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# ANNUAL REPORT

FOR THE YEAR 1975-76

Pakistan Science Foundation  
Islamabad

# **PAKISTAN SCIENCE FOUNDATION**

**ANNUAL REPORT  
1975-76**

LETTER OF TRANSMITTAL

Islamabad

June 1977

Dear Mr. Minister,

I have the honour to transmit herewith the Third Annual Report of the Pakistan Science Foundation, for the Fiscal year 1975-76, alongwith its audited accounts, as 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

Mr. Niaz Muhammad Wassan,  
Minister for Science & Technology,  
Government of Pakistan,  
ISLAMABAD.

## PAKISTAN SCIENCE FOUNDATION

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Executive Committee

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Dr. S.M. Qureshi	Member (Science)
Mr. Ijaz Ahmad	Member (Finance)

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Three whole-time Members appointed by the President:

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Dr. S.M. Qureshi	Member (Science)
Mr. Ijaz Ahmad	Director/Member (Finance)

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Four Scientists nominated by the National Science Council.

Dr. M.A. Kazi, Chairman, University Grants Commission, Islamabad.

Mr. Ashfaq Hasan, Chief Engineer, Punjab Building Department, Lahore.

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

Eleven Eminent Scientists nominated by the President:

Professor Abdus Salam, F.R.S., Imperial College of Physical Science, London.

Dr. Salim-uz-Zaman Siddiqi, F.R.S., Director, Hussain Shah Jamal Post-graduate Institute of Chemistry, University of Karachi, Karachi.

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

Dr. M. S. H. Siddiqui, General Manager, Hydro-Carbon Development Institute of Pakistan, Islamabad.

Dr. Amir Muhammad, Vice-Chancellor, University of Agriculture, Lyallpur.

Professor M. A. Z. Mohyidin, Chairman, Pakistan Medical Research Council, Lahore.

Mr. Manzoor Ahmad, Member (Power), Pakistan Atomic Energy Commission, Islamabad.

Dr. M. Yaqoob Bhatti, Additional Secretary to the Government of Pakistan, Ministry of Food, Agriculture and Rural Development, Islamabad.

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

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

Mr. Abdul Mannan Khan, Director-General, Geological Survey of Pakistan, Quetta.

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LIST OF ABBREVIATIONSProvinces and Administrative Units:

B	Baluchistan
C	Centrally administered areas
F	North West Frontier Province
P	Punjab
S	Sind

Sponsoring Institutions:

AC	Agricultural College
AU	Agricultural University
EU	Engineering University, Lahore
IU	Islamabad University
KU	Karachi University
MH	Mayo Hospital
PU	Peshawar University/Punjab University
SU	Sind University
KMC	Khyber Medical College
NHL	National Health Laboratories
CSIR	Council of Scientific & Industrial Research
JPMC	Jinnah Post-Graduate Medical Centre
NIAB	Nuclear Institute for Agriculture & Biology, Lyallpur
AFMC	Armed Forces Medical College, Rawalpindi

Disciplines:

AGR	Agricultural Sciences
BIO	Biological Sciences
ENG	Engineering Sciences
MED	Medical Sciences
PHY	Physical Sciences
CHEM	Chemical Sciences
MATH	Mathematics & Computer Sciences
EARTH	Earth Sciences
OCEAN	Oceanography



## INTRODUCTION

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 needs of the country". Under the Act, the Foundation has been entrusted with the following functions:-

- (a) i) establishment of comprehensive scientific and technological information and dissemination centres;
- ii) 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) 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) establishment of science centres, clubs, museums, herbaria and planetaria;
- v) 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) organization of periodical science conferences, symposia and seminars;
- vii) exchange of visits of scientists and technologists with other countries;
- viii) 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 outside the country, and to assist them, in collaboration with the agencies concerned, in finding, within Pakistan, employment suited to their genius; and
  - iii) cultivate liaison with similar bodies in other countries.

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) establishment of a national scientific information system, (iii) promotion of public understanding of science, (iv) utilization of the results of scientific and technological research, and (v) utilization of the scientific man-power and arresting the flight of talent from the country.

## CHAPTER - I

ACTIVITIES AND PROGRAMMES:

The progress of work done by the Pakistan Science Foundation during the year 1975-76, under the various functions entrusted to it, is summarised below:-

Item I: Establishment of Scientific & Technological Information & Dissemination Centres.

The Pakistan Scientific and Technological Information Centre (PASTIC) was further strengthened and continued to provide, inter-alia, the following services:

Documentation Service

- 2000 scientific and technical documents were procured from national/international sources and were supplied to scientists and technical workers.
- At the request of researchers in the country, 20 technical and scientific documents in German, Russian, French and Chinese languages were translated into English.
- 30 bibliographies were prepared on specialized subjects.
- Regular reprographic service was provided to the scientists and technologists in the country at subsidized rates.

Information Transfer Service

- Transfer of technical and scientific information to various clients was arranged through NTIS (USA), Current Contents, I.S.I. (U.S.A.) and the Pakistan Current Contents.
- Data bases in U.S.A. and U.K. were utilized for the collection of information and its transfer to the users in various institutions in Pakistan.
- Patent information service in various fields of technology was provided to the scientists and other users in the country.

### PASTIC National Science Reference Library

The strengthening of the National Science Reference Library was given top priority. As the grant-in-aid given by the Government for the PASTIC Project in the year 1974-75 was inadequate, a special grant of Rs. 2 lac was granted to the PASTIC by the Pakistan Science Foundation to supplement the Government grant. Nearly 1200 reference books and 83 periodicals worth Rs. 5 lac were ordered/subscribed to in the year 1974-75. Most of these books and periodicals have been received during the year under report. A fresh order for scientific and technological reference material worth Rs. 1.5 lac has been placed during the year 1975-76.

### Establishment of PASTIC Sub-Centres

In addition to the sub-centres at Karachi and Lahore and the National Centre at Islamabad, two new sub-centres, one each at Peshawar and Quetta, were established during the year under report, making a total of 4 sub-centres and one national centre. In this way a net-work of scientific and technological information has now been developed in the country.

### PASTIC Projects.

PASTIC has undertaken the following long-term projects:-

- i) Preparation of computer-based lists of scientific and technical periodical holdings in Pakistani libraries.
- ii) Computerization of scientific and technical literature produced in Pakistan.
- iii) Preparation of an Index to Research and Development Reports published by government departments.
- iv) Compilation of an Index to Post-graduate Degree Dissertations in the field of Science and Technology.
- v) Survey of users' requirements of scientific and technological data.
- vi) Preparation of a directory of current scientific and technical research projects in Pakistan.

### PASTIC as UNEP/IRS Focal Point

PASTIC was declared as the focal point of UNEP/ International Referral Service and a grant of Rs. 1.25 lac was sanctioned for the development of this focal point. A feasibility report and the PC-I proforma has been submitted for approval and release of funds.

### Other Activities

- i) A seminar on scientific information was held at Karachi.
- ii) A refresher course for librarians was conducted at the National Centre of PASTIC, Islamabad.
- iii) A training programme for six weeks on methodology of documentation and information data processing and information analysis was arranged at Islamabad.

Item II: RESEARCH SUPPORT

Promotion of basic and fundamental research in universities and other institutions on scientific problems relevant to the socio-economic development of the country.

The Foundation carries out its statutory responsibility for the promotion and support of research through a number of programmes which, inter-alia, include: (a) research grants for projects submitted by individuals or groups of scientists in the universities and other research institutions; (b) organization of integrated research programmes; (c) provision of equipment, literature and staff training facilities, building of institutional capability for conducting research; and (d) support for participation in regional and international research programmes.

Grant of research projects submitted by individual research workers or groups of scientific workers

The grant of funds for research projects is the Foundation's principal programme for the promotion of basic and fundamental research in the universities and other research establishments. The criteria for research grants are:

- (a) the scientific merit of the project;
- (b) competence of the principal investigator to accomplish the proposed plan of work in an efficient manner;
- (c) availability of requisite facilities at the institution sponsoring the research proposal;
- (d) the urgency and importance of the proposed research project;
- (e) the number of persons likely to benefit from it;
- (f) possibility of wide-scale application of the results of the proposed research; and
- (g) likelihood of the completion of the project within the stipulated time.

Before the research proposals are finally approved by the Executive Committee, they are reviewed by one or more specialists in the concerned discipline and critically examined by the PSF technical and finance committees to effect improvements if necessary.

Sixty-one research projects costing Rs. 2,76,52,026/- carried over from the previous year and forty-four new proposals received during the year costing Rs. 1,20,51,765/- were processed.

Twenty-nine research proposals were sanctioned during the year under report by the Foundation at a cost of Rs. 31,32,030/- Table-I gives details of the year-wise and discipline-wise distribution of the sanctioned projects.

TABLE - I

Scientific research projects sanctioned discipline-wise, during fiscal years 1973-74, 1974-75 and 1975-76.

S. No.	Discipline	1973-74		1974-75		1975-76	
		No. of schemes	Amount sanctioned (Rupees)	No. of schemes	Amount sanctioned (Rupees)	No. of schemes	Amount sanctioned (Rupees)
1.	Agricultural Sciences	1	3,61,551	6	16,36,346	8	11,63,966
2.	Biological Sciences	9	14,70,069	13	21,62,504	2	74,373
3.	Chemical Sciences	7	14,09,038	9	12,62,804	8	10,35,897
4.	Earth Sciences	1	3,00,000	3	3,91,628	3	78,845
5.	Engineering Sciences	1	57,520	1	35,000	1	30,000
6.	Environmental Sciences	-	-	-	-	3	3,79,206
7.	Mathematics	1	69,395	1	1,00,000	1	44,835
8.	Medical Sciences	1	14,000	7	1,86,071	2	2,70,968
9.	Oceanography	1	1,46,237	-	-	1	53,940
10.	Physical Sciences	4	4,41,174	1	5,14,855	-	-
11.	Surveys and Statistics	-	-	-	-	-	-
Total:		26	42,68,984	41	62,89,208	29	31,32,030



Summary Description of Research Projects:

A brief description of the research projects, sanctioned during the year 1975-76, is as, given below:

AGRICULTURAL SCIENCES

S-AC/AGR(21)

Title: Survey, identification and control of plant virus diseases in Sind.

Viral infections are amongst the most destructive of plant diseases of economic crops. The project aims at carrying out a detailed survey of virus diseases of solanaceous crops like potato, tomato and red pepper grown in the province of Sind, assessing losses and evolving control measures.

AGR(28)

Title: Studies on rinderpest-like and other diseases prevalent in livestock at Landhi Cattle Colony, Karachi.

The rinderpest-like disease syndrome in livestock is responsible for heavy economic losses in the country in general and at the Landhi Cattle Colony, Karachi, in particular. The problem has existed in the said colony for the last 10 years but no conclusive identification of the causal agent/agents has been made, nor has an effective remedy been developed so far to check the substantial losses of buffaloes as well as cattle due to this disease.

The objectives as envisaged in this project are to isolate and identify the virus/viruses, to conduct comparative studies on the characteristics of the etiologic virus as well as rinderpest virus; evolve efficient and rapid methods of diagnosis and develop an effective vaccine to combat and adequately control this disease.

F-FI/AGR(30)

Title: Biology and integrated Control of Shisham bark borer.

The Shisham bark beetle, Agrius dalbergiae has appeared as a very serious pest in shisham plantation at Islamabad and is spreading to road-side plantations on highways emerging from Islamabad. The extensive gallery system made by the grubs in the bark breaks cell sap flow resulting in mortality of 5-10 per cent of the growing stock every year and making shisham-raising in the area difficult. Spreading of this pest, as it has already started through the road-side plantations, will also pose a great threat to shisham raising even in the irrigated plantations. The project aims at a study of the life history of the beetle to find out effective methods of control. Silvicultural, biological, microbial and use of antifeed ants will be tried as also the application of insecticides in a safer way, such as soil treatment, injection into stem and brush painting or spraying of tree trunks.

For silvicultural control, removal of infested trees before adult emergence of the beetle, application of fertilizer and irrigation water etc. will be tried. Study of parasites and predators of the pest and possibility of their application for biological control will be investigated.

AGR(31)

Title: Cytogenetic studies of branched ear derivatives in wheat.

There is a great potential for increasing the productive capacity of wheat plant by modifying it so as to bear many tillers and each tiller in turn to bear a larger number of grains of medium weight. Triticum turgidum is a species of wheat with 28 chromosomes and possesses branched ear, while the common bread wheat (*T. aestivum*) is a 42 chromosome species and the spike is unbranched. By successive back crossing some 500 lines have been established, a few of which definitely hold

a great promise in out-yielding the regular T. aestivum. The main objective of the present project is to improve the grain quality and seed size in these lines by thoroughly screening the material at hand and hybridization after careful cytological studies of the promising strains.

AGR(32)

Title: Con-servation of superior specimen of buffalo and propogation of superior germ plasm to improve level of performance of Ravi/Nili buffaloes at Livestock Experiment Station, Qadirabad.

Livestock as a whole and especially buffalo production has been a seriously neglected area of research and development in Pakistan. The best milch buffaloes of the world are found in the Punjab, whose potential has not as yet been fully exploited. The project aims at the identification of superior animals with outstanding performance and making extensive use of their progeny through artificial insemination. It is hoped that as a result of this study animals with higher level of performance would be available to produce milk of better quality at less cost.

S-AC/AGR(36)

Title: Investigations on nematode diseases in Sind Region.

Nematodes are very destructive plant parasites. They attack many plant species and cause a variety of diseases to various crops like banana, tomatoes, wheat, cotton etc. No detailed information is available on the occurrence of different species and the extent of damage they cause in Sind Region. The present project envisages carrying out a detailed survey and identification of nematode diseases and to assess the losses as well as suggest control measures.

S-AC/AGR(38)

Title: Investigation on the ecology and biology of cutworm in Hyderabad Region.

Cutworms cater-pillars inhabit the surface layers of the soil during the day time but come out at night to chew plant

stems and newly set seedlings, particularly, when they are at ground level and thus cause extensive damage. The project aims to carry out a detailed survey of the losses caused by the cutworms in the Hyderabad region to study the life cycle, seasonal history, migratory habits, population dynamics and to investigate natural enemies and their potential to keep the pest under control.

