assessed but complexes of multi-dentate and mixed ligands have received much less attention.

It is proposed to synthesise some new chelating agents and to study the influence of the design of the ligand on the coordination properties of various transition metals. The proposed studies are likely to lead to the discovery of new useful compounds of practical importance.

SU-CH(30)

(v) Chemical analysis and utilization of certain sub-standard or un-economic minerals and ores of Pakistan:

At present full advantage is not being taken of certain mineral resources of Pakistan because they are of poor quality and as such are considered not

useful in their present form. For example, the mineral "celestite" found near Thana Bula Khan (Sind) contains over 98% strontium sulphate. This mineral at present is being used only as a loading material in paper industry and is being sold at a very low price. If it is converted into nitrate, chloride or acetate of strontium it will have a great export potential at high remunerative prices. There are a number of other minerals such as, Barite, Dolomite, Gypsom, Chromite, Bauxite etc., which fall in the same category and could be converted into more useful and economically exportable products.

It is proposed to carry out the experimental work in four phases viz; (i) obtaining of representative samples, (ii) their analysis for elements of interest, (iii) preparation of compounds of commercial importance and (iv) processing of promising materials on a pilot scale.

SU-CH(44)

(vi) Chemical composition of hair root as a criterion of protein malnutrition:

Adequate objective criteria for differentiating between the various types and severity of protein and protein-calorie malnutrition are not available.

Changes in hair colour, texture and appreance have long been noted as one of the effects of protein malnutrition. Hair has been studied morphologically and shown to exhibit specific changes in experimental animals kept on low protein diets as well as in children suffering from protein defficiency diseases like marasmus and kwashiorkor. These changes can be quantified chemically by measuring protein and DNA of hair roots of persons consuming protein defficient diets. These could serve as criteria of protein malnutrition.

It is proposed to examine the DNA and protein of hair roots of children suffering from both types of

malnutrition. The proposed studies would help to diagnose and detect malnutrition among the children at early stages so that treatment could be started in time to prevent some of the defects - particularly impaired mental development which results from prolonged malnutrition.

SU-CH(46)

(vii) Study on growth kinetics and macromolecules of various cells in culture:

Tissue culture technique has been widely used in recent years to study problems like ageing, differentiation, morphogenesis, hormone-action, drug action, cell transformation, immunology etc. This has enabled very accurate studies without the interference of other factors that operate "in vivo".

This project aims at culturing and studying the lineage of cell types like leukemic cells, lymphocytes, fibro-blasts, mammalion gametes, developing ova etc., and many differentiated and malignant cell types.

The proposed studies would assist in the investigations of basic problems concerned with ageing, malignancy, cancer, differentiation, development, anti-fertility, heart-disease, blood pressure and many endocrine and diseases of malnutrition.

(3) PHYSICAL SCIENCES:

SU-Phy(3)

(i) Investigation of electronic spectra of metallic hydrides:

In recent years, molecular spectra have become of increasing importance in the investigation of astrophysical problems. The celestial spectra in which bands are observed are those of the aurora, lower temprature stars, the sun and sun-spots. The identification of some of these bands was the direct result of the discovery of new band system in laboratory sources.

It is proposed to make the study of some metallic hydrides, particularly those of silver, zinc, magnesium and aluminium. Many band systems expected in the ultraviolet regions of these hydrides have not been obtained. The vibrational and rotational analysis will yield information regarding the molecular constants, dissociation energy and thermodynamical constants.

PU-Phy(11)

(ii) High energy phenomenology:

Elementary particles are the basic constituents of matter and a study of their properties is of fundamental importance to our understanding of nature. No comprehensive theory of elementary particles exists at present. Even piecemeal explanations of the experimental data are not considered very satisfactory.

It is proposed to use a modified form of the Regge theory to explain the freshly available experimental data concerning particle - particle and particle-nucleus interactions. These investigations will keep the University Faculty abreast of the current developments in the subject.

PU-Phy(12)

(iii) Properties of dielectric at micro-wave frequencies:

The importance of electronic equipment in the telecommunication, industry, defence and house-hold use can hardly be over-emphasised. One of the important components of all electronic equipment is the capacitor, which is sensitive to temperature because of the change of behaviour of the dielectric used in it at different temperatures. This necessitates an accurate knowledge of the behaviour of the various dielectric materials to enable proper choice of the dielectric for a particular electronic equipment.

It is proposed to make detailed studies about the behaviour of dielectrics at different temperatures which will help in the choice of the right type of dielectric for a particular electronic equipment.

PC-Phy(9)

(iv) To investigate momentum distribution of nucleons inside the nuclei of light elements of emulsion using nuclear emulsion technique.

The nuclear emulsion technique which has been largely replaced by the Bubble Chamber, is still very useful for certain types of problems. The studies are being conducted in the U.S.A. with the nuclear emulsions, in the field of cosmic rays where stacks are flown at great height and plates exposed to high energy particles.

The proposed study involves the measurment and analysis of the recoil of nuclei of light elements of the emulsion when a stopping antiproton annihilates on a proton of the nucleus. And it is proposed to determine momentum distribution of Nucleons inside the nuclei of light elements by the emulsion technique. A stack of nuclear emulsions has been imported from Cern, Geneva.

Besides the piece of fundamental research, this study will familiarize our researchers with this useful technique.

(4) MATHEMATICS & COMPUTING ACTIVITIES:

CU-Math(7)

(i) Study of magneto-hydrodynamics and plasma physics:

Plasma state is the most common state of matter in the nature. The sun and the stars are nothing but gignatic condensations of high temperatue plasma. The outer layers of the earth's atmosphere are also known to consist of plasma.

The current trend in plasma research has been to concentrate on such topics as are likely to lead

to useful practical applications e.g; MHD generator, controlled thermo nuclear reactions and plasma engines etc. At present MHD generation appears to be the most promising of the direct conversion techniques in the range of power exceeding 100 megawatt. It also holds promise of high conversion efficiency.

The proposed programme of work is aimed at initiating and developing theoretical studies of magneto hydrodynamics and plasma physics to explore the possibility of utilizing the enormous quantities of energy stored in the nuclei on an industrial scale.

The proposed programme will initiate studies on a new and an important branch of mathematical physics in Pakistan which appears rich in its potentialities.

(5) AGRICULTURAL SCIENCES:

PU-Agr(16)

(i) Synthesis of improved wheat genotypes based on the development of criteria involving physiological analysis.

Work on the improvement of wheat has been in progress in the Indo-Pakistan sub-continent for the past many years. The main emphasis has been on yield per acre and baking quality.

The proposed study aims at the identification of morphological and physiological characteristics responsible for most efficient utilization of assimilates, for the production of more wheat of better quality per unit area. The scheme porposes to utilize the vast store of germplasm available at NIAB as well as PATI, Lyallpur to produce synthetic strains best suited for different ecological zones of Pakistan.

The work proposed is of basic importance and, if carried out as proposed, would enhance the accuracy of selection in producing most suitable varieties for different ecological zones of not only wheat, but other crops as well.

(ii) Morpho-physical effects of gamma irradiation on growth and yield of agricultural crops: PU-Bio(5)

Basic information is lacking about plant responses to ionising radiations for predicting the levels of radio-activity at which the production potential of economic plants is impaired.

It is proposed under this study to assess morphological, anatomical and physiological responses of crops like maize, tobacco, peas, sunflower and gram to gamma radiation and effect of growth stimulators and micro-nutrients in overcoming the radiation damage. The studies proposed would elucidate the mechanism of radiation injury and restoration of normal growth and development after the initial radiation damage.

(6) MEDICAL SCIENCES:

Studies for the development of a vaccine for trachoma: CI-MED(11)

The incidence of Trachoma in Middle Eastern countries and Pakistan is very high. The disease rarely heals spontaneously, but invariably affects the cornea and leads to visual disability from corneal cicaterization. It is one of the most important conditions which leads to blindness especially in our rural areas which comprise more than 80% of the total population. The disease has a direct impact on the well being of our people. Response to treatment depends upon many factors such as age at onset, duration of the disease, clinical

type of the disease, associated secondary infections, general environmental conditions and virulence of trachoma virus. At present the approach of treatment is the use of antibiotics.

The object of this study is: (i) to determine the incidence of the disease and its clinical manifestation, (ii) isolation of virus strains and finding out the peculiarities of various local strains with the ultimate objective of developing a monovalent or a polyvalent vaccine.

There is circumstantial evidence that local differences in both prevalence and severity may depend on environmental factors, host susceptibility or pathogenicity of the agent and because of these regional differences results of independent studies carried out in different parts of the world cannot be pooled to give a valid picture of the disease.

To start with, it is proposed to collect material from out-patient departments of the local hospitals and to isolate the virus strains from active cases. The virus would be cultivated in developing chick embryos and later on in tissue culture. The activity will then be expanded to include children of nearby villages and schools in Rawalpindi and Islamabad. Studies will be carried out to test the sensitivity of virus strains to various anti-trachoma agents. A few suitable strains would be selected to develop a vaccine. Initial trials of the vaccine would be carried out in primates and then, if found safe, would be tried in humans.

(7) EARTH SCIENCES:

BU-Geo(10):
Exploration of fluorite deposits in Kalat Division

The discovery of flourite deposits in Kalat Division is of qualitative and quantitative

significance. The mineral is easily recoverable, profitably marketable, can find indigenous use and has a high export value. A general investigation of the prospective area and a detailed study of the potential of the deposits is of prime importance for the development of the deposits and exploitation of the mineral wealth of the area.

The field investigations would be aimed at understanding structural, and concentration controls and the laboratory investigations would deal with mineralogy and chemistry of the deposits.

A correct appraisal of the discovery will be helpful to the government departments in their planning, to industrial research organizations in their research and to private sector interested or engaged in the mining or related chemical industry. The regional mapping may reveal deposits so far concealed and will provide leads for further discoveries. The results will also add to the knowledge of the geology of the country and will contribute to the understanding of the genesis of the mineral deposits and related phenomena.

(8) OCEANOGRAPHY:

SU-Ocean (2):

Studies on settlement and control of marine organisms in cooling system of coastal installations:

The KANUPP at Karachi has reported wide scale settlement of marine organisms in the cooling system as well as in the condensor screen, blocking the flow of sea water and consequently affecting the efficient working of the system. If settlement of marine organisms is allowed to continue it may seriously affect the entire cooling system and may cause serious damage to the Reactor. The proposal is aimed at

studying scientifically the nature of fouling organisms, their seasonal abundance in the neighbouring waters and conducting experiments to ascertain their settlement in the turbines of the cooling system.

These investigations will help in establishing necessary measures to provide control for large scale settlement of organisms. The results may also be used for suggesting control for other set-ups including Desalination Plants and future installations in the coastal areas.

(9) ENGINEERING SCIENCES:

PU-Eng(9):

The photogrammetric measurement of constructional displacements of Tarbela Dam:

The behaviour in terms of the displacements at various points of large structures during their construction and after their completion when in use needs constant watch. The analysis of the displacement at various points of the structure would forewarn any danger to the stability of the structure. Displacements for large dams in countries like Canada, USA and England are measured by the help of photogrammetry. A photogrammetric scheme with reasonable economy is to be designed to determine three dimensional displacements of points on the structure of Tarbela Dam during and after its construction.

This work will help in building up an indigenous capability of measurement of the displacements and watching the stability of the large and life line structures like Tarbela Dam.

(d) Institutional Support:

Quick, efficient and modern analytical techniques demand the use of a variety of sophisticated equipment and a scientific worker is greatly dependent for the precision and speed of his research on the equipment and tools available to him at a research institution. The availability of appropriate sophisticated equipment enables the scientific workers to be more productive as well as makes possible investigations which would not be possible without the specialised equipment and tools. In view of the paucity of our resources it is obvious that we cannot equip every research establishment with all types of costly equipment. Selective up-grading of such centres in the nation which already have a nucleus of sophisticated analytical facilities through additional funding to create 'National Centres' in the more important fields where scientific workers from other universities and research institutions could also come for work is one aim of PSF support.

The Pakistan Science Foundation also assists in the provision of equipment and chemicals, etc., to research workers who for some reason are unable to get these from their own institutions and it is established that such support would lead to quick progress of research of national significance.

The emphasis is on (1) fostering and equipping multi-disciplinary research units directed towards the solution of areas of high research priority; (2) provision of equipment, literature, staff training facilities and improvement of data processing, documentation and information systems and similar facilities which would build up research capability of selected research centres and units. A sum of Rs. 80,000/- was provided as a special financial support to the Post Graduate Institute of Chemistry, University of Karachi as a

partial contribution for the purchase of a spectrometer to build up the capability of the Institute of Chemistry for advanced research. PSF has also sanctioned a project for the creation of facility for Tissue Culture work at the Biological Research Centre, University of Karachi. This basic facility would enable the scientists to undertake research in a number of fields hitherto neglected due to lack of the facility.