As a result of these investigations it would be possible to control the pest in this region, which would ultimately lead to a healthy and profitable crop production.

AGR(42)

Title: Scheme for the surveillance and monitoring of diseases naturally transmitted between vertebrate animals and man and related health hazards.

Zoonoses are diseases and infections which are naturally transmitted between animals and man. There are as many as 150 zoonoses including tuberculosis, brucellosis, anthrax, salmonellosis and rabies, transmitted to man due to close association with animals. This has been a neglected field of great importance to public health.

The purpose of the project is to initiate work on the surveillance and monitoring of zoonoses and related health hazards and to provide, as far as possible, necessary technical assistance required for the development of a national zoonoses control programme. The project envisages to undertake surveys, identification and epidemiological investigations on these diseases.

This will result in the reduction of communicable diseases from animals to man and prevention of economic losses in livestock due to the major zoonotic diseases.

BIOLOGICAL SCIENCES

SU-BIO(68)

Title: Bibliography of marine fishes and fisheries of Pakistan.

The project aims at the preparation of a comprehensive bibliography of marine fishes and fisheries of Pakistan. Extensive work has been published on the subject by workers at different institutions in Karachi, Lahore and Lyallpur but the papers are scattered in scientific journals. Under this project, these papers will be critically studied and annotated. Personal contacts will also be made with workers who have published their work abroad so that the bibliography may be as complete as possible.

P-CSIR/BIO(69)

Title: Production of Amylolytic Enzymes for Industrial Use.

Amylolytic enzymes find extensive application in the textile, food and pharmaceutical industries. These enzymes are imported in Pakistan for industrial use. The basic raw materials, such as, wheat bran, maize bran and starch, for amylase production, are, however, abundantly available in Pakistan. The aim of the study is the local production and profitable application of these enzymes in various industrial processes. The results achieved so far on laboratory scale studies are quite encouraging. Attempts, are, therefore, being made to exploit these findings for commercial production of amylolytic enzymes within the country.

S-KU/Chem (5)

Title: Chemistry of Nucleosides.

Nucleic acids have long been known to possess hereditary properties. Some of the thio-ribonucleosides, apart from their importance in chemotherapy, have been found to be minor components of a transfer RNA molecule. If one knows the order

of reactivity of these compounds, it would be possible to cleave an RNA chain at a desired point and study its fragments. The knowledge and study of such molecule could provide valuable information for the care of hereditary diseases. The aim of the project is to introduce initially simple synthetic approaches for the production of thio-ribonucleosides.

The project is expected to yield useful results to be applied in chemotherapy and for treating hereditary diseases.

SU-CHEM(17)

Title: Chemical and pharmacological investigations of seeds of *Abrus precatorius* Linn.

*Abrus precatorius* Linn belongs to the natural order Leguminaceae growing in the plains of India, Burma, and other tropical countries of the world. It has been shown that the seeds, when taken internally by females, result in disturbance of uterine functions and prevent conception.

The objective of this project is to investigate the pharmacology of the seed oil and its constituents, the structure and chemistry of particular anti-fertility agent and the endocrine mechanism involved.

The research findings would help in developing safer and cheaper contraceptives from the indigenous sources.

P-PU/CHEM

Title: Characterization and production of enzymes of commercial importance from indigenous animal and plant sources and by micro-organism.

Certain plants like oat, wheat germ, barley etc. and animal organs like sheep and cattle pancreas and calf stomach are known to be potential sources of enzymes which are presently being wasted away.

The project aims at isolating and purifying enzymes from indigenous animal and plant sources for their possible uses.

The investigation would result in finding new sources of enzymes of commercial importance.

F-GU/CHEM(53)

Title: Investigation of alkaloids present in plants native to Pakistan.

There is a large number of plants available in Pakistan which have never been investigated systematically for their alkaloid content.

The project envisages the collection of a variety of medicinal plants, belonging to the family Berberidiacea, from the hilly regions of Pakistan. These plants would be tested for physiological properties. Detailed chemical analysis of those plants would be undertaken which show some action of therapeutic importance and can be used for the manufacture of useful drugs.

The discovery of new alkaloids such as Pakistan-amine, Pakistanine and Baluchistanamine would not only contribute a great deal to the scientific advancement but also enhance the prestige of the country.

C-IU/CHEM(54)

Title: Preparation and study of medicinal Compounds.

Properties of chemical compounds are changed if their structures are modified.

The Project envisages the (i) Preparation of new medicinal compounds by effecting certain modifications in the structure of sulphaguanidine and (ii) Synthesis of 5-Flourouracil (a known anti-cancer drug), with metal ions such as Platinum, Palladium and Cobalt.

It is expected that new compounds will also be active and would prove useful in their medicinal properties.

F-FU/CHEM(60)

Title: Molecular weight and size measurements of colloidal, polymers and macromolecular materials by light scattering techniques.

The project envisages study of molecular weight and size measurement of colloidal, polymers and macromolecular materials by light scattering techniques.

These studies would result in providing better technical know-how and would help in establishing quality control and other important factors vital to the betterment of plastic and polymer industry in the country.

S-SU/CHEM(65)

Title: Reactions of thionyl chloride with sucrose, trehalose methyl-b-maltoside and methyle -b-lactoside.

Several disaccharides, such as, sucrose, maltose, lactose and cellobiose are readily available but apart from some studies with trehalose and sucrose there has been no systematic study of their chemistry.

It is, therefore, proposed to undertake a detailed study of the reactions of the above mentioned disaccharides in order to explore the synthetic applications of these reactions.

C-IU/CHEM(70)

Title: A study of factors influencing the stability of five membered lactone rings.

Lactone rings are very important constituents of several pharmacologically active compounds, for example, santonin, nobilin, anemonin, withaferin, phalloin, phalloidin and amanitin. It has been found that the stability



of five membered lactone rings is influenced by the number and types of the substitutes. No systematic study is available in this regard.

The present project aims at synthesizing a series of differently substituted lactones and measuring the position of its equilibrium.

This study will reveal the factors which influence the stability of five membered lactone rings and have direct bearing on their pharmacological activity.

### EARTH SCIENCES

PU-EARTH(17)

Title: Geological investigations of the chromite ore-deposits of Malakand Agency.

Recent geological literature shows that the question of emplacement and occurrence of chromite of the alpine nature, similar to that of Malakand Agency, is still unsolved and pose many problems. In the present project, efforts will be made to provide sufficient scientific data to understand the problem of chromite genesis. It will also establish important geological and structural criteria applied in locating and finding deeper extensions of chromite ore bodies.

PU-EARTH(19)

Title: Impact of metropolitan expansion on the ecology of rural urban fringe - a case study from Peshawar.

Physical growth of cities has great significance for urban ecologists. The trends of development of cities with particular emphasis on environmental and ecological conditions have received little attention in our country. Failure to take these factors into account as normal and integral part of our planning and decision making has considerably damaged our urban environment.

The objective of the present project is to examine the nature of ecological changes in the rural fringe as a result of recent decision of boundry expansion of the Peshawar metropolitan area. Study will be conducted into the loss of good agricultural land and orchards, growth and distribution of population, pressure on existing amenities e.g. educational facilities, health services, water supply, sewerage and drainage etc.

The results of this study will provide a general framework for relationship amongst the principal activities in the area to serve as a guide for action in reserving land for future and will form a basis for similar studies to be conducted at the regional and national level.

F-PU/EARTH(20)

Title: Socio-demographic survey of Daudzai Integrated Rural Development Area.

The National Planning Commission have been concerned about the low rate of economic development, intra-regional disparities and the unbalanced growth of different regions of the country. The Government has recently launched an Integrated Rural Development Programme and has set up national pilot projects in various provinces to test different approaches for solving this problem.

The present project envisages to carry out a demographic and socio-economic study of Daudzai Integrated Rural Development Area and to create a data bank for the growth and development of the area.

The analysis and projection of processed data would provide a broad flexible generalised development plan for the region concerned and would serve as a model survey for mosaics of other projects in the whole country.

## P-UP/ENG(3)

Title: Studies of atmospheric and underground corrosion, its control and prevention.

The entire net-work of tubewells, underground pipes and other installations are facing acute corrosion damage. Some of these have been badly hit and require complete replacement much earlier than the expected life of the metallic pipes. The present project aims at the corrosion study of tubewells essentially, and find out protective measures for them.

## S-KU/ENV(4)

Title: Problems of eutrophication and control of aquatic weeds in fresh water lakes of Sind.

The death and disintegration of aquatic weeds causes natural pollution and extremely high tension of dissolved oxygen in fresh waters which markedly decreases the productivity of the fresh water bodies.

The project aims at studying the problems of eutrophication (healthy nutrition) in lakes of Sind and its correlation with the overall productivity of lakes. The over growth of weeds and suitable methods for their control would also be studied.

These investigations would result in laying down a sound and scientific basis for the development of fisheries resources in the fresh water bodies of the province and would help in controlling environmental hazards.

## CU-ENVR(5)

Title: Biological control of termites with pheromones.

Termites are well known pests all over the world. They cause serious damage to several types of wood and agricultural crops of economic importance. They also destroy wooden frame-works of buildings, furniture and other

cellulose material. Several organic chemicals like dichloro-diphenyl, trichloro-methane are being used to eradicate termites, but they are toxic for both man and animals. They are absorbed by plants or make their way to rivers and other water resources adversely affecting the environment and finally being transmitted to animals and men.

Social animals such as termites have a very sophisticated chemical communication system that control food collection, nest and mating activities. These chemicals known as pheromones have been extracted and purified from several insects. The pheromones of termites have not been identified so far.

The purpose of the project is the isolation and purification of different pheromones from termites, development of bio-assay of these pheromones and biological control of termites with pheromones. As a result of these studies effective and safer control measures will be evolved.

C-IU/ENVR(10)

Title: Behavioural and ecological studies on Rhesus Monkeys.

Rhesus monkeys are extensively used in medical and phsycological research. Studies on behaviour and ecology of Rhesus monkeys are, therefore, of much importance for research workers in these fields.

The present project aims to study the survival, feeding habits, mating behaviours, group integration and comparative studies of these monkeys in their natural habitats in two different areas i.e., Dunga Gali and Marghala hills.

The result will not only be useful for the medical research but would also help the preservation of wild life in these areas.

MATHEMATICS AND COMPUTING  
ACTIVITIES

P-PU/MATH(8)

Title: Inclusive Reactions.

The study aims at investigating mathematical models developed so far to predict the behaviour of fundamental particles and suggest a new model which takes into account the deficiencies and short-comings of the existing models. This study will help in understanding the new branch of phenomenology which is known as Regg phenomenology.

MEDICAL SCIENCES

S-JPMC/MED(20)

Title: Epidemiological study of nutritional disorders in pre-school children in an urban community.

Malnutrition is closely linked with the complex problems of socio-cultural nature and economic deprivation. The worst sufferers are the vulnerable groups comprising of pre-school children and pregnant and lactating mothers.

West Pakistan Nutrition Survey have shown a high infant mortality (17%), 1-5 years mortality (26%), mean weight and height of children were below the third percentile of the IOWA Chart, showing gross growth retardation due to nutrition deficiency. Incidence of calorie, protein and most vitamin deficiencies are higher in the urban than in the rural population.

The main objectives of the project are: (1) determination of epidemiological characteristics of nutrition problems in pre-school children of an urban community with a view to determine the relative importance of various causal factors, (2) institution of an intervention programme to deal with factors causing protein-calorie malnutrition in pre-school children, and (3) evaluation of the intervention programme instituted for the control of nutritional disorders of the pre-school children in the given community.

C-AFMC/MED(31)

Title: Studies of the nutritional problems of pregnant and nursing women among the families of armed forces of Pakistan.

The total caloric cost of pregnancy has been calculated to be 80,000 K-calories above the normal requirements. The joint FAO/WHO report of 1965 recommended that an additional intake of 40,000 K-calories above the normal requirements be consumed and the balance of 40,000 K-calories be taken care of by cutting down physical activities. However, it was felt that women in underdeveloped countries cannot afford to cut down their usual physical activities. The FAO/WHO Adhoc Committee report of 1973 has, therefore, recommended the additional intake of full amount of 80,000 K-calories.

In view of the changed recommendations, the present project aims at investigating the effects of the intake of full amount of 80,000 K-calories, above the normal requirements during pregnancy and lactation and the effect on the total food requirements of the country. Besides, the nature of deficiencies in terms of specific nutrient calories, protein, vitamin and minerals have also to be ascertained.

This will give a clear understanding of the nature and extent of problems of human nutrition and would go a long way in devising measures to improve the nutritional status.

#### OCEANOGRAPHY

S-KU/OCEAN(4)

Title: Shore erosion studies of Pakistan coast in the vicinity of Karachi.

The importance of the ocean as a major resource is now being increasingly realized and nations are today looking towards the ocean for ore and oil production, transportation,

food, and many other uses. Shore erosion studies are thus of great significance for all countries interested in the development of their marine sciences and oceanography.

The present project aims at the study of shore erosion of Pakistani coast in the vicinity of Karachi by collection of sand samples and observations on waves and tides.

The results of this study may throw some light on measures to be taken for preventing the shore erosion in the Karachi coastal areas.

INSTITUTIONAL SUPPORT

Some of the grants sanctioned, during the current year, to enhance the institutional capabilities are as follows:

- (i) A grant of Rs. 4,00,000/- was sanctioned as special financial support to the University of Islamabad (now Quaid-e-Azam University), for upgrading its computer centre facilities. Of the sanctioned grant, Rs. 1,00,000/- was released as an advance in 1973-74 and the remaining amount of Rs. 3,00,000/- was released during the year under report.
- (ii) An amount of Rs. 3,000/- has been released to the invertebrate reference museum as a special grant for the purchase of museum furniture.



Item III: UTILIZATION OF RESEARCH RESULTS

The utilization of 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.