(e) Participation in regional and international programmes:

Research programmes, specially identified as major research efforts, are undertaken by the international community, at regional as well as global levels, to accomplish designated objectives related to one or more fields of science or to achieve a defined economic or social goal. It is to the advantage of Pakistan to participate in these programmes especially those that have a bearing on the achievement of its own national goals. The Foundation has been engaged in identifying such programmes and is endeavouring to arrange for the participation of the Pakistani scientists.

There are now a number of international and regional research centres established by the United Nation's family of specialised agencies or others including non-governmental foundations. Linkage with such centresmakes available valuable external research resources. Linkages are also being established with emerging national research organizations in other countries for exchange of information, experience and materials.

An advisory Panel has been constituted to keep under review the above mentioned aspects of the Foundation's work and to give advice on the best manner in which the Foundation can arrange for participation in regional and international programmes. The Pakistan Science Foundation is participating in the UNESCO sponsored "Man and the Biosphere" programme. The PSF during 1973-74 also provided funds for three Pakistani scientists to visit foreign countries and attend important conferences and seminars.

III. UTILIZATION OF RESEARCH RESULTS:

The utilization of the results of scientific and technological research including pilot plant studies to provide the technical and economic feasibility of processes found to be promising on laboratory scale:

Scientific and technological research provides: (1) new knowledge and insight into natural phenomenon, (2) new and superior technology and (3) new and more useful materials or new uses of materials. The utilization of such knowledge, technology and materials is essential to the success of the 'New Thrust' programmes launched by the Government for the security of the nation and the economic prosperity and social welfare of the people. Economically the most productive element is the element of technology transfer - from world resources to Pakistan, from our own laboratories to industry and farming etc., and from the more advanced parts of the country to the less advanced parts. A great deal of transfer of technology is possible from the more advanced nations - some directly and some with minor adaptations. International bodies and some countries like Japan are establishing institutions to facilitate such transfer and Pakistan would take advantage of these.

The PSF is also working closely with the Department of Patents and has acquired from the Pakistan Patents office their collection of patents specifications from a number of advanced countries. This collection is being classified and organised to make it available for reference to innovators and entrepreneurs. The Applied Science Research Councils in the nation are also encouraged to promote greater utilization of the fruits of world science and technological progress.

P.S.F. has under preparation a project for establishing a national Centre for Research Utilization and Special Projects (CRUSP). The Centre shall generate projects as a result of research having particular relevance to socio-economic needs of the nation. A Joint Pakistan-US/NSF Science Review Team examined the proposal in May 1974 after holding discussions with numerous research organizations. The proposal, we hope, will be given concrete shape in 1974-75.

Cooperative projects and programmes were also developed with appropriate agencies in the nation to ensure the utilisation of results of research. The Foundation's Expert and Advisory Panels assisted in the identification of feasible projects. Some important projects are mentioned in the following paragraphs:

(i) Extraction of metals from Laterite Deposits in Baluchistan:

Large laterite deposits are known to exist in Baluchistan containing metallic oxides of titanium, aluminium and iron. It is estimated that the amount of foreign exchange spent on the import of these chemicals yearly exceeds Rs. 50 lakhs. The value of metals of metallic oxides from the ore, once we are able to arrange for their exploitation, would of course, be infinitely greater providing materials for our own industries and for export. The Pakistan Science Foundation started supporting research work on a semi-pilot plant stage at the PCSIR Laboratories, Lahore and Peshawar to establish the feasibility of an economically viable process. Representative samples were collected with the collaboration of the Geological Survey of Pakistan and their analysis is being carried out.

(ii) Increased production of meat and milk through coarse grain revolution:

A number of factors basic to the development of livestock industries were identified by the Foundation and it was found that the most serious constraint is the non-availability of enough coarse grains which constitute an essential component of poultry and livestock fattening rations. In the face of serious food shortages for humans coarse-grains could be the saving factor for the nation. Accordingly a proposal was developed by the Pakistan Science Foundation for the utilization of the results of research in respect of coarse grain production which is aimed at the production of an additional 5 million tons or so of grain-Sorghum from land at present left fallow in: (i) the cotton-wheat rotation in the irrigated tracts, (ii) after the harvesting of rice (mainly using residual moisture in the soil) and (iii) by improved cultural practices in the areas currently under grain Sorghum. The proposal was given practical shape by launching a pilot project in collaboration with M/s. Rafhan Maize Products Company Ltd., Lyallpur, involving cultivation of Sorghum during the spring of 1974 on 100 locations dispersed all over the irrigated zone in ten districts of Punjab and Sind. The results have been very encouraging. Pacific 007, an Australian Sorghum hybrid, was identified as the most suitable variety for multiple cropping on irrigated lands of Pakistan. It is an early maturing variety; when sown in the end of February 1974 it was ready for harvesting by 20th May, 1974, whereas other varieties were still green. It was also no more suceptible to the attack of insect pests than other varieties. After observing the results of spring season trials, the farmers were of the opinion that it can also be successfully grown as an inter-crop in sugar-cane, which is also planted in the month of March; sugar-cane being

a slow growing crop would still be very small when the grain sorghum, sown in-between the sugar-cane would be ready for harvesting. Experimental sowing of a summer season sorghum crop is scheduled from 15th August depending upon the locations. The success of this trial sowing has opened up fresh vistas for attaining self-sufficiency in food-grains.

(iii) Intermediate Technology approach to animal production and protection in the Northern Areas:

The Pakistan Science Foundation, under the directions of the Federal Minister of Finance, Planning and Development, was entrusted with the work of over-seeing the programme of application of improved technology for animal production and disease prevention in the Northern Areas of Gilgit, Baltistan and Diamir. The mass application of biologicals and broad spectrum parasiticides for the control of disease prevalences in livestock through the training of skilled and intermediate level workers recruited from the local communities was attempted with the cooperation of the Agricultural University and the Animal Husbandry Department, Punjab and Baluchistan. The scheme was launched in collaboration with the Northern Areas Administration. Drugs, biologicals and other requisites for mass dosing, dipping and vaccination were supplied. A Project Director was appointed. Three teams of experienced veterinarians were provided who trained 600 auxiliary workers selected one each from the 600 villages in the area. The training was aimed at providing a basic understanding of livestock disease control measures and skill in three specific operations viz., (i) vaccination against the more important

preventable epizootics, (ii) dosing against internal parasites and (iii) dipping of livestock against external parasites. In the absence of professional level veterinary personnel, the contribution of the auxiliary worker is very critical in saving hundreds of thousands of animals from death and disease.

(iv) Development of Appropriate Technologies:

Special attention was given by the Pakistan Science Foundation to the development of plans and programmes for the utilization of research to evolve 'appropriate' technologies. Liaison was established with organizations which possess specialised experience in the development of such technologies, such as, the Intermediate Technology Development Group of U.K. and the Board of Science and Technology for International Development (BOSTID) of the U.S. National Academy of Sciences. The Foundation held a number of meetings with representatives of these organizations. Under the guidance of the Federal Minister for Finance, Planning and Development, work has been initiated by scanning literature, preparing bibliographies and developing proposals on the following items:-

(a) Preparation of fortified 'Nan-roti' with added amino acids, high quality proteins, minerals etc., with a long shelf life on a mini-plant scale.

(b) Non-conventional sources of Energy - solar energy and bio-gas.

(c) The utilization of Urea, molasses and single cell protein in the manufacture and development of low cost milk substitutes for feeding male buffalo calves, nearly 1½ million of which die of starvation due to lack of milk.

(d) The preservation of milk, by the development of low cost substitute technology at mini-plant scale for village communities based on heat sterilization and disposable packaging to replace the expensive technology based on the use of chilling centres, refrigeration vans, pasteurization and cold storage.

(e) Improved brick-kilns and standardized bricks.

(f) Water-harvesting and low-cost lining of water channels.

(g) Low-cost rural roads and houses.

A number of meetings were held with the experts in each field and plans are in the initial stages of development.

Intermediate Technology Centre:

The PSF has formulated a scheme costing Rs. 3.68 crores (capital) with a recurring component of Rs. 39.40 lac to establish an Intermediate Technology Centre. This project stems from the consideration that the pattern of technological and industrial development followed so far in the country has been confined to the purchase of western technology, which is capital intensive, labour saving and dependent on imported machinery and even raw materials and has exclusively benefitted the small modern sector depriving the rural masses from participating and benefitting from the processes of modernization and social reconstruction. The proposed Centre shall develop potential for:

(a) identifying such improved intermediate technologies which have proved successful in conditions similar to ours and adapting those to our own conditions; also the scaling up of locally available technologies

or scaling down sophisticated highly automated technologies to meet our needs;

(b) creating infra-structures and functional organizations which should be able to carry out activity in the field for growth of industry and agriculture;

(c) mobilizing the advisory and technical facilities of all relevant organizations within Pakistan, such as the PCSIR, PASTIC, the Polytechnics, PARD, etc., and similar overseas organizations such as ITDG and thus becoming part of a growing international network of data collection, identification and exchange of appropriate technologies;

(d) disseminating such information, conducting field trials under operating conditions and helping to create the necessary facilities for the widespread introduction of appropriate technologies under operating conditions and evaluating results thus obtained;

(e) supporting and conducting research and development into the existing and potential range of appropriate technologies in agriculture, industry and services of all kinds;

(f) training special cadres with social vision, democratic approach and technical skill;

(g) organizing special social and economic bodies, where existing institutions are insufficient, to motivate and mobilize the people for mass participation in the application of appropriate improved technologies for the building of roads, houses, sanitary works and water supplies etc.,

(h) arranging for the design and manufacture of plant and machinery for the intermediate technologies evolved and adapted under the auspices of the Intermediate Technology-Centre.

The purpose of setting up the Centre is to provide channels for the flow of identified appropriate technologies after trial of proto-types to be eventually utilized by rural and sub-urban communities. The aim would be to procure participation of people not only in the execution of development work but also in planning. Training of cadre is to be done in areas of work based on the educational programmes to be devised to motivate them and give them social foresight and skill appropriate to the work to be carried out and to create in them capabilities of leadership and management. Priorities will be for the agricultural practices, industries and facilities that will directly affect the rural population and find employment for them in rural areas, thereby reducing migration to cities.

Some of the areas which have been identified preliminarily are:-

i) ENERGY: Non-conventional sources such as wind, solar and bio-gas as well as small hydro-electric projects and other feasible conventional sources for local consumption where transmission is not possible.

ii) WATER: harvesting and conservation, creation of small reservoirs, tube-wells, shallow wells, desalination of water through solar energy.

iii) FOOD AND AGRICULTURE:

a) Storage, preservation and dehydration, fortified wheat flour and 'Nan'. Development of processed livestock feed.

b) Fish curing.

c) Agriculture and animal husbandry practices, machinery and implements suited to small farms.

iv) WORKS:

a) Building construction: utilization of mud and lime, and redesigning of houses for comfortable living conditions in terms of temperature and humidity, appropriate to each area. Improved

precast material, bricks and brick kilns and provision of lime kilns, etc.

b) Soil stabilized village roads, and culverts. These can be constructed from materials available locally.

c) Health and sanitation: Safe drinking water, village drainage, sewerage disposal and other connected facilities.

v) INDUSTRIAL CHEMICALS:- Manufacture of chemicals and products from agricultural wastes, such as rice husk, wheat straw, banana pulp and fibre, fertilizer and insecticide plants. Setting up mini-plants and local leather industry.

IV. SCIENCE CENTRES:

The establishment of science centres, clubs, museums, herbaria and planetaria:

No programme of research support can be sustained, if there is not enough awareness in the population at large of the role of science in national progress. To achieve public understanding of the impact of science on society, an institutional structure needs to be created including the establishment of science centres and the promotion of science clubs, in all communities, large and small.

Preparation of detailed schemes was initiated by the Foundation for the establishment of science museums, herbaria and planetaria by the Federal Government as both the capital cost and the expenditure for their maintenance on a continuing basis would be considerable and beyond the existing resources of the Foundation.