The projects sanctioned by the Foundation under this head are as follows:-

F-PU/UTZ(8)

Title: Use of biogas for running 30-40 H.P. engine.

Under a previous project, biogas has been successfully tried for operating a 5.H.P. engine. Under the new project it is proposed to extend the expertise and technical know-how gained so far to use bio-gas for operating a larger engine of 30-40 H.P. capacity. The results of this study will be much better utilized as an engine of larger capacity can be used more profitably and more efficiently for operating medium-sized tubewells in rural areas.

F-PU/UTZ(15)

Title: Economical production of a 1,000 watt solar cooker.

The project envisages the prototype development of a solar cooker which would generate energy equivalent to 1,000 watts and could be mass-produced within reasonable cost so as to enable the households to save conventional fuel. The project is an extension of the work already done in this connection whereby a number of models were developed and tested to identify the most economical amongst them.

F-PU/UTZ(23)

Title: Design & construction of a carburetor for automobiles i.e. engine to run on dual fuel i.e. petrol and compressed natural gas.

The purpose of this project is to develop a carburetor for automobiles which could operate efficiently both on petrol and

on compressed natural gas. If the results of the project are successful, it will be possible to introduce the carburetor on commercial scale and reduce consumption of petrol which is becoming increasingly expensive. Use of natural gas in automobiles, which is abundant and comparatively cheap, will considerably reduce operating costs.

C-ATC/UTZ(27)

Title: Wind Power Utilization.

The project aims at technical evaluation of the performance of wind mills by studying such aspects as the intensity of wind and its characteristics in a time-frame and their ultimate efficiency in operating water pumps. It is also intended to demonstrate the working of wind mills and their economic feasibility so that the use of wind mills may be popularised amongst the larger sections of the population who inhabit areas where wind power could be profitably used.

P-EU/UTZ(24)

Title: Studies on Soil Cement Housing.

For low cost houses, stabilised soil-cement blocks have been used very successfully in various countries as an alternative to conventional materials such as bricks, stone, cement concrete etc. The overall cost of house construction can be reduced by 50% without sacrificing much of the durability, strength and weather resistance. In Pakistan, soil-cement blocks have been used in a large number of rural areas but the construction specifications and technical requirements have not yet been standardised.

This project aims at conducting a preliminary survey of the characteristics of soils available in various parts of the country and determining through field trials and laboratory experiments the best mix of soil, cement, sand and water, etc. suited to construction in various localities/environments.

**Item IV: SCIENCE CENTRES**

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

No programme of scientific advancement can be sustained in a community if there is not enough awareness in the population at large of the role of science in national progress. To achieve public understanding and support, an institutional structure needs to be created, including the establishment of science centres, science museums, science libraries and the promotion of science clubs etc., in all communities, large and small.

In view of the extreme paucity of funds made available to the Foundation through the normal grant-in-aid, a scheme for the establishment of science centres at Lahore and in Sind was submitted to the Ministry of Science and Technology on PC-I proforma for consideration and approval under the annual development programme at an estimated cost of Rs. one million, including 30% of the cost in foreign exchange for a period of three years. A project was also submitted to the Government for the establishment of a National Museum of Natural History and Herbarium at Islamabad for approval at a total cost of Rs. 65 million including a foreign exchange component of Rs. 0.64 million for a period of five years. Under the Prime Minister's directive, Government released an anticipatory grant of Rs. 1.87 lac to the Foundation for initiating work on the Museum and a nucleus of the National Museum of Natural History has been established pending approval of the project by the Planning Division. Arrangements are being made to transfer the vertebrate fossil collections at the Palaeontology and Stratigraphy branch of the Geological Survey of Pakistan, Quetta to form the core of the vertebrate palaeontology section of the Museum. Steps are also being undertaken to obtain specialists on deputation for the initiation of work.

Item V: SCIENTIFIC SOCIETIES/LEARNED BODIES.

The Foundation is making annual grants to the established learned bodies and scientific societies and endeavouring to provide all possible assistance to the new ones. Annual grants amounting to Rs. 4,86,000/- were released this year to various scientific societies and learned bodies for the achievement of their approved objectives (Annexure-IV).

Special grants totalling Rs. 30,000/- were sanctioned to various scientific societies for their publication programmes (Annexure-V.)

**Item VI: SCIENCE CONFERENCES**

The organization of periodical science conferences, symposia, seminar etc.

During the year under report, grants totalling Rs. 96,000/- were given to various scientific organizations and insitutions for holding seminars, symposia and conferences (Annexure VI). These included the all Pakistan Science Conferences at Peshawar and Karachi. A brief account of a few important seminars is given below:

- (a) A seminar on the 'Role of Science and Technology in Industrial Development' was held under the auspices of the Institute of Chemical Engineers from 7-9th April, 1977 at Lahore. Major topics discussed in the seminar included: development of indigenouse technologies, training of technical manpower and participation of engineers and technologists in industrial planning.
- (b) An international seminar-cum-workshop on 'Solar Energy Applications' was organized by the Engineering faculty of Peshawar University in collaboration with the Colorado State University, U.S.A. from the 19-24th March, 1976. The Workshop was attended by participants from seven countries. Major topics discussed included solar, water and air heating, graindrying, solar thermal power systems, solar distillation, heating and cooling of the buildings etc. A review of the past and current work on solar energy in developed countries with special reference to the United States of America and Australia was also made to enable the participants to rapidly update their knowledge on the practical aspects of solar energy utilization and assist them in setting project priorities for their own solar energy programmes in the future.

Item VII: EXCHANGE OF SCIENTISTS.

Exchange of visits of scientists and technologists with other countries.

Travel grants, totalling to Rs. 61,987, were sanctioned to support the visit of seven scientists, doctors and engineers for participation in the following international conferences/ meetings etc.

- World Telecommunication Forum, Geneva.
- Second Asian Conference on Liver, Singapore.
- 14th International Conference on low temperature physics, Helsinki.
- International Solar Energy Society meeting, Los Angeles.
- Meeting of Solar Scientists, Shiraz, Iran.

Visit of the Scientists' Delegation to China.

On the invitation of the Chinese Academy of Sciences, a delegation of six scientists and science administrators, headed by Dr. Z. A. Hashmi, Chairman, PSF, visited China for about four weeks.

The visit to China provided a marked contrast to earlier experiences in the mass application of science to societal needs in other parts of the developing world. It was found that scientific activity in China was organised to adapt perfectly to the needs, opportunities and challenges which China herself faced. The S & T system was functioning in complete harmony with the total life style adopted by the nation, with the result that during a mere quarter of a century, a self-reliant Science and Technology system was established in the nation, which was relevant to national needs, was efficiently managed and was focussed mainly on the liberation of the creative energies of the mass of the people and the development of local resources in all parts of the country. It was felt that Pakistan could greatly benefit from a close study of the Chinese experience

in the organization and functioning of an indigenous and dynamic S & T system.

The delegation was also most impressed by the deeply moral, almost spiritual, quality of the gigantic struggle including the struggle for scientific experiment which China had waged for improving the human conditions and the quality of life of its people.

The high point in this visit, however, was the opportunity provided to the delegation to meet Prime Minister, Hua-Kua-Feng, (then Vice Premier), who explained at length the ideological and cultural setting of scientific activity in the nation. The most vivid impressions received by the delegation were:

- i) self-reliance and freedom of Chinese people from intellectual and cultural dominance of others.
- ii) active participation of intellectuals and scientists as well in socialist production at the grass-root level.
- iii) creation of own new and better forms after testing, criticising and discarding the useless foreign things.
- iv) involvement of the mass of the people in scientific activities, encouragement of research efforts by the workers and peasants in close combination with the scientists.
- v) giving to knowledge a place of honour in the scale of chinese value and the declaration of the love of science as a basic virtue.

In the field of technology, China has a policy of walking on two legs i.e: (i) adoption of the latest in sophisticated technologies, such as development of nuclear and space technologies; and (ii) the development of appropriate and intermediate labour-intensive, low capital technologies for the utilization of local resources. The Peoples' Republic of China is the best example of the massive adoption of the small-scale rural industry, based

on an intermediate appropriate technology approach, for rapid development of the less endowed areas, and equitable distribution of benefits.

The establishment of a nation-wide net-work of small industrial plants and units, well within the resources of local communities to finance and manage, has transformed the Chinese country-side. Over the years, steady improvement has been effected in modernising such smaller units with the help of central research and design institutes which were assigned to work on these tasks on a priority basis. Some examples of their achievements are:

Chemical Fertilizer Plants: New standardised small plants have an annual capacity of 3,000 to 5,000 tons. The raw material used is relatively poor quality coal-lignite and low-quality anthracite instead of gas. Seventy per cent of the fertilizer supply in the nation comes from such small plants.

Cement Plants: Three fourths of the country have their own small cement plants of an annual capacity varying from a few hundred tons to 50,000 tons. Such small plants form the base of the construction industry of the country.

Iron Foundries: In China, there are standard furnaces of 8,13,28,50,100 and 120m<sup>3</sup>, the smallest of these yields an annual production of approximately 2,000 tons of pig iron. These furnaces, although of small capacity, are extremely well designed.

Bio-Gas (methane) Plants: Marsh gas prepared from farm-yard manure, night-soil and vegetative waste in very inexpensive plants seems to have solved the Chinese peasants' problem of lighting and fuel and have saved coal and paraffin as well as the costly transportation. Remote areas have greatly benefitted.



Visit to the Union of Soviet Socialist Republics.

On the invitation of the Presidium of the USSR Academy of Sciences, Dr. Z. A. Hashmi, participated in the 250th Jubilee celebrations of the Academy held at Moscow during October 1975. The USSR Academy of Sciences was founded in 1724 by Czar Peter I. It is a venerable Soviet organization with the country's 676 most distinguished scholars, from all fields of scientific endeavour, as its members. There are also 70 outstanding foreign scientists holding honorary membership of the Academy. The Academy directs the functioning of approximately 250 research institutes and employs almost 60,000 scientific workers.

Eminent scientists from all over the world participated in the celebrations. This provided an admirable opportunity for the Chairman, PSF to establish contacts and cultivate liaison with the administrators of science programmes in organizations similar to PSF. Besides representing Pakistan at the Jubilee celebrations, Dr. Hashmi also visited a number of Scientific and Technological Institutes of the Academy of Sciences, the Academy of Agricultural Sciences and the University of Moscow to study the strides that Soviet Science and Technology have made since the revolution.

The celebration meeting was held on October 7, at the Kremlin Palace of congresses. The session was opened by Academician V. Kotelnikov, the Acting President of the Academy. The meeting was attended by the top political and intellectual leadership in the nation, amongst others, V. Grishin, A. Gromyko, A. Kosygin, F. Kulakov, A. Pelse, N. Podgorny, D. Polyansky, M. Suslov, P. Demichev, B. Ponomaryov, M. Solomenfsev, V. Dolgikh and I. Kapitonov. Leonid Brezhnev presented the well-earned award of the Order of Lenin to the Academy. In his inaugural speech, Mr. Brezhnev spoke of the great love and respect which science has traditionally enjoyed in the USSR: " Never under any social system has science enjoyed such a decisive status in economic and social development as it does under socialism.

To us science today is a life-giving source of technical, economic and social progress, a source of growth for the culture of the people and of their well-being." He pointed out that USSR had, during the past 50 years, developed a formidable and powerful scientific potential with more than a million people working in various fields of science. He pointedly drew attention to the spectacular scientific and technical progress achieved in the back-ward regions of the USSR, under a planned system of science and technology.

There were vast areas in Central Asia, Siberia, Eastern and Northern USSR which possessed no other technology than native handicrafts. Determined efforts were made to establish universities and academies of sciences in the various Soviet Republics and today these former technological out-skirts produce about 40 per cent of innovations and 30 per cent of the industrial exports of the USSR. To take one example, the State of Uzbekistan with a population of only 12.5 million inhabitants, which had no scientific and technical base at the time of the revolution, has today 146 research institutes and 40 institutions of higher learning with 26,000 scientists including 7,700 Ph.D level men.

Soviet experience in the utilization of the science for the development of the nation has many lessons for Pakistan and the Third World countries. The developing countries account for only about two per cent of the world's total research and development and only one per cent of technological innovations. This gap has serious implications; it perpetuates the Third World's technological dependence and often prevents technology from exploiting sources of growth. The developing countries are estimated to spend for imported technology from 3 to 5 billion dollars annually. This expenditure is likely to increase 30 times by the end of the century. Importation of foreign

technology must thus be substituted by a growing proportion of indigenous technology which is possible only by strengthening national scientific and technological capability. Sixty years ago, the Soviet people were in the same position as the Third World countries are today. Today, they have achieved a large measure of self-reliance. Self-reliance does not imply a denial of technology transfer or import of high technology. These processes have been continuously pursued in the USSR but, the imported technology has been planned to serve as a threshold for further progress towards building indigenous capability.

The Pakistan Academy of Sciences on behalf of the President and Fellows of the Academy, sent their greetings and felicitations to the President and the Academicians of the USSR Academy of Sciences contained in a silver casket through Dr. Z. A. Hashmi, who is a Fellow of the Pakistan Academy of Sciences and a member of its Council.

The full text of the greetings is attached as Appendix-X.

Appendix- x

FROM THE PRESIDENT AND FELLOWS  
OF THE PAKISTAN ACADEMY OF SCIENCES

GREETINGS AND FELICITATIONS

TO THE

PRESIDENT AND ACADEMICIANS OF THE  
USSR ACADEMY OF SCIENCES

on the auspicious occasion of the two hundred and fiftieth anniversary of its foundation.

As one of the oldest and most venerated learned bodies in the world, which has a long and continuous tradition of making great and outstanding contributions to the advancement of knowledge, the USSR Academy of Sciences is a source of inspiration to the scientists all over the world.

The Fellows of the Pakistan Academy of Sciences are happy to recall that the two Academies have cooperated with each other in the past, and that various missions have visited the institutions of scientific research in the two countries with mutual advantage and benefit. They hope that the collaboration will continue in future as well.