The universities and the provincial governments were also encouraged to develop projects for the establishment of science museums, herbaria and planetaria. Their requests for financial and technical assistance in the establishment of such facilities when received would be considered on merit. Plans were formulated for the establishment of Science Centres all over the country, which will include science clubs, childrens' museums of Science and Science exhibitions to make the society science conscious. The Foundation prepared blue prints to set up such a science centre at Lahore in consultation with the Chairman, Board of Intermediate and Secondary Education. Assistance was provided in the preparation and approval of the scheme for the establishment of national herbarium at the University of Islamabad in collaboration with the National Science Foundation, USA.

National Science Centre at Islamabad:

A scheme for survey, architectural designing and purchase of land for National Science Centre at Islamabad was prepared and submitted to the Government of Pakistan. The scheme of the Centre in its entirety envisages the construction of buildings

to provide basic scientific facilities for scientific and technological promotion and support and to accommodate the headquarters and liaison offices of various scientific and technical agencies at the nation's capital. The needs of the following organizations administratively linked with the Scientific & Technological Research Division shall be accommodated:-

i) Pakistan Science Foundation.
ii) National Science Council.
iii) Pakistan Council of Scientific and Industrial Research.
iv) Irrigation, Drainage and Flood Control Research Council.
v) Pakistan Medical Research Council.
vi) Council for Works and Housing Research.
vii) Geological Survey of Pakistan.
viii) Survey of Pakistan.
ix) Zoological Survey Department.
x) Pakistan Academy of Sciences.
xi) Pakistan Association of Scientists and Scientific Professions.
xii) Pakistan Association for the Advancement of Science.
xiii) Scientific Society of Pakistan.
xiv) Institute of Engineers (Pakistan).
xv) Institute of Architects (Pakistan).
xvi) Patents and Design Office.
xvii) Pakistan Standards Institute.
xviii) Meteorological Department.
xix) Pakistan Scientific and Technological Information Centre.

The Centre would provide common physical facilities, such as a science reference library, seminar rooms and an exhibition hall, auditorium, modern information transfer service. The Centre would facilitate intellectual interaction and provide visibility to science in the country. Land has already been selected on the Constitution Avenue Islamabad near the proposed Cultural Complex.

Two types of Science Centres are proposed to be

established: (1) as part of educational and scientific establishments and (2) as independent institutions run by civic bodies, science societies and associations. Such centres would maintain science libraries, arrange science exhibitions, science fairs, popular lectures on science, popular courses on science subjects, and promote science clubs.

A high priority is being given to the organisation of science clubs. Plans are being drawn up in consultation with the Boards of secondary Education, the Departments of Education and the non-governmental science societies and Associations for establishing science clubs. The emphasis is on the development of science clubs in the schools on the model of the 4-H clubs in the U.S.A., and the British Association of Young Scientists (B.A.Y.S.) in the U.K.

The role of the Foundation in these activities is informational with a few pilot programmes for demonstration. The extension activities would naturally be the responsibility of the agencies and departments concerned. An advisory panel has been constituted to advise the Foundation on the programmes and projects in this area of activity.

V. LEARNED BODIES:

The promotion of learned bodies, scientific societies, associations and academies, engaged in spreading the cause of scientific knowledge in general or in the pursuit of a specific scientific discipline or technology in particular:

Learned bodies, such as, the Royal Society and the Association for the Advancement of Science in the U.K. have played a leading role in the modernization and progress of the advanced nations. Similar institutions would have to be built up in Pakistan in order to promote and popularize science.

There are four categories of such societies: (1) general societies for the promotion and popularization of science, (2) specialised societies dealing with a particular discipline of science, (3) professional societies which look after the interests of the professions and (4) prestigeous societies whose membership is a mark of distinction. They play a crucial role in the maintenance of a climate conducive to creative scientific work in society; are frequently consulted by Governments on science policy issues, have library facilities, conduct examinations for professional diplomas, publish scientific journals, organise conferences and in some cases maintain their own laboratories. It is necessary for Pakistan to foster a similar development of learned bodies.

A number of such societies already exist but need to be greatly strengthened. In many disciplines and professions no such organization exists and new societies would have to be promoted. Most of the existing learned bodies in the country suffer from inadequacy of funds. There is also room for improvement in their working and for better consideration of their programmes. It is necessary to arrange for: (1) more adequate funding, (2) a clearer definition of their objectives, (3) a more careful preparation of their programmes; and (4) better coordination

with national and international scientific societies and organizations. A careful review is planned to be made of their activities and appropriate steps will be taken to persuade them to streamline their working. Grants would be made to the Societies for approved programmes.

An Advisory Panel was constituted to make a careful study of the programmes of our learned societies including the study of similar organisations in other countries to recommend measures for their reorganisation and support.

A joint meeting of all the scientific societies and learned bodies in the country was held in March, 1974, which was inaugurated by the Minister Incharge of Science and Technology and specific tasks were suggested to different societies for the achievement of the objectives laid down in their charters. Financial grants amounting to Rs. 2.05 lacs were given to 11 scientific societies for developing integrated programmes for the promotion of science in the country.

VI. SCIENCE CONFERENCES:

The organisation of pericdical science conferences, symposia and seminars:

It is axiomatic that coordination in science is best achieved through consultation and meetings amongstthe scientific workers. Science conferences, symposia and seminars are important means for the exchange of ideas and information amongst the scientific workers. Government as well as the universities and scientific bodies arrange for such conferences. The activity is, however, minimal due mainly to financial constraints. The Pakistan Science Foundation assisted in improving the functioning of the existing conferences and endeavoured to obtain greater regional and international participation at the more important meets. Grants totaling Rs. 1,83,396/00 were given to various scientific societies and learned bodies of the country for holding seminars, symposia and science conferences. This included financial support for two all Pakistan Science Conferences which were held at Quetta and Jamshoro and a number of technical meets arranged by universities and scientific societies.

An Advisory Panel was constituted to review the current activities in the field and advise the Foundation in the development of long-term programme of conferences, symposia, workshops and seminars. The programme would be instituted with the cooperation and in consultation with the universities, major research centres and the premier scientific associations and societies in the country. P.S.F. is engaged in preparing a comprehensive schedule of such activities over the next two years.

VII. EXCHANGE OF VISITS:

The exchange of visit of scientists and technologists with other countries:

A major weakness of Pakistani science is its isolation. Due to lack of contact with the scientists in advanced societies and the absence of intellectual inter-action, many of our scientific workers become obsolescent and lose enthusiasm, freshness and spontaneity. There is an urgent need to end the isolation from world science of Pakistani science and scientists. Our scientific workers must be enabled to meet their counterparts in the advanced societies, and visit international and regional research centres and universities of repute.

Eminent men of science from the great centres of research and universities of repute abroad were invited for visits. The P.S.F. received over two dozen distinguished visitors from foreign countries and discussed with them vital issues concerning the functioning of science in Pakistan.

Pakistan has cultural pacts with many friendly countries which generally provide for exchanges of scientists. Pacts have also been made with some countries, specifically for the exchange of scientists and scientific information. Advantage is proposed to be taken to arrange the exchange of scientists under these Pacts. There are international programmes sponsored e.g; by the United Nation's family of specialised agencies - UNESCO, FAO, WHO, etc., which also provide for such exchanges. The facility is also available under technical assistance programmes of a number of countries and from non-governmental foundations. Some of our research organizations and universities have also bilateral links with similar organizations in advanced countries under which such exchanges occur.

These resources are at present not being utilized

fully nor very effectively. A careful review is being made by the Advisory Panel constituted by the Foundation to examine the problem and develop plans in collaboration with all concerned for: (a) the full utilization of the facilities now available and (b) augmenting the existing facilities. The study visits abroad would be linked with specific programmes of research and development in order to maximise the benefits from the programme, aimed at achieving economic growth.

VIII. AWARDS AND FELLOWSHIPS:

The grant of awards, prizes and fellowships to individuals engaged in developing processes, products and inventions of consequence to the economy of the country:

A system of public recognition, awards and financial support for creative individuals is necessary to provide incentives and opportunities for discovery, invention and innovation.

Efforts were made to identify research items likely to lead to the development of processes, products and invention with the help of the universities and cooperating research institutes. The Foundation's advisory panel for the purpose is busy in drawing up detailed proposals for the awards and prizes. Pending finalization of arrangements the Pakistan Academy of Sciences was given funds for grant of medals, prizes and fellowships to scientists and technologists.

IX. SURVEYS AND STATISTICS:

Special scientific surveys not undertaken by any other organisation and collection of scientific statistics related to the scientific effort of the country:

The Foundation's Advisory Panel for scientific surveys was requested to draw up a long-term programme for: (1) the collection of scientific statistics related to the scientific effort of the country and (2) the special scientific surveys.

Work on the collection of statistics on all aspects of science in the nation was started forthwith. The collection and compilation of such statistics would provide an inventory of the scientific resources of the nation, assist in the assessment of the pace of development in the field of science, and constitute an objective basis for future planning. The standard methodology developed by UNESCO, OECD and similar organisations for collecting, present-ing and analysing statistics in the area of science and technology is under study for adoption in the survey work. Work is in progress on the compilation of Directories on the following:

(1) Scientific man-power.
(2) Research establishments.
(3) Research projects under study.
(4) Scientific journals published in the country.
(5) Scietific societies functioning in the country.

Science Expedition to the Northern Areas (Gildit, Baltistan and Diamir):

A Science Expedition to the Northern Areas was mounted in collaboration with the research councils, universities, research institutes and other learned bodies, as well as scientific departments and the National Development Volunteer Programme (NDVP), mainly to draw the attention

of the scientists working in the universities and research establishments in the more advanced parts of the country to the need of providing scientific and technological support to the highly isolated and undeveloped Northern Areas and to obtain scientific information on various aspects of life and living in these Areas which could be the basis of realistic developmental planning. Teams of scientific workers were drawn from science establishments which expressed interest in participating in the Expedition and sent to the Northern Areas for a period of about six weeks. In all 18 teams involving about 50 scientific workers assisted by 125 NDVP Volunteers visited the Areas. The surveys undertaken included the following sectors:-

1. Demographic/Socio-economic.
2. Range/Forest/Ecology.
3. Health.
4. Food and Nutrition.
5. Fruit Preservation/Culturing of Mushrooms.
6. Low Cost Building Materials.
7. Radio-active Minerals.
8. Mineral Exploitation.
9. Flora.
10. Limnology.
11. Fauna.
12. Fisheries.
13. Agriculture.
14. Livestock.
15. Water and Power.
16. Soil.
17. Geography.
18. Medicinal Plants.

The major aim was to stimulate the research establishments in the country to initiate surveys and research on problems pertaining to the development of the Northern Areas. The visit of the scientific workers to this neglected region

would hopefully lead to further work in the years to come which would provide the basis of realistic development planning in the Areas.

The Teams are expected to complete their field work by the end of August 1974. A report based on the data collected would be prepared. Seminars, symposia will also be held to identify areas of future work and to assist in project formulation.

Joint Pak-American Science Review:

An expert and critical study of PSF and its future role was initiated by the constitution of a Joint Pak-American Science Review Team, with the assistance of the U.S.AID and the U.S. National Science Foundation. The Team, consisting of three U.S. scientists and three Pakistani scientists was charged with the task of examining the structure and programmes of the Foundation on subjects concerning, inter-alia, the following:-

i) the appropriate structure, programme priorities and procedures of Pakistan Science Foundation;

ii) financing of scientific research and scientific programme by the Foundation;

iii) promotion of research and strengthening the competence and capability of institutions and centres of scientific research;

iv) establishment of scientific and technical communication, information and documentation centres;

v) utilization of results of research;

vi) establishment of institutional links with scientific bodies in the US and exchange of scientists and;

vii) development of collaborative scientific research with US institutions;

viii) the needs of the Foundation: Funds, training facilities, expert assistance, equipment, books, journals and other material.

The Review Team completed its first phase of work, in May 1974 by visiting major organisations concerned with scientific research in the country and holding discussions with concerned scientists and experts and submitted an interim report in May, 1974. The final report is expected to be submitted by the end of 1974, after the Team completes the second phase of its work based on visits to U.S. research establishments.

X. RESEARCH EVALUATION:

Review of t-he progress of scientific research sponsored by the Foundation, to evaluate the results of such research:

Since scientific work lies in unchartered areas a central problem of all research endeavours is not only to establish a sound initial research plan but to ensure that the corrective feed-back process is efficient. Mechanisms have, therefore, to be established for review, consultation and periodic evaluation of research.

The reviews of the progress of scientific research financed by the Foundation are planned to be undertaken regularly by the appropriate technical committees constituted by the Foundation which would, if necessary, appoint specialist sub-committee for review, comprising of scientific workers in the concerned discipline/disciplines.