The Fellows of the Pakistan Academy of Sciences have great pleasure in sending their best wishes to their Academician colleagues in the USSR for the continued progress and development of their Academy and for the success of their scientific endeavours for the benefit of mankind.

Presented in October in the year One Thousand Nine Hundred Seventy Five on behalf of the PAKISTAN ACADEMY OF SCIENCES, through Dr. Zafar Ali Hashmi, Fellow Pakistan Academy of Sciences and Member of its Council.

Sd/-

M. RAZI UDDIN SIDDIQUI  
Secretary

· Item 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.

The Pakistan Academy of Sciences has been requested to arrange for awards and fellowships out of the grant in aid given by the Pakistan Science Foundation to the Academy. The Academy has instituted the award of gold medals to be given to persons, who have made outstanding contributions in the field of science. The medals will also bear the name of the donor agency, namely the Pakistan Science Foundation.

Item IX: SURVEYS AND STATISTICS.

Special scientific surveys and collection of scientific statistics related to socio-economic effort of the country.

a) Collection of statistics on scientific efforts of the nation.

Work was initiated on the determination of the scientific potential of the nation in collaboration with the National Science Council including:

1. Scientific manpower.
2. Research establishments.
3. Research projects under study.
4. Scientific journals published in the country.
5. Scientific societies functioning in the country.

Work on the inventory of research establishments was completed in collaboration with the National Science Council of Pakistan, during the year under report, and published by the Council as the "Directory of Research Establishments in Pakistan".

Survey work on scientific manpower, research projects under study and scientific societies functioning in the country is still in progress.

b) Natural Resources Surveys.

(i) Punjab Barani Areas - Resources Survey and Development.

The Barani (rainfed) areas comprise 84 per cent of the land-mass of Pakistan. They include the ecologically and economically less fortunate parts of the country and have received only marginal benefits from the developmental efforts in the country. In particular, the impact of improved technologies in resources utilization and the maintenance of the long-term productivity and stability of the fragile and precariously balanced eco-systems has been negligible. The areas do, however, possess a wealth of under-utilised resources, both human and material. Even macro-level surveys of such resources have not been carried out.

A 15 member commission, headed by Dr. Z. A. Hashmi, Chairman, Pakistan Science Foundation, was appointed by the Government of the Punjab to deal with various aspects of socio-economic development of the Punjab Barani Areas.

The Pakistan Science Foundation arranged for the participation of a large number of top ranking scientists available in the country in the various fields concerned with the development of Barani Areas. A comprehensive report was prepared and submitted to the Government of the Punjab for further necessary action. The report deals at length with the historical background, geographical and ecological zones, developmental problems and constraints, agriculture, livestock and poultry, forest and range lands, wildlife and fisheries, water, energy, minerals, industry, social infrastructure, physical infrastructure, training and technology, and organization and strategy for resources development on an area basis.

The report has received world-wide attention. Typical is the following comment of Dr. N.R. Carpenter, Chief, Farm Management and Production Economist, Agriculture & Services Division, Food and Agriculture Organization, Rome:

"May I sincerely congratulate you as Chairman and the other members of the Punjab Barani Commission for the excellent and outstanding work you have completed in your Report of the Punjab Barani Commission. Several of us in the Food and Agriculture Organization have studied it very carefully and believe it to be the most outstanding document produced on this subject todate."

- (ii) Northern Areas -As reported last year the PSF organised a resources survey/development expedition to the Northern Areas, comprising interdisciplinary, inter-institutional teams of scientists from 20 universities/research establishments in the country. The report of the expedition is in the final stages of compilation. The organization of the Report would generally follow the Punjab Barani Areas Report.

Item X: RESEARCH EVALUATION.

As reported previously, a mechanism was developed by the Foundation for the review of not only the initial work plan but also for the evaluation of the progress of projects being financed by the Foundation.

In view of the difficulties encountered in this behalf, certain improvements were made in this mechanism. These include the development of two proformae - one PSF IV for the critical review of new research projects submitted to Foundation for financial support, and the other PSF XI for evaluation of research progress reports by competent scientists. These proformae are attached as Appendix VII and VIII.



Item XI: SCIENTISTS' POOL.

As reported earlier, a Placement Office was created in the Pakistan Science Foundation for assisting scientists, engineers and doctors in finding jobs suited to their qualifications. During the period under report, eleven scientists serving in various institutions abroad, approached the Pakistan Science Foundation for the purpose of securing suitable positions in Pakistan.

Nine scientists were placed on the Scientists' Pool of the Foundation. All of them succeeded in securing gainful employment of their choice in various universities and research organizations in the country through the good offices of the Foundation.

Item XII: INTERNATIONAL LIAISON.

a) Last year, a Joint Pak-American Science Review Team was constituted to make a critical study of the structure and programmes of the Pakistan Science Foundation and define its future role in the development of a competent scientific community dedicated to the creation of a modern nation state and a progressive social order in Pakistan.

The recommendations of the team were considered and approved by the Foundation's Board of Trustees as well as the Minister of Education, Science and Technology and Provincial Coordination. Action initiated last year on various recommendations was continued during the year under report as well. A portfolio of the schemes/projects based on the team's recommendations was prepared and submitted to the Ministry of Science and Technology for onward transmission to the Planning and Development Division.

Memorandum of understanding between NSF(U.S) & PSF.

b) A draft memorandum of understanding between the U.S. National Science Foundation and the Pakistan Science Foundation, for scientific and technical collaboration and strengthening the bonds of friendship for mutual benefit of both the organizations, was sent to the S & T R Division for necessary action.

Item XIII: OTHER ACTIVITIES

i) Science Policy

The Pakistan Science Foundation actively participated in the process of formulating proposals for the National Science and Technology Policy, aimed at integrating scientific endeavour with the objectives of national socio-economic development. The Foundation rendered financial and technical support to the work of 14 technical panels involving about 150 of the nation's eminent scientists, technologists and users of S & T, who prepared preliminary recommendations for the application of science and technology in various sectors of the economy. The Chairman PSF also headed a working group, which was charged with the task of undertaking in-depth review of the panels' recommendations and transcribing them into a comprehensive set of proposals for consideration of the Government. The Foundation also assisted in holding two Scientists' Moots (at Karachi and Islamabad), in which the draft proposals were thrown open for discussion to a much larger cross-section of the country's scientists/technologists.

The Foundation partially supported the visit of a UNESCO expert who was invited to assist in this task.

ii) The Islamic and the RCD Science Foundations

Science in the Islamic and the RCD countries, in common with most of the developing world, is still below the critical level and hence unproductive. In order to bridge the widening technological gap with the advanced nations and to move towards collective self-reliance, it is being increasingly realised that the Region Countries and the Islamic World should develop strong cooperative relationship in the field of Science and Technology. Pakistan has strongly favoured the establishment of an Islamic Science Foundation and an RCD Science Foundation to foster such cooperative effort.

The Chairman PSF was entrusted with the responsibility of drawing up outline proposals for the establishment of the proposed Science Foundation. The outline proposal was based generally on the experience and working of the Pakistan Science Foundation. Various options as to the structure and functions of the Foundation were developed for consideration at appropriate levels. The following were considered to be broad general objectives of the proposed Foundations:

1. Building up strong scientific communities in a systematic manner by training cadres of high level scientific and technical manpower through providing facilities for advanced studies within the Region, which would also help in arresting the flight of talent from the Region and attracting back talented scientists working in advanced countries.
2. Building and strengthening scientific and technological establishments and services for the conduct of research and development of technology, and also providing research grants to creative scientific workers who may be otherwise limited in the pursuit of research due to lack of funds.
3. Collection of statistical data, the conduct of scientific surveys, and establishment of a scientific data bank for the Region.
4. Promoting public understanding of science and assisting organizations and institutions in the region engaged in moving science in society.

Initial work was undertaken to develop the approach for delineating areas of cooperation, optimal and minimal size of research groups, building up of scientific institutions, data banks, promotion of scientific awareness, governance and administration and operation, finances and mode of funding.

- iii) Participation of Chairman, PSF, in the Planning Meeting for the Establishment of the East-West Centre Environmental Policy Institute, Hawaii.

The East-West Centre, Hawaii is a world-famous institution for scientific studies, education and development

and its activities have considerable impact on policy and programmes in many vital fields of development in Asian countries. A large number of Pakistani scholars and scientists have received advanced training at the Centre. Pakistan is deeply interested in Environmental Policy and has included it as an area of major concern in the Permanent Constitution, the Education Policy and the proposals for the Science and Technology Policy etc., and is collaborating in a variety of international programmes, including the UNESCO Man and the Biosphere Programme, for which a national committee has been constituted with Dr. Z.A. Hashmi, as its Chairman. A separate Division for Environment and Urban Affairs has been established in the Federal Government. As such, Pakistan has pressing training/research needs in the area of environment policy and development. No such institution, however, exists in Pakistan to train the high-level manpower needed for the purpose. Pakistan would, therefore, have to depend for the purpose on advanced country institutions such as the East-West Centre until it develops its own institutions for the purpose. The structure, functions and programmes of such institutions are, therefore, of considerable importance to us.

Dr. Hashmi is one of the 12 consultants invited by the Chancellor, East-West Centre, to advise the Centre on the international problems of Environment and Policy and in planning programmes and institutional structure for the proposed Environment Institute at the Centre. Dr. Hashmi participated in a number of meetings concerned with the formulation of a specific East-West Centre programme for studies, training and development in the area of resources utilization and environment. In these meetings the problems of relevance to Pakistan were high-lighted.

- iv) Appointment of Dr. Z.A. Hashmi, Chairman, Pakistan Science Foundation, as Member Advisory Committee on the Application of Science & Technology to Development (ACAST).

On the nomination by the UN Secretary-General, Dr. Z.A. Hashmi, Chairman, Pakistan Science Foundation, was elected a Member of the prestigious United Nations Advisory

Committee on the Application of Science and Technology to Development (ACAST).

The ACAST was established by ECOSOC following the U.N. Conference on the Application of Science and Technology for the benefit of the less developed areas. Its charter/responsibilities include the review of the scientific and technological programmes and activities of the United Nations and related agencies and to recommend to ECOSOC measures for their improvement, the establishment of priorities and the elimination of duplication. The ACAST provides policy guidance and makes recommendations on matters related to the application of science and technology to development. The Chairman attended the 21st Session of ACAST at Geneva on 17-26 November, 1975, at which questions of the formulation of a unified science and technology policy for programmes within the United Nations system, mechanisms for assessment, acquisition, transfer, integration and planning of technology for development, the World Plan of Action for the Application of Science and Technology to Development and the regional plans, the application of computer science and technology to development, and the role of an international technological information system in the transfer and assessment of technology and in the indigenous growth of appropriate technologies in developing countries were discussed.

v) Man and the Biosphere Programme

The UNESCO's Man and the Biosphere programme represents a new integrated approach to research training and action aimed at improving man's partnership with the environment through the co-operative efforts of countries showing common problems under comparable ecological conditions.

Pakistan's National Committee on the UNESCO Man and the Biosphere Programme was constituted by the Government of Pakistan in 1973, with Dr. Z.A. Hashmi as its Chairman, to organise research activities on particular national problems which are related to the international programme.

The tasks identified and accomplished under the national MAB Programme are summarised below:-

1. Resource Conservation and Utilization Survey

Major food production systems in the country are in a state of progressive instability and degradation. The land-use and cropping patterns have been exploitative and with the increase in population and cultivation of marginal lands, a host of problems such as waterlogging, salinity, wind and water erosion, etc., have assumed dangerous proportions. In order to ensure the utilization of natural resources on a sustained basis, the national MAB Committee has promoted and supported a number of studies including the following:

- Resource management in the Punjab Barani areas.
- Ecology and resource development in the Northern Areas.
- Long-term stability and productivity of the Indus Basin.

2. Research Studies

A number of research studies are being developed in the fields of pollution, utilization of industrial and sewage waste, and ecological effects of urban and metropolitan expansion in Pakistan.

3. Biosphere Reserves

In consultation with the National Wildlife Council, the MAB National Committee is making efforts to designate Biosphere Reserves in Pakistan.

4. Participation in MAB regional meetings

The MAB National Committee has promoted Pakistan's participation in a number of MAB regional meetings including: (a) Integrated Ecological Research and Training Needs in South Asia Mountain System held at Kathmandu, Nepal, 1975, (b) Ecological Effects derived from Large River Basins held at Alexandria, Egypt, 1976.

5. World Environment Day

The MAB has promoted the observance of the 5th June, as the anniversary of the Stockholm Conference on Human Environment (1972). The MAB National Committee has sponsored the organization of the World Environment Day through exhibitions of posters, paintings, pamphlets, film shows on environmental problems, illustrated lectures etc.

6. Seminars/Symposia

A number of national seminars regarding the management of the Biosphere were organised in collaboration with the National Academy of Sciences, the Ministry of Environment and Urban Affairs and other institutions to create awareness amongst the decision-makers, planners, resource managers and the people at large.



CHAPTER-2REPORTS ON ON-GOING PROJECTS

Progress reports of the following projects financed by PSF were received, during the year under report, and were sent to the specialists in the relevant fields for critical evaluation:

i) Projects Annual Progress Reports

Project No:	S-SU/AGR(13)
Title of the Project:	Exploration of Nitrogen fixing algae from the Agricultural fields of Sind.
Location:	Botany Department
Sponsoring Authority:	University of Sind
Total Amount of Grant:	Rs. 2,34,421/-
Duration:	3 Years.
Date of initiation:	1.3.1975
Main Objectives:	To collect, identify and isolate nitrogen fixing algae in the rice growing fields and other soils of agricultural land of Sind and to carry out detailed morphological and taxonomical investigations in respect of the general characters of different plant families.
Project No:	C-IU/AGR(22)
Title of the Project:	Studies and evaluation of the Physiological changes

induced in the biotic community of the agricultural land by the use of pesticides.

Location: Biology Department  
 Sponsoring Authority: University of Islamabad.  
 Total Amount of Grant:Rs. 2,35,308/-  
 Duration: 3 Years  
 Date of Initiation: February, 1975.  
 Main Objectives: The present investigation is aimed at assessing the effects of pesticides on organisms inhabiting the agricultural lands and the surrounding areas.