The expert panels appointed for the various basic economic and social goals also advise regarding the utilization of the results of research which have been evaluated as applicable for the achievement of national goals.

XI. SCIENTISTS POOL:

Maintain a National Register of citizens of Pakistan who are highly qualified and talented scientists, including engineers and doctors in or outside Pakistan, and to assist them, in finding within Pakistan employment most suited to their genius:

The highly trained and gifted individuals are the greatest asset of the nation. The impact that one creative individual can make through his inventions, discoveries and innovations in creating new sources of wealth and welfare for a society can be greater than the labour of thousands of untrained individuals. Their identification and best utilization is, therefore, a matter of the utmost importance for every society.

The Pakistan Science Foundation has been entrusted with the responsibility to maintain a current register of scientific and technical personnel and in other ways to provide a central clearing house for the collection, interpretation and analysis of data on the availability of and the current and projected need for the scientific and technical man-power in the country so as to provide a reliable source of information for policy formulation by the appropriate agencies. Efforts are being made to maintain liaison with the Man-power Division in the Ministry of Labour, the NDVP Unit of the Planning Commission and other related agencies. Proformae have been developed for the record of the bio-data of the scientific workers, in collaboration with the Directorate of Computer Application of the Cabinet Division. Work on the maintenance of a National Register of scientific man-power in the country was initiated. A Placement Office is being created in the Pakistan Science Foundation, which will, in addition to the maintenance of a National Register of talented scientists, assist them in collaboration with agencies concerned in finding employment suitable to their genius.

In order to assist in the proper utilization of the highly qualified scientific workers, and arrest 'brain drain' and flight of talented individuals from the country, the Foundation has established a scientists' pool. A proforma was devised for the registration of highly qualified scientists with the Foundation and applications were invited through news-paper advertisement as also through our embassies in the advanced countries. Thirteen scientists were accepted for placement in the Scientists' Pool. Their particulars were circulated to the universities, research establishments and science organizations and arrangements were made for their gainful employment.

XII. INTERNATIONAL LIAISON:

Liaison with similar bodies in other countries:

There are and would be numerous scientific problems, which it will be possible to solve only within the framework of world-wide international cooperation. Fostering international cooperation, particularly inter-institutional cooperation, would, therefore, constitute a most rewarding activity for science organisations.

Scientific establishments in different countries were contacted in order to share knowledge, exchange information and to foster cooperation for the achievement of common goal.

CHAPTER 2

ORGANIZATION AND ADMINISTRATION:

The wide ranging charter of the PSF demands an elaborate infrastructure for carrying out various programmes. The first year of operation was naturally devoted to the conceptualization and creation of the infra-structure and to acquire momentum for initiating the important tasks entrusted to the Foundation. Numerous problems were faced in finding office and residential space in the capital, and due to lack of work space the barest minimum staff was recruited. Most of the work was accomplished through committees, expert panels, advisory panels involving about 250 key persons in the fields of science, technology, economics, management and industries. A brief account of the organizational structure of the Foundation as it developed during the first year of its existence is given below:

The Board of Trustees: The "Board of Trustees" is the supreme policy making body of the Foundation and is vested with the general direction, conduct and management of the affairs of the Foundation. It consists of 19 members: 3 wholetime members, namely the Chairman of the Foundation, one Member Science and one Member Finance appointed by the President of Pakistan and 16 part-time members, namely the Chairman of the National Science Council ex-officio, four scientists nominated by the National Science Council and eleven eminent scientists nominated by the President of Pakistan. All the 19 members of the Board of Trustees, except the Member Finance, are required to be eminent scientists, indicating the nation's resolve to give to scientists their due place in the management of vital national affairs.

The Executive Committee: The Executive Committee of the Foundation is composed of the three whole-time members of the Board of Trustees. The functions delegated to the Executive Committee include, amongst others, the framing of rules for the preparation of the budget, the setting up of ad-hoc Committees and the sanction of research and other proposals submitted to the Foundation.

Chairman: The Chairman is the principal executive and scientific officer of the Foundation and heads its Board of Trustees and the Executive Committee. He directs and controls the work of the Foundation and exercises general supervision and control over all the employees of the Foundation.

Selection Board: The Selection Board performs the following functions:-

(a) to consider the applications of candidates for the posts of officers of the rank equivalent to grade 17 Officers and above in Government; and

(b) to recommend the names of suitable candidates for appointment.

The following were the members of the Selection Board:-

i. Dr. Z.A. Hashmi, Chairman, P.S.F. - Chairman

ii. Mr. Justice Faizullah Khan Kundi, Chairman, Federal Public Service Commission. - Member

iii. Mr. Justice Mohammad Afzal Cheema, Secretary Law, Government of Pakistan, Islamabad. - Member

iv. Lt. General M. Ayub Khan, Chairman, Pakistan Medical Research Council. - Member

v. Dr. M.A. Kazi, Chairman, University Grants Commission - Member

vi. Dr. Mohammad Yaqoob Bhatti, Animal Husbandry Commissioner, Ministry of Food & Agriculture, Islamabad. - Member

Finance Committee: The following functions have been entrusted to the Finance Committee:-

(a) to consider the annual budget and advise the Foundation thereon;

(b) to make recommendations to the Foundation on all matters relating to the finances of the Foundation and to review its financial position periodically;

(c) to examine and report on the financial implications of any major new development programme;

(d) to examine financial sound-ness of the research schemes; and

(e) to do such other things as are referred to it by the Chairman, the Executive Committee or the Board of Trustees of the Foundation.

The following were the members of the Finance Committee:-

1. Dr. Z.A. Hashmi, - Chairman
2. Mr. Riaz-ud Din Ahmad, Chairman, Agricultural Development Bank - Member
3. Dr. B.A. Azhar, Joint Economic Advisor, Ministry of Finance - Member
4. Mr. M. Zafar Iqbal, Dy Secretary, Economic Affairs Division - Member
5. Mr. Hafizuddin Ahmad, Member Finance, Pakistan Science Foundation - Member/Secretary

The Goals and Priority Committee: The Goals and Priority Committee performs the following functions:-

(a) to examine the policies and programmes of the Foundation, and advise the Foundation concerning the goals to be pursued thereon;

(b) to review the reports and recommendations of the advisory or expert panels and the technical ad-hoc Committees and advise the Foundation concerning priorities in the context of national development requirements; and

(c) to do such other things as may be assigned or referred to it by the Chairman, the Executive Committee or the Board of Trustees.

The following were the members of the Goals and Priority Committees during the year under review:

1.	Dr. Z.A. Hashmi	-	Chairman
2.	Chairman, National Science Council	-	Member
3.	Chief Economist Planning Commission	-	Member
4.	Member Science PSF	-	Member
5.	Director of Finance, PSF	-	Secretary/ Member

Technical Committees: The Foundation decided to constitute the following Technical Committees: (1) Mathematics and Computing Activities (2) Physical Sciences (3) Biological Sciences (4) Earth Sciences including geography (5) Chemical Sciences (6) Environmental and Atmospheric Sciences (7) Engineering Sciences (8) Agricultural Sciences (9) Medical Sciences and (10) Oceanography.

The Technical Committee performs the following functions, namely;

(a) examine the periodical and final progress reports of the schemes financed by the

Foundation and the new schemes and extension proposals submitted to the Foundation for financial assistance;

(b) approve technical programmes of shemes sanctioned by the Foundation;

(c) prepare a co-ordinated programme of research in their respective fields; and

(d) make recommendations on all technical matters referred to them by the Chairman.

The following were the members of the Technical Committees:-

I. Committee for Mathematics and Computing Activities:

Dr. Razi-ud-Din Siddiqui, Fellow Pakistan Academy of Sciences (upto April 1974)

Dr. A.R. Hanafi, Mathematical Department, University of Karachi(since May 1974).

Dr. N.M. Talpur, Professor of Mathematics, Sind University (upto April 1974)

Dr. Asif Alijee Qazi, Sind University, Jamshoro (since May,1974)

Dr. S.M. Yousuf, Professor of Mathematics, University of Islamabad.

Dr. M. Mushtaq, Deputy Director, Pakistan Computer Bureau, Cabinet Division, 26-A, Satellite Town, Rawalpindi.

Dr. M. Nawaz, Head of Computer Division, University of Engineering and Technology, Lahore.

Dr. Mohammad Afzal, Director Statistics, Planning Department, Government of Punjab, Lahore.(since May, 1974).

II. Physical Sciences Committee:

Dr. Riazuddin, Member (Technology) PINSTECH, Islamabad.

Dr. Mumtaz Shaukat, Professor of Physics, Punjab University, Lahore.

Dr. Mohammad Ali Khattak, Professor of Physics, Peshawar University

Dr. Mohammad Aslam Khan, Chief Scientist and Scientific Advisor to the Ministry of Defence, Defence Science Organization, 21 Victoria Barracks, GHQ, Rawalpindi.

Dr. S.M.A. Tirmizi, Professor of Physics, Karachi University.

Dr. Abdul Hasain Shah, Associate Professor of Physics, Sind University.

Dr. S. Bande Hasan, Professor of Physics, University of Baluchistan, Quetta.

III. Biological Sciences Committee:

Dr. Zain-ul Abidin, Dean Faculty of Science, Karachi University

Dr. Ahmad Mohiuddin, Professor of Zoology, Sind University

Dr. A.G. Khan, Associate Professor of Biology, Islamabad University.

Dr. Amir Mohammad, Director, Nuclear Institute for Agriculture & Biology, Lyallpur.

Dr. S.M. Jaffar, Dy Scientific Adviser, Ministry of Science and Technology, Islamabad.

Dr. M. Naseem, Associate Professor, Peshawar University, Peshawar.

IV. Earth Sciences Committee:

Dr. R.A. Khan Tahir Kheli, Head, Department of Geology, Peshawar University, Peshawar.

Dr. Aziz-ur Rehman, Associate Professor Geophysics, Punjab University, Lahore.

Dr. Gulzar Ahmad Khan, Head Department of Earth Sciences, Islamabad University.

Dr. Mohammad Hafeezuddin Khan, Oil & Gas Development Corporation, Central Hotel Building, Club Road, Karachi-4.

Dr. S.A. Bilgrami, Pakistan Chrome Mines, Shahrah-e-Staff College, Quetta.

Professor F.A. Shams, Department of Geology, Punjab University, Lahore.

Dr.(Miss) K.M. Elahee, Department of Geography, Punjab University, Lahore.

V. Chemical Sciences Committee:

Dr. Wadal Shah, Professor of Chemistry, Sind University.

Dr. S. Marghoob Ali, Professor of Chemistry, Peshawar University.

Dr. M.D. Shami, Professor of Chemical Technology, Institute of Chemical Technology, Punjab University, Lahore.

Dr. M.H. Hashmi, P.C.S.I.R., Lahore.

Dr. M.K. Bhatti, P.C.S.I.R., Lahore.

Dr. M. Afzal, Head Department of Chemistry, Islamabad University.

VI. Environmental and Atmospheric Committee:

Dr. Tariq Mustafa, Space and Upper Atmospheric Research Committee, Karachi.

Mr. Saleem Mahmood, Space and Upper Atmospheric Research Committee, Karachi.

Dr. Rehman Beg, Forest Research Institute, Peshawar.

Dr. A.G. Asghar, Fellow of the Pakistan Academy of Sciences, 30, Gulberg Road, Lahore.

Dr. Naqvi, Department of Botany, Peshawar University, Peshawar.

Mr. Abdul Hamid Chottani, P.C.S.I.R., Karachi.

Dr. Altaf Hussain, Asstt. Scientific Adviser, Ministry of Science and Technology, Islamabad. (w.e.f. 4-3-1974).

VII. Engineering Sciences Committee:

Dr. A.Q.K. Afghan, Additional Secretary, Ministry of Science & Technology, Islamabad.

Dr. V.G. Desa, Member (Technology), PCSIR, Block 95, Pak Secretariat, Karachi.

Dr. Kazi Ainud-din, Professor of Electrical Engineering, Engineering University, Lahore.

Dr. Afzal Kazi, Professor of Agriculture Engineering, Agricultural University, Lyallpur.

Dr. Jamal Khan, Professor of Mechanical Engineering, Peshawar University, Peshawar.

VIII. Agricultural Sciences Committee:

Dr. Amir Mohammad, Director, Nuclear Institute for Agriculture and Biology, Lyallpur.

Dr. Heshamul Haque, Director-General, Agricultural Research Council, Karachi.

Dr. M. Yaqoob Bhatti, Animal Husbandry Commissioner, Ministry of Food and Agriculture, Islamabad.

Dr. Sardar Ali Qureshi, Cereal Botanist, Agricultural Research Institute, Lyallpur.

Dr. A. Hameed Khan, Director Advanced Studies, Agricultural University, Lyallpur.

Dr. Abdul Wahid Khan, *Scientist Emeritus, Flat No. 1, Building No. 2 Kandawala Flats, 7, Gizri Road, Karachi.

IX. Medical Sciences Committee:

Col. M.I. Burney, Director, National Health Laboratories, Islamabad.

Professor S.M.K. Wasti, Professor Emeritus, 1, Edward Road, Lahore.

Dr. Atiqur Rehman Ansari, Inst. of Hyg. & Preventive Medicine, 6 Birdwood Road, Lahore.

Dr. Nasiruddin Azam, No. 9 Dabgari Garden, Peshawar Cantt.

Dr. Azim Barya, Director Research, Agriculture Research Council, Pak Secretariat, Block 79, Karachi.

Dr. Zaheeruddin, National Health Laboratories, Islamabad.

Dr. Batul Raza, Director Research Institute for Fertility Control, Pak Sectt. Block 36-A, Shahrah-e-Iraq, Karachi-1.

Dr. Abdus Salam Akhtar, Director, Veterinary Research Institute, Ghazi Road, Lahore Cantt.

Dr. Javed A. Hashmi, Director, Pakistan Medical Research Council, Jinnah Post-graduate Medical Centre, Karachi (w.e.f. 14.2.1974).

X. Oceanography Committee:

Dr. S.M. Haq, Head, Institute of Marine Biology, Karachi University, Karachi.

Commander G.S. Qureshi, Director Hydrography, Naval Headquarters, Karachi.

Dr. Mrs. Nasima M. Tirmizi, Zoology Department, Karachi University, Karachi.

Dr. S.A. Jalil, Director Marine Fisheries Department, Fish Harbour, West Wharf, Karachi.

Mr. Mohammad Samiullah, Director, Meteorological Department, Central Secretariat Block 2, Karachi.

Expert Panels: Fourteen expert panels were constituted to advise the Foundation on the types of research needed for the attainment of the principal socio-economic development objectives. The following were the members of the Panels:-

I. Power and Energy:

Mr. Manzoor Ahmad, Additional Secretary, Ministry of Fuel, Power and Natural Resources, Islamabad.

Dr. Abdul Ghani, Member, Federal Public Service Commission, Karachi (w.e.f. 22.4.1974).

Professor Majeed Mian, University of Peshawar, Peshawar.

Mr. M. Masihuddin, Joint Secretary, Ministry of Fuel, Power and Natural Resources, Islamabad.

Dr. Naeem Ahmad Khan, Secretary, Atomic Energy Commission, Islamabad.

Mr. M. Shafiq, Head Nuclear Engineering, PINSTECH, Rawalpindi.

Mian Masood Anwar, Principal Scientific Officer, PINSTECT, Islamabad.

Mr. Masood-ur-Rahman, Chief Engineer, Planning & Development, WAPDA, Lahore.

Dr. M. Abdullah, Professor, Electrical Engineering, College of Engineering, Peshawar University, Peshawar.

Dr. S. Hamid Ali Shah, Petroleum Cell, Islamabad.

Dr. M.Q. Siddiqi, Deputy Secretary, Ministry of Fuel, Power and Natural Resources, Islamabad.

II. Mineral Development:

Dr. Kh. Salah-ud-din, Institute of Chemical Engineering and Technology, Punjab University, Lahore/Chairman, PCSIR, Karachi.

Dr. S. Neaz Ahmad, Department of Geology, University of Baluchistan, Quetta.

Dr. Azizul Rehman, Department of Geology, Punjab University, Lahore.

Mr. Shah Jehan, WPIDC, Karachi.

Mr. Tayab Ali Shah, Deputy Director General, Geological Survey of Pakistan, Lahore.

Dr. Safdar Khan, Department of Geology, Peshawar University, Peshawar.

Dr. Farshori, Head, Department of Geology, Sind University, Jamshoro.

III. Transport and Communication:

Mr. Tajammal H. Hashmi, Additional Secretary, Government of Pakistan, Vice President, Pakistan Institute of Engineers, Islamabad.

Mr. Sadaqat Hasan Mir, Chief Transport and Communications, Planning Division, Islamabad.

Mr. S.M. Iqbal, Transport Consultant, Planning Division, Islamabad.

Mr. Abdul Qadir, Chief Operating Superintendent, P.W.R., Lahore.

Mr. Mushtaq Ahmad, Chairman, Road Transport Corporation, Islamabad.

Mr. Wahab Kazmi, Director Planning and Operation, Road Transport Corporation, Sind, Karachi.

Mr. S.A. Khaliq, Deputy Director General, Planning T & T Department, Islamabad.

Mr. Mohammad Javaid, D.C.E. Long Distance Communication, Rawalpindi.

Mr. S.A. Aziz, Chief Engineer, Pakistan Broadcasting Corporation, Rawalpindi.

Dr. Riaz Ahmad, Chief Engineer, Pakistan Television Corporation, Rawalpindi.

Brig. M.Z.H. Rathore, Army Signal Centre, Mangla.

Mr. Mazharuddin, Chief Officer Research, Headquarters Office, Pakistan Western Railways, Lahore.

IV. Industrialization:

Dr. A.K. Qureshi, General Manager (Chemicals), W.P.I.D.C., Karachi.

Dr. Shabir A. Qureshi, P.C.S.I.R., Lahore.

Mr. S.A. Sattar, Kohi-Noor Rayon Mills Ltd., Kala Shah Kaku.

Dr. Naseem Allahwala, Al-Atlas, Mohammadi House, McLeod Road, Karachi.

Mr. Hameed Ullah, Acting General Manager, PITAC, Lahore.

Mr. Mukhtar Ahmad, Deputy Technological Adviser, Ministry of Science & Technology, Islamabad.

Mr. Abdul Hamid Chottani, PCSIR, Karachi.

Dr. A.A. Faruqui, Manager Commercial Division, National Refinery Ltd., Karachi.

V. Water Resources:

Mr. Manzoor Ahmad, Additional Secretary, Ministry of Fuel, Power and Natural Resources, Islamabad.

Mr. Sarfaraz Khan Malik, Joint Secretary, Economic Affairs Division, Islamabad.

Mr. A.H. Kazmi, Director, Geological Survey of Pakistan, Regional Office, Block 50, Pak Secretariat, Shahrah-e-Iraq, Karachi.

Mr. C.M. Umar, Chief Engineer, W.A.S.I.D., WAPDA, Lahore.

Mr. S.M. Yaqoob, Director, Irrigation Research Institute, Library Road, Lahore.

Mr. Khalid Pervaiz, Head, Department of Irrigation and Drainage, Agricultural University, Lyallpur.

VI. Soil Management:

Dr. A.G. Asghar, Fellow Pakistan Academy of Sciences, 30 Gulberg Road, Lahore.

Ch. Mohammad Nawaz, Director Soil Conservation Department, 3/4 Asghar Mall Scheme, Rawalpindi.

Dr. M. Amjad Hassan, Director Soil Survey, Ferozepur Road, Lahore.

Dr. M. Bashir Chaudhri, Director General, Soil Survey Project of Pakistan, Ferozepur Road, Lahore.

Dr. Inam-ul-Haq, Head Department of Soil Sciences, Agricultural University, Lyallpur.

Dr. A.G. Khan, Associate Professor, Department of Biology, Islamabad University, Islamabad.

VII. Weather and Climate Modification:

Mr. M. Samiullah, Director, Meteorological Department, Block No. 3, Pak Secretariat, Karachi.

Mr. M. Rehmatullah, Deputy Director, Pakistan Meteorological Department, Headquarters Office, Secretariat Block 1 - 3, Shahrah-e-Liaqat, Karachi.

Mr. M. Umar, Chief Engineer, WASID, Gulberg, Lahore.

Mr. A.M. Khattak, Advisor Forests, Ministry of Food and Agriculture, Islamabad.

Dr. Tariq Mustafa, SUPARCO, Karachi.

VIII. Modernization of Agriculture:

Dr. Israr-ul Haq, Vice-Chancellor, Agricultural University, Lyallpur.

Dr. Abdul Wahid, Scientist Emeritus, Karachi University, Karachi.

Dr. M. Yaqoob Bhatti, Animal Husbandry Commissioner, Ministry of Food, Agriculture & Rural Development, Islamabad.

Lt. Col. M. Sadiq Malik, Joint Secretary, Ministry of Food, Agriculture and Rural Development, Islamabad.

Dr. S.A. Qureshi, National Coordinator, Wheat Improvement Programme, Agricultural Research Institute, Lyallpur.

Mian Mumtaz Ali, Deputy Agricultural Development Commissioner, Islamabad.

Dr. K. Zia-ud-din, E-18, 4th Gizri Street, Defence Housing Society, Karachi-6.

IX. Oceanography:

Mr. Mohammad Samiullah, Director, Meteorology Department, Karachi.

Mr. S.A. Jalil, Director Marine Fisheries, Karachi.

Mr. A.H. Kazmi, Director Geological Survey of Pakistan, Quetta.

Dr. G .S. Qureshee, Lt. Cdr., P.N. Hydrographic Directorate, Pak Navy, Karachi.

Mr. Hatim-un-Wala, PCSIR, 21-E, Block 6, PECHS, Karachi.

X. Food and Nutrition:

Dr. A.H. Khan, Principal Scientific Officer, PCSIR, Karachi.

Dr. M.B. Sial, Head, Department of Nutrition, Agricultural University, Lyallpur.

Dr. M. Ashfaq, Asstt: Professor of Paediatrics, Khyber Medical College, Peshawar.

Dr. S.M. Ali, Senior Research Officer, PCSIR, Lahore.

Dr. M. Shafique Chaudhary, Department of Food Technology, Agricultural University, Lyallpur.

XI. Fabrics and Clothing:

Dr. F.A. Bhatti, Principal, Institute of Textile Technology, Lyallpur.

Mr. M.B. Farooqi, Secretary, WPIDC, Karachi.

Chairman, Technological Research Sub-Committee of the Pakistan Central Cotton Committee, Karachi.

Dr. S.M.A. Shah, Senior Research Officer, PCSIR, Peshawar.

Mr. Mohammad Akbar Khan, Director Textile Department, Investment Promotion and Supplies, Karachi.

Mr. Wajid Qureshi, Textile Engineer, Ameejee Valijee & Co., Karachi.

XII. Housing and Urbanization:

Mr. Ashfaq Hassan, Chairman, Housing and Works Research Council, Islamabad.

Ch. Salim Ullah, Chief Physical Planning and Housing Section, Planning Division, Islamabad.

Dr. Ghulam M. Samdani, Regional and Urban Development Project, Ministry of Presidential Affairs, Islamabad.

Dr. Abdur Rahim, Director Planning, Lahore Improvement Trust, Lahore.

Mr. Ahmed Ali, Director Master Plan Department, KDA Karachi.

XIII. Population:

Dr. Vaqar Hussain Zaidi, Director Statistics, Population Planning Council, Haroon Chamber, Near Melody Cinema, Islamabad.

Dr. Batul Raza, Director, National Research Institute for Fertility Control, Pak Secretariat, Block 36-A, Shahrah-e-Iraq, Karachi-1.

Dr. Zaheer-ud Din Khan, Dy Director Reproductive Biology, National Health Laboratory, Islamabad.

Mrs. Wajia Hashmi, Chairman, People's Welfare Society, Islamabad.

Dr. Asma Khan, Deputy Director Planning, Sind Population Planning Board, P.O. Box 2009, Karachi-8.

Dr. Waziri, Principal R.T.C. Population Planning Board, 4-B Sir Syed Road, Peshawar Cantt.

Dr. Bismilla, District Technical Officer, Population Planning Board, C/O Mohd Ibrahim Kurd, Secretary Baluchistan Population Planning Board, Quetta.

Mrs. Mussharaf Ahmed, Deputy Director, Population Research, Population Planning Council, Islamabad.

XIV. Environment:

Dr. Afzal Qadri, Professor Emeritus, Karachi University, Karachi.

Dr. M. Sulaiman Kakli, Acting Chief, Agriculture and Food Section, Planning Division, Islamabad.

Mr. A.M. Khattak, Adviser Forests and Member/ Secretary Wildlife Enquiry Committee, Food and Agriculture Division, Islamabad.

Dr. H.H. Naqvi, Department of Botany, Peshawar University, Peshawar.