Project No: P-NIAB/AGR(17)  
 Title of the Project: Biological Control of soil salinity and fertility.  
 Sponsoring Authority: Nuclear Institute for Agriculture and Biology, Lyallpur.  
 Total Amount of Grant:Rs. 3,04,097/-  
 Duration: 3 Years  
 Date of Initiation: July, 1974.  
 Main Objectives: To study the comparative efficiency of different biological, chemical and combination methods for reclaiming a medium-textured highly salinesodic calcareous soil under field conditions.

Project No: PSF/RES/S-TC/AGR(18)  
 Title of the Project: Survey, collection and study of the mites attacking

different crops in the Sind and their control.

**Location:** Agricultural College, Tandojam, Sind.

**Sponsoring Authority:** Sind Agriculture College

**Total Amount of Grant:** Rs. 1,51,080/-

**Duration:** 3 Years

**Date of Initiation:** 15.2.1975

**Main Objectives:** The aim of the present project is to identify mites and find out ways to bring them under control.

**Project No:** PSF/RES/35(4)/74

**Title of the Project:** Veterinary disease investigation in Northern Areas.

**Location:** Gilgit

**Sponsoring Authority:** Animal Husbandry Department, Northern Areas.

**Total Amount of Grant:** Rs. 6,45,296/-

**Duration:** 3 Years

**Date of Initiation:** July, 1974.

**Main Objectives:** To improve the general condition of livestock in Northern Areas by carrying out a detailed investigation of disease caused by malnutrition, mis-management, severe cold weather and inadequate veterinary cover against infections and parasites.

**Project No:** P-PU-BIO(5)

**Title of the Project:** Morpho-physiological effects of gamma irradiation on growth and yield of Agricultural crops.

**Location:** Botany Department.  
**Sponsoring Authority:** Punjab University, Lahore.  
**Total Amount of Grant:** Rs. 2,05,895/-  
**Duration:** 3 Years  
**Date of Initiation** 12.3.1975  
**Main Objectives:** To assess morphological, anatomical and physiological responses of crops to gamma radiation and effect of growth stimulators and micro-nutrients in overcoming the radiation damage.

**Project No:** P-PU-BIO(6)  
**Title of the Project:** a) Palynological studies of the plants growing in the Punjab.  
b) Seasonal variation in the frequencies of air borne pollen and spores, which cause allergies and asthma with special reference to the central Punjab.

**Location:** Botany Department  
**Sponsoring Authority:** Punjab University, Lahore.  
**Total Amount of Grant:** Rs. 1,17,710/-  
**Duration:** 3 Years  
**Date of Initiation:** 1.7.1975  
**Main Objectives:** To collect and study the morphological details of the fungal spores as well as the pollen grains of the Plants growing in the Punjab and seasonal variation in the frequencies of airborne pollen and spores which are known to cause allergy and asthma.

Project No: P-PU/BIO(9)  
Title of the Project: Investigation into the occurrence, Biology and Histochemistry of Larval Trematodes in Pakistan.  
Location: Zoology Department  
Sponsoring Authority: Punjab University, Lahore.  
Total Amount of Grant: Rs. 68,892/-  
Duration: 2 Years  
Date of Initiation: July, 1975.  
Main Objectives: To study the occurrence and biology of larval trematodes in fresh waters of Pakistan, histochemical studies of trematodes, larvae and their biology in relation to the intermediate and definitive hosts.

Project No. S-KU/BIO(13)  
Title of the Project: Utilization of brackish water for growing plants on sandy belts of Pakistan.  
Location: Botany Department  
Sponsoring Authority: University of Karachi.  
Total Amount of Grant: Rs. 2,27,257/-  
Duration: 3 Years  
Date of Initiation: 15.3.1975  
Main Objectives: To study the soil analysis and composition of brackish water at different places and to evolve techniques for growing plants on sandy belts.

Project No: S-KU/BIO(16)  
Title of the Project: Systematics, Biology and seasonal abundance of plankton in Karachi coastal waters.  
Location: Karachi.  
Sponsoring Authority: Karachi University  
Total Amount of Grant:Rs. 1,45,839/-  
Duration: 3 Years  
Date of Initiation: 10.3.1975  
Main Objectives: To study plankton floating organisms in relation to the physio-chemical factors operating in ocean, its role in the food chains and the dominance of different plankton species during different seasons.

Project NO: SU-BIO(35)  
Title of the Project: Palynological studies of the plants growing in Sind region.  
Location: Botany Department  
Sponsoring Authority: Sind University  
Total Amount of Grant:Rs. 1,23,048/-  
Duration: 3 Years  
Date of Initiation: 1.10.1974  
Main Objectives: To collect and preserve pollen grains of plants growing in Sind, carry out their detailed morphological studies and to establish a pollen herbarium at the University of Sind.

**Project No:** S-KU/BIO(36)

**Title of the Project:** Survey of trace elements in soils of Sind Province and their effect on the productivity of wheat, paddy and cotton.

**Location:** Botany Department

**Sponsoring Authority:** Karachi University

**Total Amount of Grant:** Rs. 1,17,900/-

**Duration:** 3 Years

**Date of Initiation:** 1.5.1975

**Main Objectives:** To examine and record the distribution of available trace elements in soil and means of increasing the yield of wheat, paddy and cotton under normal irrigation and draught conditions.

**Project No:** S-KU/BIO(47)

**Title of the Project:** Culturing of microalgae strains to produce animal feeds for commercial exploitation.

**Location:** Botany Department

**Sponsoring Authority:** Karachi University

**Total Amount of Grant:** Rs. 1,46,366/-

**Duration:** 3 Years

**Date of Initiation:** 1.7.1975

**Main Objectives:** Screening of microalgae inhabiting our lakes, rivers and soils, and to test their protein contents for digestibility and find ways for its mass-scale production for consumption by men/animals.

Project No: P-PU-BIO(50)  
 Title of the Project: A survey and control of silkworm diseases in Punjab, NWFP and Azad Kashmir.  
 Location: Zoology Department  
 Sponsoring Authority: University of the Punjab, Lahore.  
 Total Amount of Grant: Rs. 1,49,768/-  
 Duration: 2 Years  
 Date of Initiation: February, 1974.  
 Main Objectives: To carry out a detailed study in the etiology of various silkworm diseases, their seasonal incidence and the extent of damage in the districts of Hazara, Parachinar, Swat, Chitral, Azad Kashmir, Changa Manga and Quetta.

Project No: S-SU/BIO(57)  
 Title of the Project: Culture collection of algae of Pakistan at Sind University.  
 Location: Botany Department  
 Sponsoring Authority: University of Sind, Jamshoro  
 Total Amount of Grant: Rs. 2,03,056/-  
 Duration: 3 Years  
 Date of Initiation: 1.4.1975  
 Main Objectives: To establish a centre for the culture collection of algae of Pakistan at the University of Sind for reference by the other scientific workers of the country.



Project No: C-IU/BIO(61)  
Title of the Project: Studies on Glycoprotein Hormones.  
Location: Islamabad  
Sponsoring Authority: Islamabad University  
Total Amount of Grant: Rs. 4,87,636/-  
Duration: 3 Years  
Date of Initiation: 1.5.1975  
Main Objectives: To obtain in selectively pure form well-characterized glycoprotein hormones for use in medicines and biology with the possibility of commercial preparation.

Project No: C-IU/BIO(62)  
Title of the Project: Studies on the mechanism of synthesis, release and regulation of human chronic gonadotrophin.  
Location: Islamabad  
Sponsoring Authority: Islamabad University  
Total Amount of Grant: Rs. 1,99,300/-  
Duration: 2 Years  
Date of Initiation: 1.5.1975  
Main Objectives: To investigate the characterization of messenger RNA and polyribosomal complex from the placental syncytiotrophoblast. Cells of placenta and to study the PNA polyribosomal complex and other factors involved.

Project No: S-KU/CHEM(10)  
Title of the Project: Structural and synthetic studies in some B-Carboline basis.  
Location: Karachi  
Sponsoring Authority: Karachi University  
Total Amount of Grant: Rs. 2,77,600/-  
Duration: 3 Years  
Date of Initiation: April, 1975  
Main Objectives: Structural and synthetic studies on B-Carboline basis for developing new therapeutic agents for the treatment of cardiovascular and psychoactive drugs which could be used in the treatment of certain types of metal ailments.

Project No: S-SU/CHEM(18)  
Title of the Project: Biochemical studies in plants infected by parasitic nematodes.  
Location: Karachi  
Sponsoring Authority: Karachi University  
Total Amount of Grant: Rs. 1,50,724/-  
Duration: 2 Years  
Date of Initiation: 1.5.1975  
Main Objectives: To explore chemical and bio-chemical environments in which parasitic nematodes are likely to attack plant root and to suggest effective control measures.

Project No: F-PU-CHEM(19)  
Title of the Project: Chemical analysis of minerals for their commercial Exploitation.  
Location: Peshawar  
Sponsoring Authority: Peshawar University  
Total Amount of Grant: Rs. 78,251/-  
Duration: 3 Years  
Date of Initiation: 15.2.1975  
Main Objectives: To collect samples of various minerals, found in Pakistan and to carry out complete qualitative analysis using chemical and instrumental techniques.

Project No: F-PU-CHEM(22)  
Title of the Project: Models for phosphate linkages  
Location: Peshawar  
Sponsoring Authority: Peshawar University  
Total Amount of Grant: Rs. 72,165/-  
Duration: 3 Years  
Date of Initiation: 1.1.1974  
Main Objectives: Investigation on organophosphorus compounds using different models for di and tri phosphates and their comparison with the studies on high energy molecules like ATP and ADP etc.

Project No: S-KU/CHEM(26)  
Title of the Project: Interaction of aminoacids with riboflavin with its neuro-chemical applications.  
Location: Karachi  
Sponsoring Authority: Karachi University  
Total Amount of Grant: Rs. 78,910/-  
Duration: 3 Years  
Date of Initiation: 1.4.1975  
Main Objectives: To study the interaction of riboflavin with amino acids for obtaining biological data such as free energy entropy and stability constant, for understanding various processes at the level of central nervous system.

Project No: F-PU-CHEM(38)  
Title of the Project: Influence of ligand structure on coordination properties and reactivity of transition metals.  
Location: Chemistry Department  
Sponsoring Authority: Peshawar University  
Total Amount of Grant: Rs. 59,813/-  
Duration: 3 Years  
Date of Initiation: 1.1.1974  
Main Objectives: To synthesise some new chelating agents and to study the influence of the design of the ligand on the coordination properties of various transition elements.

**Project No:** S-CSIR/CHEM(40)  
**Title of the Project:** Effect of germination on the nutritive value and digestibility of gram and pea.  
**Location:** PCSIR Laboratories  
**Sponsoring Authority:** PCSIR Laboratories, Karachi.  
**Total Amount of Grant:** Rs. 90,280/-  
**Duration:** 3 Years  
**Date of Initiation:** 14.4.1975  
**Main Objectives:** To isolate protein and carbohydrate fractions of gram and pea and study their structural characteristics and to study the effect of germination on nutritive value and digestibility of their carbohydrates.

**Project No:** C-IU/CHEM(41)  
**Title of the Project:** Infra-red studies of organic compounds.  
**Location:** Chemistry Department  
**Sponsoring Authority:** Islamabad University  
**Total Amount of Grant:** Rs. 1,47,575/-  
**Duration:** 2 Years  
**Date of Initiation:** 2.5.1975  
**Main Objectives:** To undertake research in the field of infra-red spectroscopy and to train manpower for a spectroscopic laboratory proposed to be established in the Islamabad University.

Project No: P-CSIR/CHEM(49)  
Title of the Project: Production of single cell protein from industrial wastes.  
Location: PCSIR Laboratories  
Sponsoring Authority: PCSIR Laboratories, Lahore.  
Total Amount of Grant: Rs. 3,22,130/-  
Duration: 2 Years  
Date of Initiation: 2.5.1975  
Main Objectives: To investigate the production of single cell proteins on pilot plant scale by using the cultures of yeast and to study the economic feasibility of the process.

Project No: P-CISR/CHEM(51)  
Title of the Project: Use of activated clays for prevention of infestation in cereal grains.  
Location: PCSIR Laboratories  
Sponsoring Authority: PCSIR Laboratories, Lahore.  
Total Amount of Grant: Rs. 78,975/-  
Duration: 2 Years  
Date of Initiation: June, 1975  
Main Objectives: To utilise indigenous materials for the production of activated clay and devise suitable methods for their application to prevent infestation in stored food grains.

**Project No:** F-PU/EARTH(15)  
**Title of the Project:** Land forms and soil parent material of the Khattak foot hills, Peshawar Valley.  
**Location:** Geography Department  
**Sponsoring Authority:** Peshawar University  
**Total Amount of Grant:** Rs. 24,470/-  
**Duration:** 2 Years  
**Date of Initiation:** June, 1976  
**Main Objectives:** To explore the land resources and to identify soils for agriculture and forestry etc. to study genesis as well as evaluation of land forms, the shape, lithology, composition, age and distribution of major surface deposits of the Khattak Hills.

**Project No:** S-KU/PHY(5)  
**Title of the Project:** Fundamental and applied research in experimental solid state physics at and below room temperature.  
**Location:** Physics Department  
**Sponsoring Authority:** Karachi University  
**Total Amount of Grant:** Rs. 5,34,018/-  
**Duration:** 3 Years  
**Date of Initiation:** 1.7.1975  
**Main Objectives:** To measure the resistances and the mechanical and elastic properties of some solids and to prepare a comprehensive data on the elastic modules, elastic co-efficients, tensile strength, creep and fatigue properties and harness them for studying their mechanical behaviour.

**Project No:** P-PU/PHY(9)  
**Title of the Project:** To investigate the momentum distribution of nucleus inside the nuclei of light elements of emulsion using nuclear emulsion technique.  
**Location:** Physics Department  
**Sponsoring Authority:** Talimul Islam College, Rabwah.  
**Total Amount of Grant:** Rs. 1,17,272/0  
**Duration:** 2 Years  
**Date of Initiation:** 1.11.1974  
**Main Objectives:** To determine the momentum distribution of nucleus inside the nuclei of light elements of emulsion using nuclear emulsion technique.

**Project No:** P-PU/PHY(12)  
**Title of the Project:** Properties of dielectrics at microwave frequencies.  
**Location:** Lahore  
**Sponsoring Authority:** Punjab University, Lahore.  
**Total Amount of Grant:** Rs. 1,75,760/-  
**Duration:** 3 Years  
**Date of Initiation:** 1.7.1974  
**Main Objectives:** To make a detailed study of the behaviour of dielectrics at different temperatures in microwave frequencies range to facilitate the choice of the right type of dielectric for a particular electronic equipment.



ii) Projects with Second Annual Progress Reports

Project No: S-KU/BIO(52)

Title of the Project: Marine Molluscs of Pakistan

Location: Zoology Department

Sponsoring Authority: Karachi University

Total Amount of Grant: Rs. 73,340/-

Duration: 3 Years

Date of Initiation: 1.5.1974

Main Objectives: Collection of molluscs from the shore and coastal waters, their identification and preservation. Studies would also be made of egg masses which would provide a clue to the breeding of various species of molluscs.

Project No: C-IU/CHEM(14)

Title of the Project: Studies in thermodynamics of interaction of solid catalysts with gases, liquids and vapours.

Location: Chemistry Department

Sponsoring Authority: Islamabad University

Total Amount of Grant: Rs. 2,75,982/-

Duration: 3 Years

Date of Initiation: 1.6.1974

Main Objectives: The study is aimed at the evolution of processes for the re-activation of catalysts being used in ghee industry, and Hydrocarbon and Petrochemical Industries.

**Project No:** S-KU/CHEM(44)  
**Title of the Project:** Chemical composition of hair root as a criterion of protein malnutrition.  
**Location:** Biochemistry Department  
**Sponsoring Authority:** Karachi University  
**Total Amount of Grant:** Rs. 2,83,450/-  
**Duration:** 3 Years  
**Date of Initiation:** 13.5.1974  
**Main Objectives:** To examine the DNA and protein of hair roots of children suffering from protein deficiency diseases such as marasmus and kwashiorkor.

**Project No:** S-KU/CHEM(46)  
**Title of the Project:** Studies on growth kinetics and macromolecules of various cells in culture.  
**Location:** Biochemistry Department  
**Sponsoring Authority:** Karachi University  
**Total Amount of Grant:** Rs. 3,53,700/-  
**Duration:** 3 Years  
**Date of Initiation:** 15.5.1975  
**Main Objectives:** To culture and study the lineage of cell types like leukemic cells, lymphocytes fibro-blasts, mammalian gametes, developing ova etc. and many differentiated and malignant cell types.

**Project No:** S-KU/OCEAN(2)  
**Title of the Project:** Studies on settlement and control of marine organisms in cooling systems of coastal installations.  
**Location:** Institute of Marine Biology  
**Sponsoring Authority:** Karachi University  
**Total Amount of Grant:** Rs. 1,76,123/-  
**Duration:** 3 Years  
**Date of Initiation:** 1.6.1974  
**Main Objectives:** To study the nature of fouling organisms, their seasonal abundance and conduct experiments to ascertain their settlement in the turbines of the cooling systems of coastal installations.

**Project No:** P-PU/PHY(11)  
**Title of the Project:** High energy phenomenology  
**Location:** Physics Department  
**Sponsoring Authority:** Punjab University, Lahore.  
**Total Amount of Grant:** Rs. 52,822/-  
**Duration:** 3 Years  
**Date of Initiation:** 1.7.1974  
**Main Objectives:** To use a modified form of the Regge theory to explain the freshly available experimental data concerning particle-particle and particle-nucleus interactions.

iii) Projects with Final Research Progress Reports

Project No: S-KU/BIO(53)  
 Title of the Project: Anatomical studies of mantis shrimps.  
 Location: Zoology Department  
 Sponsoring Authority: Karachi University  
 Total Amount of Grant: Rs. 10,626  
 Duration: 1 Year  
 Date of Initiation: 1.6.1974  
 Main Objectives: Anatomical studies of mantis shrimps which will help in facilitating export of this group of shrimps.

Project No: C-IU/ENVR(10)  
 Title of the Project: Ecological and behavioral studies on the rhesus monkey (Macaca Mulatta).  
 Location: Biology Department  
 Sponsoring Authority: Islamabad University  
 Total Amount of Grant: Rs. 38,480/-  
 Duration: 3 Years  
 Date of Initiation: January, 1976  
 Main Objectives: To study the ecology, behaviour and thermoregulatory patterns of the rhesus monkey (Macaca Mulatta) in their natural habitats.

**Project No:** B/Geo(10)

**Title of the Project:** Exploration of fluorite deposits in Kalat Division.

**Location:** Geology Department

**Sponsoring Authority:** University of Baluchistan, Quetta.

**Total Amount of Grant:** Rs. 3,00,000/-

**Duration:** 3 Years

**Date of Initiation:** March, 1974

**Main Objectives:** To investigate the prospective area and to study in detail the fluorite deposits in Kalat Division.

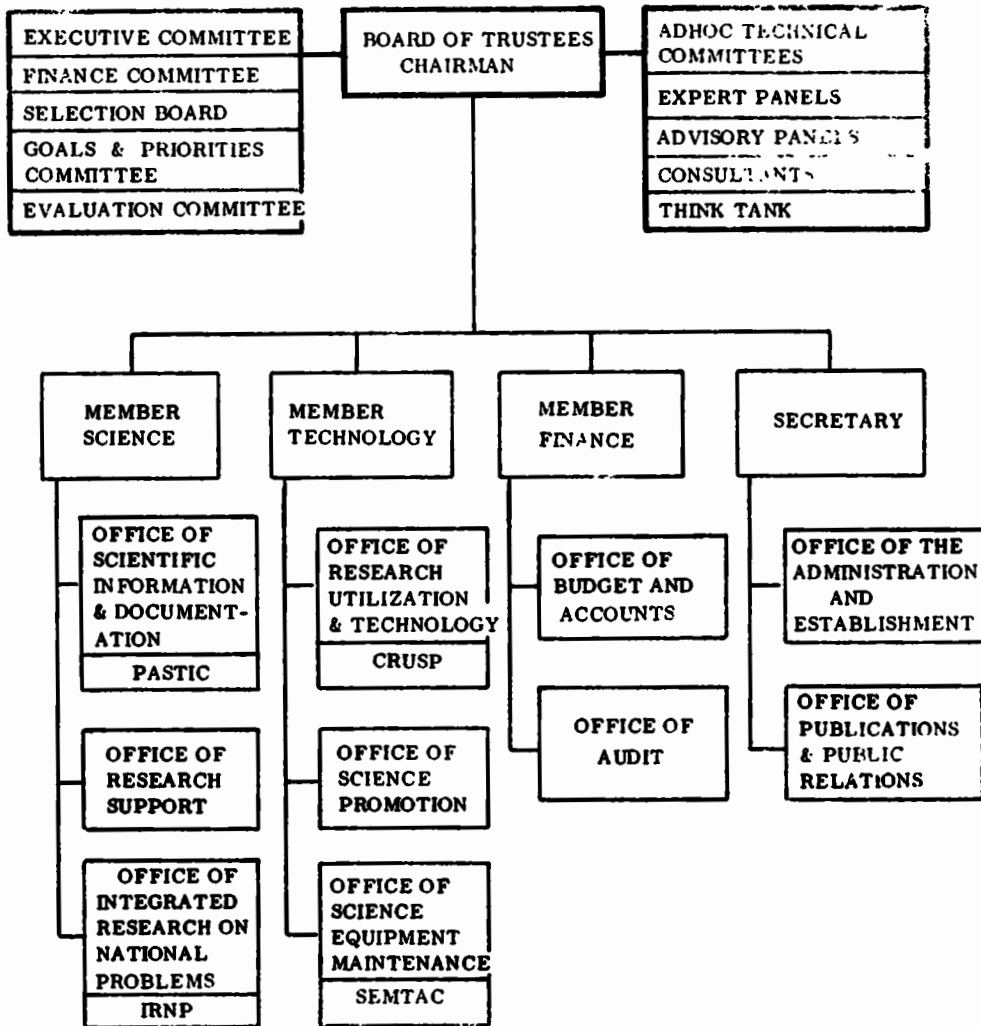
CHAPTER-3ORGANIZATION AND ADMINISTRATION

The organizational and administrative structure of the Foundation conceptualised as a result of the deliberations of the Joint Pak-American Science Review Team is given in the charts on page 70 and 71. During the year under report, however, only a small component of the proposed structure was inducted, and the staff position during the year was as follows:

S.No.	Designation	Number
1.	Chairman	1
2.	Member (Science)	1
3.	Member (Finance)	1
4.	Secretary	1
5.	Deputy Director (Finance & Accounts)	1
6.	Deputy Secretary	1
7.	Senior Scientific Officer	1
8.	Scientific Officers	3
9.	Placement Officer	1
10.	Accounts Officer	1
11.	Public Relations Officer	1
12.	Superintendent	1
13.	Supporting Clerical Staff	18

In addition to the whole-time staff members of the Foundation, there are about 284 scientists and technologists in various universities/research organizations, who are acting in an honorary capacity, as reviewers of the research proposals or serving on the technical/other committees and expert/advisory panels of the Foundation.

PROPOSED ORGANIZATION  
PAKISTAN SCIENCE FOUNDATION



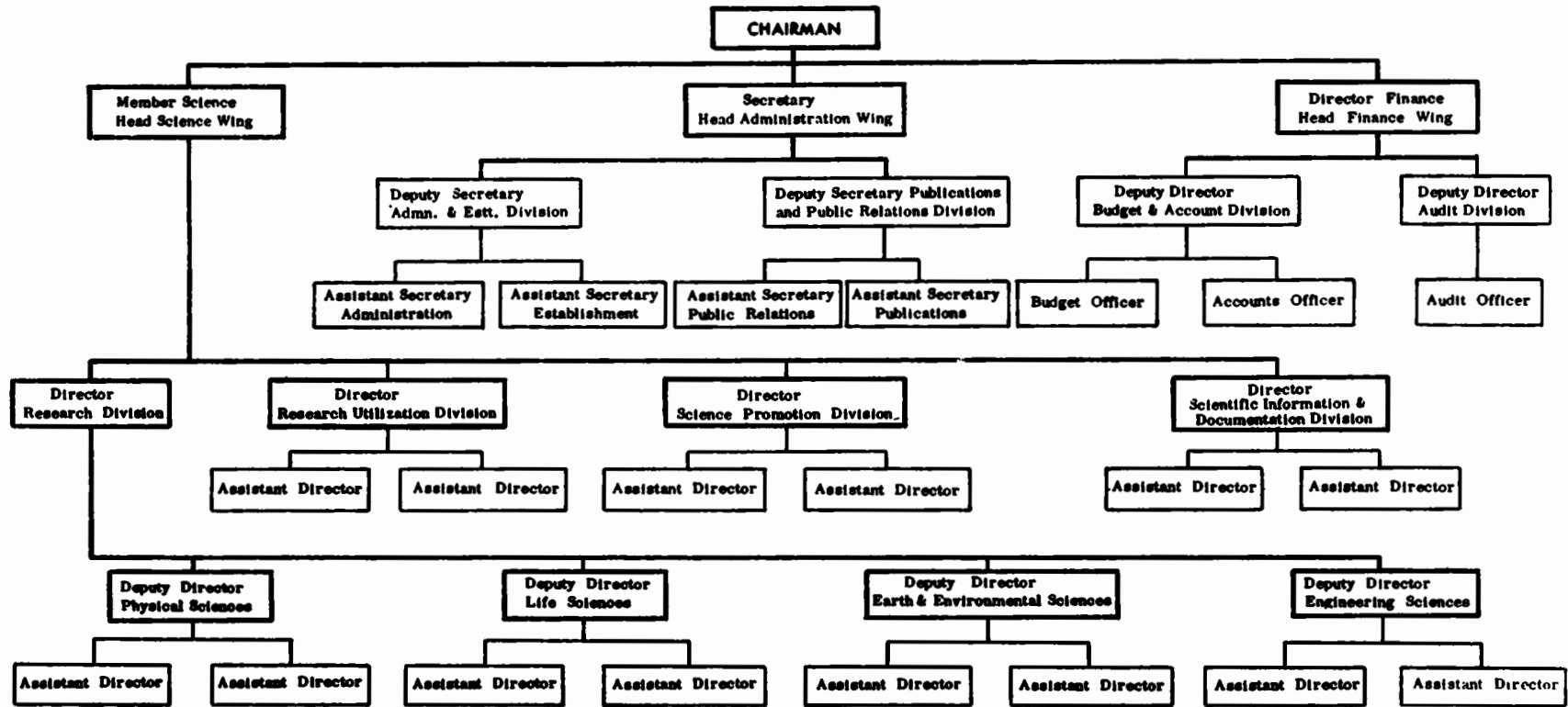
PASTIC : PAKISTAN SCIENTIFIC AND TECHNOLOGICAL INFORMATION CENTRE

CRUSP : CENTRE FOR RESEARCH UTILIZATION AND SPECIAL PROJECTS

IRNP : INTEGRATED RESEARCH ON NATIONAL PROBLEMS

SEMTAC : SCIENCE EQUIPMENT MAINTENANCE TECHNICAL ASSISTANCE CENTRE

**PAKISTAN SCIENCE FOUNDATION  
ADMINISTRATIVE STRUCTURE  
1975**





CHAPTER-4

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 on June 30, 1976 and the income and Expenditure Account for the year then ended and subject to our separate report of May 6, 1977 addressed to the Board of Trustees, we report that:

- a. We have obtained all the information and explanations we required; and
- b. such balance sheet exhibits a true and correct view of the state of the Foundation's affairs, according to the best of our information and explanations given to us and as shown by the books of the Foundation.

RAWALPINDI, MAY 06, 1977.