Dr. M. Yaqoob Bhatti, Animal Husbandry Commissioner, Ministry of Food, Agriculture and Rural Development, Islamabad.

Mr. S. Maqbool Elahi, Movement for the promotion of Parks & Playgrounds, P.O. Box No. 1040,Islamabad.

Mr. Mohammad Bilal Rashid, Vice President, Chartered Architect and Civil Engineer, 3-B, 4th Central Lane, Defence Housing Society, Karachi.

Dr. Ghulam M. Samdani, Regional and Urban Development Project, Ministry of Presidential Affairs, Islamabad.

Advisory Panels:

Ten Advisory Panels were constituted to advise the Foundation as to the best manner in which the functions entrusted to the Foundation could be performed.

The following were the members of the Advisory Panels:-

I. Information and Documentation:

Dr. V.G. Desa, Member Technology, PCSIR, Karachi.

Mr. M.A. Toor, Controller of Patents and Designs, Karachi.

Dr. A.R. Mohajir, Project Director, PASTIC, House No. 6, Street No. 22, F-7/2, Islamabad.

Dr. A. Moid, Librarian, Karachi University Library, Karachi.

Professor A.Q. Qureshi, Chairman, Board of Intermediate and Secondary Education, Lahore.

Dr. Altaf Hussain, Assistant Scientific Adviser, Ministry of Science and Technology, Islamabad.

Mr. Aslam Ghayoor, Director of Research, Ministry of Food, Agriculture & Rural Development, Room No. 335, Block 'B', Pak Secretariat, Islamabad.

Mr. A.Q. Kazi, Asstt. Scientific Adviser, Ministry of Science and Technology, Government of Pakistan, Islamabad.

II. Research Grants:

Professor N.M. Talpur, Professor of Mathematics, Sind University, Jamshoro, Hyderabad.

Professor S. Marghoob Ali, Head Department of Chemistry, University of Peshawar, Peshawar.

Dr. Abdul Hamid Khan, Director Research and Advanced Studies, Agricultural University, Lyallpur.

Dr. Abdul Wahid, Scientist Emeritus, Karachi University, Karachi.

Dr. Amir Mohammad, Director, Nuclear Institute for Agriculture and Biology, Lyallpur.

III. Utilization of Results of Research:

Mr. Ghulam Murtaza Shah, Joint Secretary, Ministry of Science & Technology, Islamabad.

Dr. Shafqat Siddiqi, Chairman, National Science Council, Karachi.

Dr. Islam Sheikh, Vice-Chancellor, University of Engineering and Technology, Lahore.

Dr. Heshamul Haque, Director-General, Agricultural Research Council, Karachi.

Mr. Abdul Hamid Chotani, Head, Fuel and Leather Research Centre, (PCSIR) Karachi.

Dr. Nasim Allah Walla, Director Development Institute, Karachi.

Dr. K. Ziauddin, E-18, 4th Gizri Street, Defence Housing Society, Karachi-6.

IV. Science Centres:

Professor A.Q. Qureshi, Chairman, Board of Intermediate & Secondary Education, Lahore.

Mr. H.M. Khoja, Chairman, Board of Intermediate and Secondary Education, Hyderabad.

Professor Ashfaq Ali Khan, Member Administrative Tribunal, Lahore.

Dr. Ghulam Rasul Chaudhry, Principal, Aitchison College, Lahore.

Professor Shahabuddin Mughni, Peshawar University, Peshawar.

Mr. Laeeq Ahmad, Controller of Examinations, University of Engineering and Technology, Lahore.

Mr. Azmat Ali Khan, 39, Garden Road, Karachi.

V. Scientific Societies:

Dr. M.M. Qureshi, Secretary, Pakistan Academy of Sciences, Islamabad.

Major Aftab Hassan, Secretary, Scientific Society, Karachi University, Karachi.

Dr. Riaz Ahmad, Vice President, Pakistan Society of Scientists and Scientific Professions, Karachi.

Dr. M.I.D. Chughtai, Secretary, Pakistan Association for the Advancement of Science, Lahore.

Mr. T.H. Hashmi, Vice President, Pakistan Institute of Engineers, Islamabad.

Dr. S.M.K. Wasti, President, Pakistan Medical Association, 1, Edward Road, Lahore.

VI. Scientists' Exchanges:

Dr. S.M. Jaffar, Deputy Scientific Adviser, Ministry of Science and Technology, Government of Pakistan, Islamabad.

Mr. Zafar Alam, Deputy Educational Adviser, Ministry of Education, Islamabad.

Mr. Rafiq Ahmad, Joint Educational Advisor, Ministry of Education, Islamabad.

Mr. Zafar Iqbal, Deputy Secretary, Economic Affairs Division, Islamabad.

Lt. Col. Shujaat Hasan Khan, Director, Ministry of Foreign Affairs, Islamabad.

VII. Science Conferences and Seminars:

Dr. M.M. Qureshi, Secretary, Pakistan Academy of Sciences, Islamabad.

Mr. G. Murtaza Gilani, Registrar, University of Agriculture, Lyallpur.

Professor M.I.D. Chughtai, Institute of Chemistry, Punjab University, Lahore.

Dr. K.E. Durrani, Associate Professor, Electrical Engineering, Engineering University, Lahore.

Major Aftab Hasan, Scientific Society of Pakistan, c/o Karachi University, Karachi.

VIII. Awards and Fellowships:

Dr. A.Q.K. Afghan, Additional Secretary, Ministry of Science & Technology, Government of Pakistan, Islamabad.

Lt. General Mohammad Ayub, Principal, Khyber Medical College, Peshawar.

Dr. Salimuzzaman Siddiqi, Director, Post-graduate Institute of Chemistry, Karachi University, Karachi.

Dr. Israr-ul Haq, Vice-Chancellor, University of Agriculture, Lyallpur.

Dr. Islam Sheikh, Vice-Chancellor, University of Engineering and Technology, Lahore.

IX. Surveys and Statistics:

Dr. W.M. Zaki, Vice-Chancellor, People's Open University, Islamabad.

Mr. Saeed Ahmad, Joint Secretary, Planning Division, Economic Section, Islamabad.

Dr. D.M. Qureshi, Chief Plan Coordination Section, Planning Division, Islamabad.

Dr. N.M. Azam, Secretary, National Science Council, Karachi.

Mr. Mohammad Afzal, Director Statistics, Planning Department, Punjab, Lahore.

Chairman, Department of Statistics, Karachi University, Karachi.

Mr. Abdul Rahim Dadi, IBM World Trade Corporation, Karachi.

X. International Liaison:

Mr. M.I.D. Chughtai, Secretary, Pakistan Association for the Advancement of Science, Lahore.

Mr. Zafar Iqbal, Deputy Secretary, Economic Affairs, Division, Islamabad.

Mr. Rafiq Ahmad, Member University Grants Commission, Islamabad.

Dr. S.M. Jaffar, Deputy Scientific Adviser, Ministry of Science and Technology, Government of Pakistan, Islamabad.

Mr. Akhtar Mahmood, Pak Sectt. No. 111, Member Federal Land Commission, Prime Minister's Secretariat, Rawalpindi.

Mr. Zainul Abidin, Chief Regional Cooperation Cell, Planning Division, Islamabad.

Mr. Javed Ahmed Mirza, Joint Secretary Incharge of RCD, Planning Commission, Islamabad.

CHAPTER 3

The report of the Auditors Messrs Riaz Ahmad & Co., Chartered Accountants, appointed by the Foundation in consultation with the Auditor General of Pakistan, is reproduced below:-

AUDITORS REPORT TO THE CHAIRMAN AND BOARD OF TRUSTEES OF PAKISTAN SCIENCE FOUNDATION.

We have examined the annexed balance sheet of Pakistan Science Foundation as at 30th June, 1974 and the Income and Expenditure Account for the year then ended, and we report that:-

a) We have obtained all the information and explanations we required.

b) Such balance sheet exhibits correct view of the state of the Foundation's affairs, according to the best of our information and explanation given to us and as shown by the books of the Foundation; and

c) In our opinion the books of account have been kept by the Foundation in accordance with the generally accepted principles of accounting.

Sd/-
(RIAZ AHMAD & CO.)
CHARTERED ACCOUNTANTS

RAWALPINDI 3rd April,1975

PAKISTAN SCIENCE FOUNDATION, ISLAMABAD
BALANCE SHEET AS AT JUNE 30, 1974.

FUNDS	NOTE		1974 Rs.	FIXED ASSETS (As per schedule annexed)		
Grant received	1	84,00,000	62,19,801	At cost	3,52,154	3,03,690
during the year		21,80,199		Less: Accumulated depreciation	48,464	
Less: Expenditure during the year						
				RESEARCH PROJECTS IN PROGRESS 5		12,38.010
CURRENT LIABILITIES				CURRENT ASSETS		
Other creditors	2	3,00,000		Accounts receivable 7	4,45,300	
Accrued expenses	3	27,921	3,51,837			
Other liabilities	4	23,916		Advances deposits and pre-payments 8	91,676	
RESEARCH SUPPORT GRANTS	5		12,38,010	Cash in hand	8,864	
				Cash at Banks:		
				In current Account	5,04,608	
				With Govt. Treasury	52,17,500	
						62,67,948
		Rs.	78,09,648			Rs. 78,09,648

AUDITORS' REPORT
(See annexed report of date)

Sd/-
(RIAZ AHMAD & CO.)
CHARTERED ACCOUNTANTS

RAWALPINDI, 3rd April, 1975

The balance sheet should be read in conjunction with the notes on accounts set out on page 82 to 84.

PAKISTAN SCIENCE FOUNDATION, ISLAMABAD

SCHEDULE OF FIXED ASSETS AS AT JUNE 30, 1974

PARTICULARS	COST			DEPRECIATION			Written down value as at June, 1974	Rate %
	As at July 1 1973	Additions during the year	As at June 30, 1974	As at July, 1973	Provided for the year	As at June 30, 1974		
Furniture and fixture	-	1,05,981	1,05,981	-	6,359	6,359	99,622	6
Office Equipment	-	62,637	62,637	-	9,395	9,395	53,242	15
Air Conditioners	-	74,764	74,764	-	11,214	11,214	63,550	15
Vehicles	-	1,06,699	1,06,699	-	21,339	21,339	85,360	20
Cycle	-	359	359	-	71	71	288	20
Library Books	-	1,714	1,714	-	86	86	1,628	5
	-	3,52,154	3,52,154	-	48,464	48,464	3,03,690	

RAWALPINDI, 3rd April,1975

Sd/-
(RIAZ AHMAD & CO)
CHARTERED ACCOUNTANTS

PAKISTAN SCIENCE FOUNDATION, ISLAMABAD
INCOME AND EXPENDITURE ACCOUNT FOR THE YEAR ENDED JUNE 30, 1974

EXPENDITURE	NOTE		1974 Rs.
GRANTS FOR			
Research supports,		12,38,010	
Science conferences and seminars		3,88,396	16,26,406
ADMINISTRATIVE AND OTHERS	9		4,08,808
TRAVELLING			
Science conferences and seminars - local		42,935	
Science conferences and seminars - foreign		37,882	80,817
SCIENTIFIC POOL			
Salaries		58,171	
Travelling		5,997	64,168
EXPENDITURE CARRIED FORWARD TO BALANCE SHEET			Rs.21,80,199

NOTE: 1. There has been no income during the year under consideration Grants received from the Government of Pakistan have been shown as funds of the Foundation, in the balance sheet.

2. The income and expenditure account should be read in conjunction with the notes on accounts set out on pages 82 to 84.

AUDITORS' REPORT
(See annexed report of date)

Sd/-
(RIAZ AHMAD & CO.)
CHARTERED ACCOUNTANTS

RAWALPINDI, 3rd April, 1975

RIAZ AHMAD & CO.
CHARTERED ACCOUNTANTS

PAKISTAN SCIENCE FOUNDATION, ISLAMABAD

NOTES ON ACCOUNTS - JUNE 30, 1974

GRANTS RECEIVED

1. Total grants sanctioned by the Government of Pakistan during the two fiscal years ended 30th June, 1974 amounted to Rs. 84 lacs including a supplementary grant of Rs. 4 lacs. These grants had been received by the Foundation prior to 30th June,1974.

OTHER CREDITORS

2. The sum of Rs. 3 lacs represents the grant earmarked by the Government of Pakistan for Pakistan Scientific and Technological Information Centre (PASTIC), which has inadvertently been received by the Foundation.