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

PAKISTAN SCIENCE FOUNDATION, ISLAMABAD  
BALANCE SHEET AS AT JUNE 30, 1975-76:

FUNDS AND LIABILITIES	NOTE	1976 Rs.	1975 Rs.	PROPERTY AND ASSETS	NOTE	1976 Rs.	1975 Rs.
GENERAL FUNDS	2	39,01,684	53,41,893	FIXED ASSETS (As per schedule annexed)		30,04,289	31,59,512
MUSEUM FUNDS	3	1,87,000	-	RESEARCH PROJECTS IN PROGRESS	7	94,12,729	51,39,496
RESEARCH SUPPORT GRANTS	4	94,12,729	51,39,496				
<b>CURRENT LIABILITIES</b>				<b>CURRENT ASSETS</b>			
For expenses	5	51,269	88,637	Accounts receivable	8	70,772	25,715
For other finance	6	20,92,632	11,65,066	Advances deposits and prepayments	9	3,43,736	90,843
		21,43,901	12,53,703	Cash and bank balances	10	28,13,788	33,19,526
						32,28,296	34,36,084
		<u>1,56,45,314</u>	<u>1,17,35,092</u>			<u>1,56,45,314</u>	<u>1,17,35,092</u>

AUDITORS' REPORT  
(See annexed report of date)

(RIAZ AHMAD & CO.)  
CHARTERED ACCOUNTANTS

RAWALPINDI                      MAY 06, 1977

The above balance sheet should be read in conjunction with the  
annexed notes on accounts set out from pages      to

**PAKISTAN SCIENCE FOUNDATION**  
**SCHEDULE OF FIXED ASSETS AS AT JUNE 30, 1976**

PARTICULARS	C O S T				D E P R E C I A T I O N			WRITTEN DOWN VALUE	RATE %
	As at July 1, 1975	Additions during the year	Adjustments during the year	As at June 30, 1976	As at July 1, 1975	Provided during the year,	As at June 30, 1976		
	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	
Lease hold land	28,33,333	-	(1,50,000)	26,83,333	-	-	-	26,83,333	-
Furniture and fixture	1,31,583	22,327	-	1,53,910	13,872	8,402	22,274	1,31,636	6
Office equipment	1,00,352	14,518	-	1,14,870	23,038	13,778	36,816	78,054	15
Air conditioners	74,764	-	-	74,764	20,746	6,103	26,849	47,915	15
Vehicles	1,07,167	-	-	1,07,167	38,505	13,732	52,237	54,930	20
Cycle	359	-	-	359	129	46	175	184	20
Library books	8,764	427	-	9,191	520	434	954	8,237	5
	32,56,322	37,272	(1,50,000)	31,43,594	96,810	42,495	1,39,305	30,04,289	
1975	3,52,154	29,04,168	-	32,56,322	48,464	48,346	96,810	31,59,512	

Depreciation on the fixed assets has been charged on reducing balance method

PAKISTAN SCIENCE FOUNDATION  
INCOME AND EXPENDITURE ACCOUNT FOR THE YEAR ENDED JUNE 30, 1976

EXPENDITURE	Note	1976 Rs.	1975 Rs.
Grants	11	52,36,075	45,43,632
Administrative and others	12	10,44,355	9,30,812
Travel grants for Scientific Surveys, Science Conferences and Seminars	13	1,19,392	2,82,976
Scientists Pool	14	43,064	1,25,371
		<u>64,42,886</u>	<u>58,82,791</u>
INCOME			
Interest received		-	1,000
NET EXPENDITURE FOR THE YEAR		<u>64,42,886</u>	<u>58,81,791</u>
LESS: Adjustments in respect of previous years	15	<u>29,695</u>	<u>3,883</u>
EXPENDITURE CARRIED FORWARD		<u>64,13,191</u> =====	<u>58,77,908</u> =====

AUDITORS' REPORT

(See annexed report of date)

RAWALPINDI           MAY 06, 1977          

(RIAZ AHMAD & CO.)  
 CHARTERED ACCOUNTANTS

The above income and expenditure account should  
 be read in conjunction with the annexed notes on  
 accounts set out from pages 76 to

PAKISTAN SCIENCE FOUNDATION  
NOTES ON ACCOUNTS - JUNE 30, 1976

ACCOUNTING POLICIES

1. The principal accounting policies which have been adopted in the preparation of the Foundation's accounts are as follows:

GRANTS RECEIVED

1.1 Grants from the Government of Pakistan have been accounted for on receipt basis, which is consistent with the previous years' practice.

RESEARCH SUPPORT GRANTS

1.2 Research support grants have been accounted for on payment basis. This is in conformity with the previous years' practice.

FIXED ASSETS

1.3 Fixed assets have been valued at cost less accumulated depreciation except lease hold land, which is valued at cost. This is in conformity with the previous years' practice.

GENERAL FUNDS

	1976 Rs.	1975 Rs.
2. These are made up of:		
Balance as at July 1, 1975	53,41,893	62,19,801
Add: Grants sanctioned and received during the year	49,72,982	50,00,000
	<u>1,03,14,875</u>	<u>1,12,19,801</u>
Less: Expenditure during the year	64,13,191	58,77,908
Balance as at June 30, 1976	<u>39,01,684</u> =====	<u>53,41,893</u> =====

## MUSEUM FUNDS

3. This represents the grant received from the Government of Pakistan for Museum being established by the Foundation.

## RESEARCH SUPPORT GRANTS

4. In accordance with the principles outlined in the charter grants totalling Rs. 42,73,233 have been paid by the Foundation during the year for the conduct of various approved scientific research projects. This position is summarised below:

Balance as at July 1, 1975	Rs. 51,39,496
Add: Grants paid during the year for finalized agree- ments	Rs. 42,73,233
Balance as at June 30, 1976	Rs. 94,12,729 =====

The grantees have undertaken to incur the grants as per the provisions of the agreement and for the performance and execution of the research project for which the grant has been paid. 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 there of is rendered to the Foundation on the conclusion of the projects.

## CREDITORS FOR EXPENSES

	1976	1975
	Rs.	Rs.
5. These are made up of:		
House rent	1,250	6,600
Salaries	6,958	27,465
Repairs and maintenance	-	139
Stationery and printing	1,749	20,429
Medical	2,838	6,817
Entertainment	487	-
Vehicle running	1,525	2,952
Travelling	102	1,013
Advances	-	1,505
Grants for Research Support	-	1,243

Audit fee	4,250	3,500
Furniture and fixture	-	3,320
Newspapers and periodicals	346	220
Leave salary and pension contribution	4,981	1,362
Water, electricity and Gas	980	1,036
Postage, telephone and telegrams	21,224	11,036
Advertisement	126	-
C.P. Fund	4,169	-
Benevolent fund	284	-
	<u>51,269</u>	<u>88,637</u>
	=====	=====

## CREDITORS FOR OTHER FINANCE

	1976 Rs.	1975 Rs.
6. These comprise of:		
Pakistan Scientific and Technological Information Centre (PASTIC) (Note-6.1)	20,71,717	11,61,843
Man and Biosphere funds	17,300	-
Others	3,615	3,223
	<u>20,92,632</u>	<u>11,65,066</u>
	=====	=====

6.1. The movement in this account during the year has been as follows:

	Rs.
Balance as at July 1, 1975	<u>11,61,843</u>
Add:	
i) Grants received from the Government of Pakistan	<u>11,20,697</u>
ii) Development grants received from the Government of Pakistan	<u>17,50,000</u>
	<u>28,70,697</u>
	<u>40,32,540</u>
Less:	
i) Expenses and advances paid	<u>19,10,757</u>
ii) UNESCO coupons	<u>50,066</u>
	<u>19,60,823</u>
Balance as at June 30, 1976	<u>20,71,717</u>
	=====

## RESEARCH PROJECTS IN PROGRESS

7. This represents the expenditure incurred on the various research projects which are still in progress (Refer Note-4).

## ACCOUNTS RECEIVABLE

8.	These consist of:	Rs.	Rs.
	Punjab Barani Commission	3,204	22,224
	Provident Fund	3,491	3,491
	Others	64,077	-
		<u>70,772</u>	<u>25,715</u>
		=====	=====

## ADVANCE DEPOSITS AND PREPAYMENTS

9.	These are made up of:	1976 Rs.	1975 Rs.
	Advances		
	Staff	<u>31,987</u>	<u>29,155</u>
	Others	<u>-</u>	<u>12,024</u>
		<u>31,987</u>	<u>41,179</u>
	Deposits		
	Telephones	<u>2,700</u>	<u>2,250</u>
	Sui Gas	<u>1,000</u>	<u>1,000</u>
		3,700	3,250
	Prepayments	<u>3,08,049</u>	<u>46,414</u>
		<u>3,43,736</u>	<u>90,843</u>
		=====	=====

## CASH AND BANK BALANCE

10.	In hand	2,587	6,167
	With Bank	3,82,476	11,13,116
	With Government treasury	<u>24,28,725</u>	<u>22,00,243</u>
		<u>28,13,788</u>	<u>33,19,526</u>
		=====	=====



GRANTS		1976	1975
		Rs.	Rs.
11.	Research support	42,73,233	39,01,486
	Scientific Societies and Professional bodies	5,02,200	2,88,579
	Utilization	1,35,014	-
	Others (Note - 11,1)	43,598	74,567
	Science Conferences and Seminars	2,82,030	2,79,000
		<u>52,36,075</u>	<u>45,43,632</u>
		=====	=====

#### 11.1 Others

Man and Biosphere project	6,241
Science Centres and Herbaria	20,000
Information and documentation	15,000
Awards and prizes	2,357
	<u>43,598</u>
	=====

#### ADMINISTRATIVE AND OTHERS

		1976	1975
		Rs.	Rs.
12.	These comprise of:		
	Salaries - Officers	2,93,651	2,17,263
	Salaries - Staff	1,79,267	1,97,817
	Honorarium	2,881	925
	Overtime	3,392	-
	Provident Fund, G.P.Fund etc.	23,563	-
	Leave salary and pension contribution	28,715	24,337
	Medical	73,663	43,529
	Rest & recreation allowance	5,557	-
	Travelling	11,733	41,961
	Rent - Office	36,500	55,600
	Water, electricity and gas	5,710	6,242
	Rent - Residential	1,23,267	90,802
	Postage, telephone and telegrams	1,13,257	78,148

	1976 Rs.	1975 Rs.
Stationery and printing	25,499	52,764
Vehicle running and maintenance	33,236	39,848
Newspapers and periodicals	4,573	2,553
Liveries and uniforms	2,347	5,568
Entertainment	7,316	6,762
Subscriptions	269	-
Insurance	5,484	788
Conveyance	2,515	506
Repair - Office equipment	3,159	2,192
Repair - buildings	4,642	504
Contingencies	5,008	4,121
Depreciation	42,495	48,346
Others	2,666	-
	<u>10,40,365</u>	<u>9,20,576</u>
<b>Other expenditure</b>		
Audit fee	2,250	2,250
Advertisement	1,493	7,666
Bank charges	247	320
	<u>3,990</u>	<u>10,236</u>
	10,44,355	9,30,812
	=====	=====

**TRAVEL GRANTS FOR SCIENTIFIC SURVEYS,  
SCIENCE CONFERENCES AND SEMINARS**

13.	Local	11,686	1,18,019
	Foreign	1,07,706	1,64,957
		<u>1,19,392</u>	<u>2,82,976</u>
		=====	=====

SCIENTISTS' POOL		1976	1975
		Rs.	Rs.
14.	Salaries	39,614	1,23,365
	Travelling	3,450	2,006
		<u>43,064</u>	<u>1,25,371</u>

#### PRIOR YEARS' ADJUSTMENTS

15. These represent the payments made during the year 1974-75 for Research Support Grants, of which the cheques have been received back.

#### FIGURES

16. ... of the previous year have been re-arranged where ever necessary for the purpose of comparison.
- ... have been rounded off to the nearest rupee.

Annexure IPAKISTAN 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 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 - (1) 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 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.

(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 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.

(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 IIBUDGETARY ALLOCATION FOR VARIOUS PROGRAMMES  
1975-76

	<u>Rs.</u>
1. Grants for Research Support	39,50,000
2. Information and Documentation	20,000
3. Utilization of Results of Research and transfer of Technology	4,00,000
4. Science Centres, Herbaria, Science Clubs and Museums.	1,30,000
5. Science Conferences including meetings of boards/committees	2,62,702
6. Exchange of visits of Scientists and Technologists	1,00,000
7. Awards, prizes and fellowships	40,500
8. Scientific Surveys and Collection of Statistics.	1,47,320
9. Experts and Consultants	50,000
10. Scientists' Pool	2,00,000
11. Learned bodies/Scientific Societies	1,50,000

Annexure IIILIST OF SANCTIONED RESEARCH GRANTS 1975-76

S.No.	List of scheme	Amount sanctioned	Name of Principal Investigator and organization supported.
		Rs.	
1.	<u>Agricultural Sciences:</u>		
	i) Survey identification and control of plant virus diseases in Sind. S-AC/AGR(21)	1,29,580.00	Dr. Ghulam Rasool Solangi, Department of Pathology, Sind Agriculture College, Tandojam.
	ii) Studies on rinderpest-like as well as other diseases prevalent in livestock at Landhi cattle colony, Karachi. S-AH/AGR(28)	49,300.00	Mr. K.M. Mangi, Director, Animal Husbandry Directorate, Hyderabad, Sind.
	iii) Biological and integrated control of shisham-bark borer. F-FI/AGR(30)	60,620.00	Mr. M. Ismail Chaudhri, Pakistan Forest Institute, Peshawar.
	iv) Cytogenetic studies of branched ear derivatives in wheat. P-IU/AGR(31)	76,940.00	Dr. Mohammad Aslam, University of Agriculture, Lyallpur.
	v) Conservation of superior specimen of buffalo and propagation of superior germ plasms to improve level of performance of Ravi/Nili buffalo at L.E.S. Qadirabad. P-DLF/AGR(32).	1,20,000.00	Mr. S.M. Naqi Haider, Director, Directorate of Livestock Farms Punjab, Lahore.
	vi) Investigation on nematode disease in Sind Region. S-AC/AGR(36)	1,23,752.00	Dr. Ghulam Rasool Solangi, Department of Plant Pathology, Sind Agriculture College, Tandojam.
	vii) Investigation on ecology and biology of cutworm in Hyderabad Region. S-AC/AGR(38)	1,31,580.00	Mr. Shaukat Hussain Baloch, Department of Entomology, Sind Agriculture College, Tandojam.

- viii) Scheme for the surveillance and monitoring of diseases naturally transmitted between vertebrate animals and related health hazards. P-AU/AGR(42). 4,72,194.00 University of Agriculture, Lyallpur.
2. Biological Sciences:
- i) Bibliography of Marine 20,933.00 Dr. M. Rahimullah Qureshi, 209/210-A. S.M.C.H.S, Karachi.
- ii) Production of amylolytic enzymes for industrial use. P-CSIR/BIO(69). 53,440.00 Dr. M. Abdul Qadeer, Senior Research Officer, P.C.S.I.R. Laboratories, Lahore-16.
3. Chemical Sciences:
- i) Chemistry of Nucleosides. S-KU/CHEM(5) 72,550.00 Dr. G.R. Niaz, Department of Chemistry, University of Karachi.
- ii) Chemical and pharmacological investigation of seeds of abrus precatrius (Linn). S-KU/CHEM(17) 35,000.00 Dr. M.E. Hamderd, Department of Chemistry, University of Karachi, Karachi.
- iii) Characterization and production of enzymes of commercial importance from indigenous animals and plant sources and by micro-organism . P-PU/CHEM(27) 1,43,541.00 Dr. M.I.D. Chughtai, Institute of Chemistry, University of Punjab, Lahore.
- iv) Investigation of alkaloids present in plants. F-FU/CHEM(53) 3,37,532.00 Dr. G.A. Miana, Department of Chemistry, Gomal University, D.I. Khan.
- v) Preparation of new medicinal compounds by structure modification and metal chelation of certain existing medicinal compounds and their study. C-IU/CHEM(54) 1,70,712.70 Dr. Christy Munir, Department of Chemistry, Islamabad University, Islamabad.

- |       |  |             |  |
|-------|--|-------------|--|
| vi)   | Molecular weight and size measurements of colloidal polymers & macromolecular materials by light scattering techniques.<br>F-PU/CHEM(60) | 1,08,162.00 | Dr. Noor Ahmad,<br>Department of Chemistry,<br>University of Peshawar,<br>Peshawar.      |
| vii)  | Reactions of thionyle chloride with sucrose, trehalose, methyle-B-maltoside and methyle B-lactoside.<br>S-SU/CHEM(65)                    | 1,26,560.00 | Dr. M. Yousuf Khan,<br>Institute of Chemistry,<br>Sind University,<br>Jamshoro.          |
| viii) | A study of factors influencing the stability of five-membered lactone rings.<br>C-IU/CHEM(70)  | 41,840.00   | Dr. Noor Ahmad,<br>Department of Chemistry,<br>University of Peshawar,<br>Peshawar.      |
| 4.    | <u>Earth Sciences:</u>   |             |  |
| i)    | Geological Investigation of chromite ore deposits of the Malakand Agency.<br>P-PU/EARTH(17)  | 10,300.00   | Dr. Zulfiqar Ahmed,<br>Department of Geology,<br>University of Punjab,<br>Lahore.        |
| ii)   | Effect of metropolitan expansion on the rural urban fringe - a case study from Peshawar.<br>F-PU/EARTH(19)                               | 31,735      | Dr. M. Aslam Khan,<br>Department of Geography,<br>University of Peshawar,<br>Peshawar.   |
| iii)  | Socio-demographic survey of Daudzai integrated development area.<br>F-PU/EARTH(20)   | 36,810.00   | Dr. Israr-ud-Din,<br>Department of Geography,<br>University of Peshawar,<br>Peshawar.    |
| 5.    | <u>Engineering Sciences:</u>   |             |  |
| i)    | Studies of Atmospheric and underground corrosion as control and prevention.<br>P-PU/ENG(3)   | 30,000.00   | Dr. I.H. Khan,<br>Institute of Chemical Engineering,<br>University of Punjab,<br>Lahore. |

6. Environmental Sciences:

- |   |             |   |
|---|-------------|---|
| i) Problems of Eutrofication and control of aquatic weeds in fresh water lakes of Sind.<br>S-KU/ENVR(4) | 1,60,726.00 | Dr. I.U. Baqai,<br>Department of Zoology,<br>University of Karachi,<br>Karachi.                       |
| ii) Biological control of termites with pheromones and pathogenic fungi.<br>C-IU/ENVR(5)                | 1,80,000.00 | Dr. Qazi Javed Iqbal,<br>Department of Biological<br>Sciences,<br>Islamabad University,<br>Islamabad. |
| iii) Behavioural and ecological studies on Rhesus monkeys.<br>C-IU/ENVR(10)                             | 38,480.00   | Dr. Qazi Javed Iqbal,<br>Department of Biological<br>Sciences,<br>Islamabad University,<br>Islamabad. |

7. Mathematics & Computing Activities:

- |   |           |   |
|---|-----------|---|
| i) Inclusive Reactions.<br>P-PU/MATH(8) | 44,835.00 | Dr. M. Rafique,<br>Department of Mathematics,<br>University of Punjab,<br>Lahore. |
|---|-----------|---|

8. Medical Sciences:

- |   |             |  |
|---|-------------|--|
| i) Nutritional disorders in an urban community.<br>S-JPMC/MED(20)   | 2,27,968.00 | Dr. Razia J. Rahmatoola,<br>Department of Paediatrics,<br>J.P.M.C., Karachi.               |
| ii) Studies on the nutritional problems of pregnant and nursing women among the families of the armed forces of Pakistan.<br>C-AFMC/MED(31) | 43,000.00   | Col: Ashfaq Ahmed,<br>Director, D.E.R.,<br>Armed Forces Medical<br>College,<br>Rawalpindi. |

9. Oceanography:

- |   |           |   |
|---|-----------|---|
| i) Shore erosion studies of Pakistan coast in the vicinity of Karachi.<br>S-KU/OCEAN(4) | 53,940.00 | Dr. S.M.A. Tirmizi,<br>Department of Physics,<br>University of Karachi,<br>Karachi. |
|---|-----------|---|

Annexure IV

PSF GRANTS GIVEN TO THE SCIENTIFIC SOCIETIES  
AND LEARNED BODIES FOR THE ACHIEVEMENT OF  
THEIR OBJECTIVES:

Year 1975-76

<u>S.No.</u>	<u>Name of Society</u>	<u>Grant in Rupees</u>
A.	<u>All Pakistan Scientific Societies/ Learned Bodies:</u>	
1.	Pakistan Academy of Sciences.	1,00,000
2.	Pakistan Association of Scientists and Scientific Professions.	40,000
3.	Scientific Society of Pakistan.	40,000
4.	Pakistan Association for the Advancement of Science.	40,000
5.	The Institute of Engineers, Pakistan	15,000
6.	Pakistan Association for the Promotion of Science and Appropriate Technolo- gies (PAPSAT).	50,000
	Total:	<u>2,85,000</u>
B.	<u>Discipline Societies</u>	
1.	Pakistan Medical Association, Karachi.	30,000
2.	Zoological Society of Pakistan.	15,000
3.	Pakistan Botanical Society.	15,000
4.	Pakistan Society of Leather Technology.	15,000
5.	Society for the Advancement of Agricultural Sciences.	15,000
6.	Pakistan Society of Public Health Engineers.	15,000
7.	Pakistan Institute of Chemical Engineers.	15,000
8.	Society for the Advancement of Animal Sciences.	10,000
9.	Biological Society of Pakistan.	10,000
10.	Pakistan Statistical Association.	10,000
	Total:	<u>1,50,000</u>

C. Provincial Society

1. Sind Science Society 25,000

Annexure VPSF GRANTS GIVEN TO VARIOUS AGENCIES FOR  
THEIR PUBLICATION PROGRAMMES:Year 1975-76

<u>S.No.</u>	<u>Agency</u>	<u>Publication</u>	<u>Grant in Rupees</u>
1.	Scientific Society of Pakistan	Science Bachon-ke- Liye	16,000
2.	Biological Society of Pakistan.	Biologia	6,200
3.	Man and the Biosphere Committee	Journal of Man and the Biosphere	5,000
4.	Gordon College, Rawalpindi	Hydrobiological Research Bulletin	3,000
		Total:	<u>30,000</u>



Annexure VIGRANTS GIVEN TO VARIOUS AGENCIES FOR  
HOLDING SYMPOSIA/SEMINARS/WORKSHOPS:Year 1975-76

<u>S.No.</u>	<u>Agency</u>	<u>Symposium/Seminar/Workshop</u>	<u>Grant in Rupees.</u>
1.	National Health Laboratories, Islamabad.	3rd Annual Health Symposium.	3,000
2.	Pakistan Institute of Chemical Engineers, Lahore.	The Role of Science and Technology in Industrial Development.	5,000
3.	University of Peshawar, Peshawar.	International Seminar on 'Solar Energy'.	20,000
4.	Pakistan Atomic Energy Commission, Islamabad.	Summer College on Physics and Contemporary Needs.	10,000
5.	PASTIC National Centre, Islamabad.	Seminar on "Scientific and Technical Information" at Lahore.	5,000
6.	University of Peshawar.	Seminar on "Human Environment" on Human Environment Day.	3,000
Total:			46,000

GRANTS GIVEN TO VARIOUS AGENCIES FOR  
HOLDING ALL PAKISTAN SCIENCE CONFERENCESYear 1975-76

<u>S.No.</u>	<u>Agency</u>	<u>Grant in Rupees</u>
1.	University of Karachi, as host institution for holding the 26th All Pakistan Science Conference sponsored by Pakistan Association for the Advancement of Science.	30,000
2.	University of Peshawar, as host institution for holding the 16th All Pakistan Urdu Science Conference sponsored by Scientific Society of Pakistan.	50,000
Total:		80,000

Annexure VII

## TRAVEL GRANTS

<u>S.No.</u>	<u>Name</u>	<u>Conference/Seminar</u>	<u>Amount Sanctioned</u> Rs.
1.	Dr. Altaf A. Qureshi, Electrical Engineering Department, U.E.T., Lahore.	World Telecommunication Forum, Geneva.	4,257
2.	Dr. Irshad A. Moriani, Liaquat Medical College, Jamshoro.	2nd Asian Conference on Liver, Singapore.	7,637
3.	Mr. Ghulam Murtaza Shah, Joint Secretary to the Government of Pakistan, S & T R Division, Islamabad.	Visit to BOSTID and NTIS, U.S.A.	5,569
4.	Dr. M.A.S. Malik, Director, Solar Energy, PCSIR Laboratories, Karachi.	Meeting of the Solar Scientists at Sheraz, (Not availed). Iran.	3,500
5.	Dr. M. Afzal, Department of Chemistry, Islamabad University, Islamabad.	Visit to Chemical Abstracts, Service Information System, Columbus, Ohio.	4,752
6.	Mr. Saifur Rehman, PCSIR Laboratories, Lahore.	International Solar Energy Society meeting, (Not availed) Los Angeles.	21,349
7.	Dr. S.M.A. Tirmizi, Physics Department, University of Karachi, Karachi.	14th International Conference on low temperature Physics, and to visit Caryogenic Laboratories at Helsinki.	14,923
Total:			61,987

Annexure VIIIGUIDELINE FOR REVIEW OF THE PROJECT PROPOSALS

1. The competence of the scientific personnel proposed under the project, particularly the Principal Investigator.
2. Whether review of literature is adequate and upto-date? If not, indicate important references which should be consulted.
3. Whether the project involves any wasteful duplication or unnecessary over-lapping? If so, indicate as to how it can be avoided?
4. Whether plan of work is technically sound and is likely to produce meaningful results? If not, kindly suggest as to how it can be improved.
5. Whether the research institution is adequately equipped and staffed to implement the project efficiently?
6. Whether the staff provided is essential and compatible with the tasks involved?
7. Whether equipment asked for is essential and cost involved reasonable? If not, to what extent it can be modified?
8. Whether the project is likely to be completed within the stipulated time: If not, indicate probable time justified.
9. Whether the project covers high priority area of research?
10. Whether the project would increase the institutional/national science capability?
11. Significance of the proposed project. Its socio-economic aspect towards development of the country and contribution to man's knowledge. (Kindly give brief narrative).
12. Assessment of the project as a whole.

GUIDE-LINES FOR EVALUATION OF ANNUAL REPORTS OF P.S.F.  
SUPPORTED PROJECTS

I. Particulars:

1. Project No. \_\_\_\_\_
2. Title: \_\_\_\_\_  
\_\_\_\_\_
3. Sponsoring Organisation: \_\_\_\_\_
4. Duration: \_\_\_\_\_
5. Date of:
  - i) Sanction: \_\_\_\_\_
  - ii) Commencement: \_\_\_\_\_
  - iii) Termination: \_\_\_\_\_
6. Expenditure:
  - i) Recurring: \_\_\_\_\_
  - ii) Non-recurring: \_\_\_\_\_
  - iii) Total: \_\_\_\_\_
7. Main objectives: \_\_\_\_\_
8. Proposed plan of work: \_\_\_\_\_  
\_\_\_\_\_

II. Evaluation:

1. Work accomplished.
2. Critical Evaluation of Work done - both qualitative and quantitative, deficiencies if any, with particular reference to:
  - i) Approach.
  - ii) Methodology.
  - iii) Reliability of data collected.
  - iv) Statistical analysis of data.
  - v) Interpretation of results and conclusions.
3. Outstanding findings and scope for their practical application.
4. Remarks on the publications issued during report period.
5. Overall evaluation.
6. General remarks and recommendations whether:
  - i) Progress satisfactory and project may continue;
  - ii) Progress partially satisfactory and work needs to be vigorously pursued;
  - iii) Progress unsatisfactory and project to be terminated.