ACCRUED EXPENSES

3. These are made up of:

	Rs.
Salaries	16,549
House rent	4,500
Telephone	2,448
Professional fees	2,250
Travelling	859
Stationery	500
Entertainment	644
Vehicles running	171
Rs.	27,921

OTHER LIABILITIES

4. These comprise of:

Continental furniture house	15,384
G. P. Fund	2,174
Income tax	1,834
Provident fund	1,638
Benevolent fund	593
Group life insurance	229
Postal life insurance	56
Others	2,008
Rs.	23,916

RIAZ AHMAD & CO.
CHARTERED ACCOUNTANTS

5. In accordance with the principles outlined in the charter, grants aggregating Rs. 49,08,243 have been sanctioned by the Foundation for the conduct of various approved scientific research projects. Against Rs. 49,08,243, only Rs. 12,38,010 have so far been paid. The position is summarized below:

	Rs.	Rs.
Grants sanctioned (As per App. I)		49,08,243
Grants paid in respect of:		
Agreements finalized	6,67,041	
Arrangements not yet finalized	5,70,969	12,38,010
		Rs. 36,70,233

6. In respect of the grants referred to in note 5 above, the grantee has undertaken to incur the grant as per the provisions of the agreement and for the performance or execution of the research project for which the grant has been sanctioned. Accordingly, these grants are being carried forward in the accounts of the Foundation, and shall be written off or reduced as and when the expenditure is incurred and the proper account thereof is rendered to the Foundation.

ACCOUNTS RECEIVABLE

7. This represents the amount recoverable from Pakistan Scientific and Technological Information Centre (PASTIC). A sum of Rs. 4,03,770 has, however, been recovered in the subsequent period.

ADVANCES, DEPOSITS AND PREPAYMENTS

8. These consist of:

Advances		
Staff	4,236	
Expenses	46,975	
Others	2,115	53.326
Deposits		
Telephones	2,250	
Sui gas installation	1,000	3,250
Prepayments		
Rent		35,100
		Rs. 91,676

RIAZ AHMAD & CO.
CHARTERED ACCOUNTANTS

ADMINISTRATIVE AND OTHER EXPENDITURES

9. These are made up of:

	Rs.
Salaries - officers	1,01,251
Salaries - staff	66,706
Honorarium	1,080
Provident fund contribution	1,525
Leave salary	5,899
Medical	860
Travelling - officers	20,236
Travelling - staff	4,552
Rent - office	24,976
Rent - residential	53,810
Electricity and gas	1,613
Postage, telegram and telephone	17,019
Stationery	22,063
Vehicles running	10,649
Legal and professional	2,430
News papers and periodical	663
Liveries and uniform	3,369
Entertainment	7,099
Miscellaneous	2,636
Advertisement	11,908
Depreciation	48,464
	Rs.4,08,808

GENERAL

10. The figures have been rounded off to the nearest rupee.

RIAZ AHMAD & CO.
CHARTERED ACCOUNTANTS

Appendix - I

PAKISTAN SCIENCE FOUNDATION, ISLAMABAD

SCHEDULE SHOWING RESEARCH SUPPORT GRANTS SANCTIONED AND PAID DURING THE YEAR ENDED 30TH JUNE, 1974.

Project No.	Amount sanctioned Rs.	Amount paid Rs.
PU-BIO (22)	4,41,000	1,15,455
PU-BIO (38)	1,93,868	54,873
PU-BIO (40)	1,56,770	28,478
PU-BIO (50)	1,41,500	44,764
SU-BIO (31)	1,15,262	18,644
SU-BIO (35)	1,18,048	17,384
SU-BIO (52)	78,680	17,276
SU-BIO (53)	14,046	5,313
CU-CH (14)	3,31,192	94,910
FU-CH (19)	91,564	9,700
FU-CH (22)	43,360	6,600
FU-CH (38)	49,120	7,500
SU-CH (30)	1,98,300	21,800
SU-CH (44)	2,71,906	58,272
SU-CH (46)	3,53,700	78,088
SU-PHY (3)	81,600	22,935
PU-PHY (11)	52,882	7,280
PU-PHY (12)	1,61,260	48,483
PC-PHY (9)	1,17,272	18,932
CU-MATH(7)	16,710	9,560
PU-AGR (16)	3,61,551	89,620
PU-BIO (5)	2,05,895	33,881
CI-MED (11)	14,000	7,000
BU-GEO (10)	3,00,000	63,909
SU-Ocean(2)	1,46,237	25,253
PU-ENG (9)	1,57,520	12,100
SU-CH (10)	80,000	80,000
Letrite deposits	15,000	15,000
Sorghum Pilot Project	6,00,000	2,25,000
	49,08,243	12,38,010

Annexure - I

PAKISTAN SCIENCE FOUNDATION ACT 1973

National Assembly of Pakistan

Islamabad, the 2nd February, 1973

The following Acts of the National Assembly received the assent of the President on the 31st January, 1973 and are hereby published for general information:-

ACT No. III OF 1973

An Act to provide for the establishment of the Pakistan Science Foundation.

WHEREAS it is expedient to provide for the establishment of the Pakistan Science Foundation and for matters ancillary thereto,

It is hereby enacted as follows:-

1. SHORT TITLE, EXTENT AND COMMENCEMENT (This Act may be called the Pakistan Science Foundation Act, 1973.

(2) It extends to the whole of Pakistan.

(3) It shall come into force at once.

2. DEFINITIONS.- In this Act, unless there is anything repugnant in the subject or context,-

(a) "Board" means the Board of Trustees of the Foundation;

(b) "Chairman" means the Chairman of the Foundation; and

(c) "Foundation" means the Pakistan Science Foundation established under this Act.

3. ESTABLISHMENT OF THE FOUNDATION.- (1) As soon as may be after the commencement of this Act, the Federal Government may, by notification in the official Gazette, establish a Pakistan Science Foundation to promote and finance scientific activities having a bearing on the socio-economic needs of the country.

(2) The Foundation shall be a body corporate by the name of the Pakistan Science Foundation, having perpetual succession and a common seal, with power, subject to the provisions of this Act, to acquire, hold and dispose of property, both movable and immovable, and shall by the said name sue and be sued.

(3) The head office of the Foundation shall be at Islamabad.

4. FUNCTIONS OF THE FOUNDATION.- (1) The Foundation shall function as a financing agency for-

(i) the establishment of comprehensive scientific and technological information and dissemination centres;

(ii) the promotion of basic and fundamental research in the universities and other institutions on scientific problems relevant to the socio-economic development of the country;

(iii) the utilisation of the results of scientific and technological research including pilot plant studies to prove the technical and economic feasibility of processes found to be promising on a laboratory scale;

(iv) the establishment of science centres, clubs, museums, herbaria and planetaria;

(v) the promotion of scientific societies, associations and academies engaged in spreading the cause of scientific knowledge in general or in the pursuit of a specific scientific discipline or technology in particular;

(vi) the organisation of periodical science conferences, symposia and seminars;

(vii) the exchange of visits of scientists and technologists with other countries;

(viii) the grant of awards, prizes and fellowships to individuals engaged in developing processes, products and inventions of consequence to the economy of the country; and

(ix) special scientific surveys not undertaken by any other organization and collection of scientific statistics related to the scientific effort of the country.

(2) The Foundation shall also -

(i) review the progress of scientific research sponsored by it and evaluate the results of such research;

(ii) maintain a National Registrar of highly qualified and talented scientists of Pakistan, including engineers and doctors, in or outside the country and to assist them, in collaboration with the concerned agencies in finding appropriate employment; and

(iii) establish liaison with similar bodies in other countries.

(3) In the performance of its functions, the Foundation shall be guided on questions of policy by the instructions, if any, given to it by the Federal Government which shall be the sole judge as to whether a question is a question of policy.

5. BOARD OF TRUSTEES.- (1) The general direction, conduct and management of the affairs of the Foundation, including administration of its funds, shall vest in a Board of Trustees consisting of the following members, namely:-

Whole-time members

(i) the Chairman;

(ii) one eminent scientist;

(iii) the Director of Finance;

to be appointed by the President;

Part-time members

(iv) the Chairman of the National Science Council;

(v) four scientists to be nominated by the National Science Council; and

(vi) eleven eminent scientists to be nominated by the President.

(2) The remuneration and other terms and conditions of service of the Chairman and the two other whole-time members of the Board shall be such as may be determined by the President.

6. CHAIRMAN OF THE BOARD.- The Chairman of the Board shall be the Chairman of the Foundation and shall be appointed for a term of three years from amongst the eminent scientists of the country having experience of research and scientific administration.

7. TERM OF MEMBERS OF THE BOARD.- The members of the Board, other than the ex officio member, shall hold office for a term of three years and shall be eligible for re-appointment or re-nomination, as the case may be.

8, MEETINGS OF THE BOARD.- (1) The meetings of the Board shall be held at least twice a year and shall be presided over by the Chairman or, in his absence, by its whole-time scientist member.

(2) All decisions at a meeting of the Board shall be taken by a majority of the votes of the members present and voting.

9. QUORUM AT THE MEETING OF THE BOARD.- To constitute a quorum at a meeting of the Board not less than nine members shall be present.

10. EXECUTIVE COMMITTEE.- There shall be an Executive Committee consisting of the Chairman and the two whole-time members of the Board.

11. DELEGATION OF POWERS.- The Board may, from time to time, delegate to the Chairman or the Executive Committee such of its powers and functions as it may consider necessary.

12. AD HOC COMMITTEE.- The Foundation may set up ad hoc committees consisting of university professors and other leading scientists and experts to scrutinize applications for financial assistance for carrying out scientific research submitted to the Foundation by the universities or other institutions or by individual scientific workers or groups of scientific workers and to review and evaluate the results of research sponsored by the Foundation.

13. FUNDS.- The funds of the Foundation shall consist of -

(a) grants made by the Federal Government and the Provincial Governments;

(b) donations and endowments; and

(c) income from other sources.

14. BUDGET.- The Foundation shall cause to be prepared and approve a statement of its receipts and expenditure for each financial year.

15. ACCOUNTS AND AUDIT.- (1) The funds of the Foundation shall be kept in a personal ledger account of the Foundation with the State Bank of Pakistan or with any Branch of the National Bank of Pakistan acting as an agent of the State Bank.

(2) The accounts of the Foundation shall be maintained in such form and manner as the Auditor-General of Pakistan may determine in consultation with the Federal Government.

(3) The accounts of the Foundation shall be audited by one or more auditors who are chartered accountants within the meaning of the Chartered Accountants Ordinance, 1961 (X of 1961), and are appointed by the Foundation in consultation with the Auditor-General of Pakistan.

16. APPOINTMENT OF OFFICERS AND SERVANTS.- (1) The Foundation may appoint such officers and servants, and engage such consultants or experts, as it may consider necessary for the efficient performance of its functions, on such terms and conditions as it may deem fit.

(2) In fixing the terms and conditions of service of its officers and servants, the Foundation shall as nearly as may be conform to the scales of pay, allowances and conditions of service applicable to the corresponding class of employees of the Federal Government.

17. ANNUAL REPORT.- (1) The annual report of the Foundation, which shall, among other things, clearly bring out the benefits accruing to the nation as a result of the activities sponsored by the Foundation, shall be prepared by the Chairman and submitted, through the Board, to the Federal Government alongwith the audited accounts of the Foundation.

(2) The annual report alongwith the audited accounts of the Foundation shall be laid before the National Assembly.

18. REGULATIONS.- The Foundation may make Regulations for the efficient conduct of its affairs.

19. REPEAL.- The Pakistan Science Foundation Ordinance, 1972 (LII of 1972), is hereby repealed.

Annexure - 2

BUDGETARY ALLOCATION FOR VARIOUS PROGRAMMES 1973-74

The budgetary allocation made for the various programmes of the Foundation during the current year was as follows:-

1. Grants for Research Support	..	Rs. 50,00,000/-
2. Information & documentation	..	Rs. 1,00,000/-
3. Utilization of results of Research and transfer of technology.	..	Rs. 1,00,000/-
4. Science Centres, Herbaria, Clubs and Museums.	..	Rs. 5,00,000/-
5. Science Conferences, including meetings of Boards/Committees, Seminars and Workshops.	..	Rs. 5,00,000/-
6. Exchange of visits of scientists and technologists.	..	Rs. 10,00,000/-
7. Awards, Prizes & Fellowships	..	Rs. 5,00,000/-
8. Scientific Surveys and Collection of Statistics.	..	Rs. 4,00,000/-
9. Experts and Consultants.	..	Rs. 1,00,000/-
10. Scientists' Pool.	..	Rs. 5,00,000/-
11. Scientific Societies and Professional bodies.	..	Rs. 3,00,000/-
	Total:	Rs. 90,00,000/-

Annexure - 3

LIST OF SANCTIONED GRANTS
1973-74

Sl. No.	Title of Scheme.	Amount sanctioned	Name of Principal Investigator & organizations supported.
1.	**Biological Sciences**		
	(i) Ecopathological studies in Plantation and Natural Forests of Punjab.(PU-BIO(22)	4,41,000	Dr. Abdul Hamid Khan, Principal Investigator, Faculty of Sciences, Agricultural University, Lyallpur.
	(ii) Collection & study of Vertebrate Fauna of Pakistan.(PU-BIO(38).	1,93,868	Dr. Nadeem Sheri, Chairman, Zoology Deptt., Agricultural University, Lyallpur.
	(iii) Ecology of some Avian and Mammalian Pests. (PU-BIO(40).	1,56,770	Dr. M. Azhar Beg, Zoology Department, Agricultural University, Lyallpur.
	(iv) Survey and control of diseases of Silk Worm B. Moriin Punjab, NWFP and Azad Kashmir. (PU-BIO(50).	1,41,500	Dr. Rafat H. Jafari, Zoology Department, Punjab University, Lahore.
	(v) Studies on the Taxonomy, incidence, seasonal fluctuations and ecology of the Parasites of fresh water fish of Kinjar Lake (SU-BIO(31).	1,15,262	Dr. Ahmed Mohiuddin, Deptt. of Fresh Water Biology, Sind University.
	(vi) Palynological Studies of Plants growing in Sind (SU-BIO(35).	1,18,048	Dr. K. Mustafa Khan, Botany Department, Sind University,Jamshoro.
	(vii) Marine Molluscs of Pakistan(SU-BIO(52).	78,680	Dr. M.M. Tirmizi, Chairman, Zoology Department, Karachi University, Karachi.
	(viii) Anatomical Studies of Mantis Shrimp. (SU-BIO(53),	14,046	Dr. M.M. Tirmizi, Zoology Department, Karachi University, Karachi.

2. Chemical Sciences:

(i)	Studies in thermodynamics of interaction of solid catalysts with gases liquids and vapours. (CU-CH(14)	3,31,192	Dr. M. Afzal, Chemistry Department, Islamabad University
(ii)	Chemical Analysis of Minerals for their Commercial exploitation (FU-CH(19).	91,564	Dr. M. Sakhawat Husain, Chemistry Deptt., Peshawar University.
(iii)	Studies on the interaction of organic phosphates with metal ions and relations of the molecular structure to biological activity (FU-CH(22).	43,360	-do-
(iv)	Influence of ligand structure on the coordination properties and reactivity of transition metals. (FU-CH-38).	49,120	Dr. S. Marghoob Ali, Chemistry Department, Peshawar University.
(v)	Chemical Analysis and Utilization of certain Sub-standard or Uneconomic minerals and ores of Pakistan. (SU-CH (30).	1,98,300	Dr. Naseem Naqvi, Institute of Chemistry University of Sind.
(vi)	Chemical composition of Hair Roots as a criterion of protein malnutrition. (SU-CH-(44).	2,71,906	Dr.(Mrs.)Barbra Zain, Bio-Chemistry Deptt., Karachi University.
(vii)	Study on growth, Kinetics and macro-molecules of various cells in culture (SU-CH (46).	3,53,700	Dr. Zainul Abedin, Faculty of Sciences, Karachi University.

3. Physical Sciences:

(i)	Investigation of Electronic Spectra of Metallic Hydrides. (SU-PHY(3).	81,600	Dr. M. Rafi, Department of Physics, Karachi University.
(ii)	High Energy Phenomenology (PU-PHY(11).	52,882	Dr. M. Saleem, Department of Physics, Punjab University, Lahore.
(iii)	Properties of Dielectrics at microwave frequencies.(PU-PHY(12).	1,61,250	Dr. Shafiq Husain Tirmizi, Deptt. of Physics, Punjab University, Lahore.
(iv)	To investigate momentum distribution of nucleus inside the nuclei of the light elements of emulsion using nuclear emulsion technique. (PU-PHY(9).	1,17,272	Dr. N.A. Khan, Deptt. of Physics, Talimul Islam College, Rabwah.

4. Mathematics Computing activities:

(i)	Study of Magneto-Hydrodynamics and Plasma Physics (CU-MATH(7).	16,710	Dr. M.A. Rashid, Chairman, Deptt of Mathematics, Islamabad University.

5. Agricultural Sciences:

(i)	Synthesis of improved wheat genotypes based on the development of criteria involving physiological analysis. (PU-AGR(16).	3,61,551	Mr. M.I. Hashmi, Scientific Officer, Nuclear Institute of Agriculture and Biology, Lyallpur.
(ii)	Morpho-Physiological effects of gamma irradiation on growth and yield of agricultural crop. (PU-BIO-(5).	2,05,895	Dr. Javed Iqbal, Botany Department, Punjab University, Lahore.

6. Medical Sciences:

	Studies for development of a vaccine for trachoma. (CI-MED(11).	14,000	Col. M.I. Burney, Executive Director, National Health Laboratory, Islamabad.

7. Earth Sciences:		
Exploration of Flourite Deposits in Kalat Divn. (BU-GEO-(10).	3,00,000	Dr. Syed Neaz Ahmed, Chairman, Departmemt of Geology, Baluchistan University.
8. Oceanography:		
Studies on settlement and control of Marine organisms in Cooling system of coastal installations. (SU-ocean(2).	1,46,237	Dr. S.M. Haq, Chairman, Institute of Marine Biology, Karachi University.
9. Engineering Sciences:		
The Photogrammetric measurement of constructional displace-ment of Tarbela Dam. (PU-Eng.(9).	57,520	Dr. Mohd Sharif Bhatti, Asstt. Professor, Civil Engg. University of Engineering and and Technology, Lahore.
10. Utilization of Research Results:		
(i)Studies on H.Y.V. of grain Sorghum to develop the multiple cropping system on irrigated lands in various regions of Pakistan.(RES.(20).	6,00,000	Rafhan Maize Products Ltd., Lyallpur (Dr. A.G. Bhatti).
(ii) Recovery of Iron, Aluminium and Titanium metals from Laterite deposits found near Ziarat in Baluchistan.	15,000	Dr. Riaz Ali Shah, PCSIR Laboratories,
11. Institutional Support:		
Purchase of Mass spectrometer for the Post Graduate Institute of Chemistry, Karachi.	80,000	Director, Institute of Chemistry, Karachi University.

GRANTS GIVEN TO VARIOUS AGENCIES
1973-74

(A) ALL PAKISTAN SCIENCE CONFERENCE

S.No.	Agency	Grant in Rupees
1.	University of Baluchistan, Quetta, as host institution for holding the Annual Science Conference sponsored by Scientific Society of Pakistan.	50,000
2.	University of Sind, Jamshoro, Sind as host institution for holding the 25th All Pakistan Science Conference sponsored by Pakistan Association for the Advancement of Science.	50,000

(B) SCIENTIFIC SOCIETIES AND LEARNED BODIES FOR THE ACHIEVEMENT OF THEIR OBJECTIVES:

1.	Pakistan Association for the Advancement of Science, 14, Shah Jamal Scheme, Lahore-12.	30,000
2.	Scientific Society of Pakistan, Zoological Building, University of Karachi, Karachi-32.	30,000
3.	Pakistan Academy of Sciences, c/o University of Islamabad, Islamabad.	30,000
4.	The Institute of Engineers, Islamabad.	30,000
5.	Pakistan Association of Scientists and Scientific Professions, E-5, Cosmopolitan Colony, Karachi.	30,000
6.	Sind Science Society, Sind University, Sind.	30,000
7.	Zoological Society of Pakistan, Department of Zoology, University of Sind, Jamshoro, Sind.	5,000

8.	Pakistan Botanical Society, Department of Biology, University of Islamabad, Islamabad.	5,000
9.	Society for the Advancement of Animal Sciences, Veterinary Research Institute, Ghazi Road, Lahore Cantt - 13.	5,000
10.	Society for the Advancement of Agricultural Societies Pakistan, University of Agriculture, Lyallpur.	5,000
11.	Pakistan Association for the Promotion of Science and and Appropriate Technologies Pakistan Science Foundation, Islamabad.	5,000

(C) SCIENCE FAIRS/SYMPOSIA/SEMINARS

S.No.	Agency	Object	Grant in Rupees
1.	Pakistan Association of Scientists and Scientific Professions.	Science Fairs (both National and Provincial)	30,000
2.	Pakistan Academy of Sciences.	Holding a series of Symposia/ Seminars on: (1) Impact of Science on Society and (2) Formulation of Science Policy.	20,000
3.	University of Agriculture, Lyallpur.	Seminar on Zoonosis.	5,000
4.	Pakistan Association for Promotion of Science & Appropriate Technologies.	Seminar on Meat Production and Technology.	5,000
5.	National Health Laboratories, Islamabad.	2nd Annual Health Symposium.	3,000
6.	University of Islamabad.	Seminar on recent Advances in Chemical Sciences.	5,000

7.	University of Engineering and Technology, Lahore.	National Symposium on Electrical Power Engineering.	5,000
8.	Ministry of Food and Agriculture.	Lectures by Dr. John A. Howards on Remote Sensing Techniques at Islamabad, Lyallpur and Karachi.	4,396
9.	University of Islamabad.	International Symposium on "Impact of Science on Society".	6,000
		Total:	3,88,396

TRAVEL GRANTS FOR VISITS ABROAD

S.No.	Name and Address	Institutions/ Places visited	Purpose	Amount paid in Rupees
1.	Dr. A.G. Khan, University of Islamabad.	University of Minnesote, U.S.A.	To attend the 2nd International Congress of Plant Pathology.	14,500
2.	Dr. M.A. Chaudhry University of Islamabad	West Germany and England	As British Council Visitor.	7,500
3.	Dr. Zainul Abedin University of Karachi.	Cold Spring Harbor Laboratory, New-York.	To attend Animal Cell Culture Workshop.	15,882
			Total:	37,882

Annexure - 4

LIST OF DISTINGUISHED VISITORS

Month	Date of meeting	Visitor
October	8-10-1973	Dr. Ardell J. Bjugtad, Assistant Chief Wildlife Habitats and Range Management USDA.
	11-10-1973	Dr. Robert B. Casady and Dr. David Martin Daughterly, International Programmes Office U.S. Department of Agriculture.
	20-10-1973	Dr. Stanley Handleman, Deputy Chief Education Officer, Asia Regional Base, USDA.
November	9-11-1973	Dr. Edminster, Director, Agricultural Research Services, USDA, Washington D.C. & Dr. Lane, PL 480 Funds Administrator at Delhi.
	12-11-1973	Dr. Vernon Ruttan, Agricultural Development Council, New-York.
	13-11-1973	Mr. Selim Marcos, Division of Oceanography, UNESCO, Paris.
December	20-12-1973	Dr. E.E. Schumacher, President, Intermediate Technology Development Group of U.K.

Month	Date of meeting	Visitor
December	20-12-1973	Dr. M. Donald Dow, National Academy of Sciences, Washington.
January	17-1-1974	Robert P. Higgins, Wayns A. Mills Reywond B. Maning of Smithsonian Institute, U.S.A.
	22-1-1974	Willian C. Galegar, Herbert B. Quinn Jr. The representative of the Environmental Agency, USA.
February	21-2-1974	Dr. James C. King, Deputy Director, Office of the International Health, U.S.A. Dr. Kenneth E. Taylor, Associate Commissioner for Science, U.S.A.
	23.2.1974	Mr. William T. Knox, Director, National Technical Information Service, U.S. Department of Commerce, WASHINGTON, D.C.
	25-2-1974	Dr. Richard K.C. Hsich, Chief, Health Service, U.S.A.
	1-3-1974	Mr. Fred Ruggles, Water Resources Division, United States Geological Survey.
March	3-3-1974	Dr. Raymond M. Davis, Director of Operations, U.S. International Executive Service Corps, Bangkok Office.
April	18-4-1974	1. Mr. O.S. Reid 2. Dr. Pyle 3. Mr. J.A. Barnet 4. Dr. G.F. Renolds of the U.K. Intermediate Technology Services Group.

Month	Date of meeting	Visitor
May	4-5-1974	Dr. Weis, Chief Science Division World Bank, Washington.
June	24-6-1974	Dr. Bodo Bartocha, Head of International Programmes, National Science Foundation, U.S.A. & Dr. R.R. Ronkin, National Science Foundation, U.S.A.